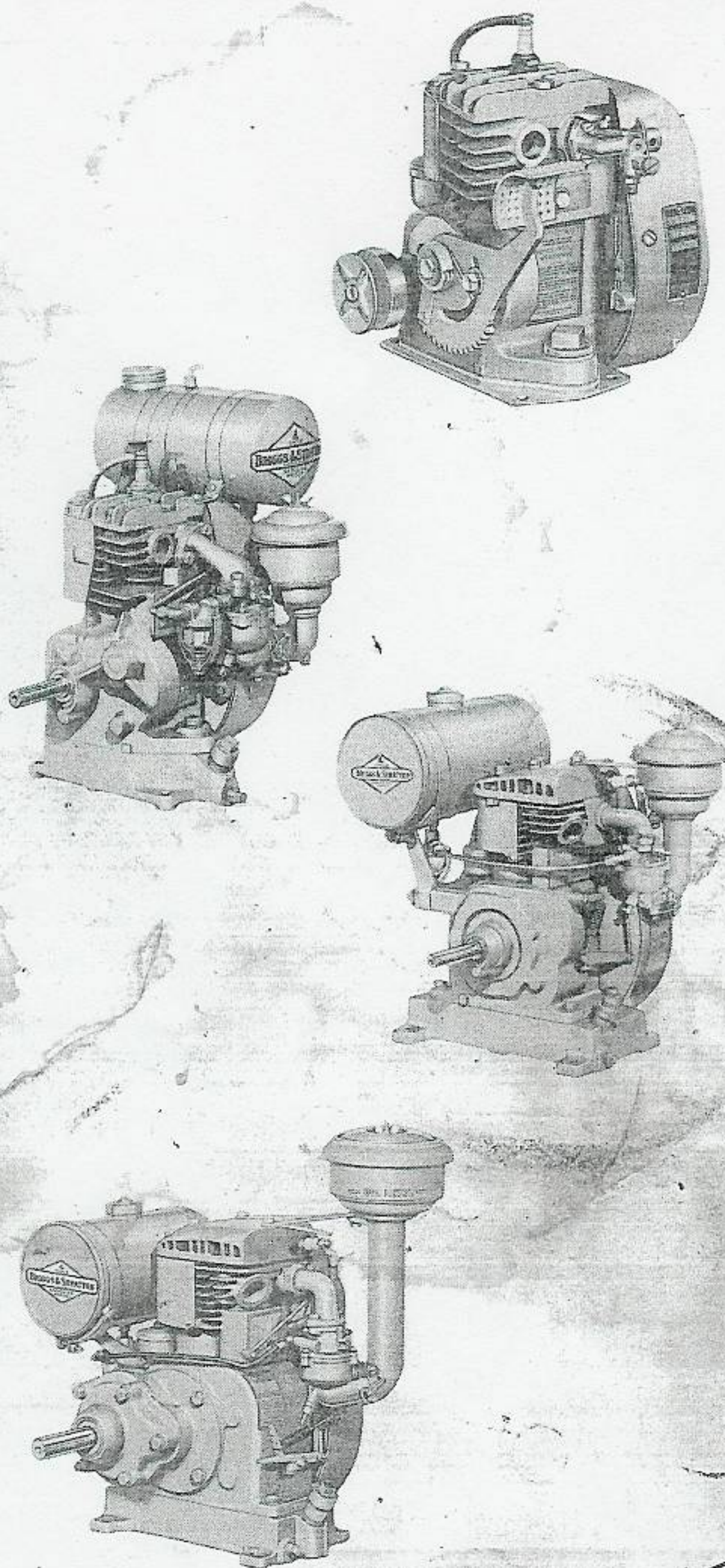


BRIGGS & STRATTON

4-Cycle Gasoline Motor

TUNE-UP INSTRUCTIONS



This book is not intended as a complete repair manual for Briggs & Stratton motors, but it does contain helpful data and instructions that will enable you to make proper adjustments, tune-ups and minor repairs on all models — a service you can render to owners insuring maximum efficiency and continuous performance from their motors.

You will find a handy index on page 1 and by following the simple instructions, your results will be highly satisfactory.

If a motor needs more than an ordinary tune-up, we advise you to consult an Authorized Briggs & Stratton Service Station who will be glad to assist you. Listed below is the station nearest you. They are a part of our Nation-Wide Service Organization, carry original Briggs & Stratton motor parts and sell at published factory prices. All Authorized Service Organizations are equipped with factory tools and manned by factory-trained mechanics — ready to take care of any emergency.

A complete directory of our Authorized Service Organization is available upon request.



NATION-WIDE SERVICE ORGANIZATION

FACILITIES

To provide prompt and efficient service on Briggs & Stratton Gasoline Motors we have established Authorized Central Service Distributors and Motor Service Stations in principal cities of the United States and Canada. The station nearest to you is listed on the cover of this book.

These organizations carry a complete stock of Briggs & Stratton Motor Parts and sell at published factory prices. All Authorized Service organizations are equipped with special factory tools and factory-trained mechanics, assuring expert repair service on Briggs & Stratton Motors. They operate under factory policies and are authorized to provide free service and parts on defective material according to the conditions of our guarantee.

RECOMMENDATIONS

When a motor is not performing as it should, and you need outside help to correct the trouble, the unit should be turned over to our nearest Central Service Distributor or Motor Service Station. Do not wait until the original trouble causes other parts to become inoperative. Prompt attention saves costly repairs.

When sending the motor for repairs be sure to include all parts such as gas line, gas tank, etc., so that the complete unit can be checked carefully.

When ordering parts, always give model letter, serial and type numbers of motor.

Worn parts of the motor should be replaced only by Original Briggs & Stratton Parts. Our motors are precision built and the replacement parts we furnish follow the exacting specifications of original equipment. There is no economy in using cheap substitute parts which may affect the efficiency and service life of the motor. For best results insist on Original Briggs & Stratton Replacement Parts.

For service other than the motor, write to the manufacturer of the complete unit, the dealer or distributor from whom purchased.

GUARANTEE

For one year from date of purchase on motors used for washing machine application (90 days from date of purchase on motors used for all other applications) Briggs & Stratton Corp. will replace for the original purchaser, FREE OF CHARGE, any parts found upon examination at our factory at Milwaukee, Wisconsin, to be defective under normal use and service, on account of defects in material or workmanship. All transportation charges on motors or parts thereof submitted for replacement under this guarantee must be borne by the owner.

This GUARANTEE shall not be effective if the motor has been subjected to misuse, negligence, or accident, or if it has been repaired outside our factory or Authorized Service Station in any respect which, in our judgment, affects its condition or operation.

IMPORTANT

Motors cannot be considered as defective and qualified for free service if repairs or part replacements are necessary as the result of abuse, misuse, negligence, accident or normal wear, or the result of using improper fuels and lubricants, or of failure to follow operating instructions.

No credit or refund will be allowed on labor charges to replace defective parts during the guarantee period if service is performed outside our factory or Authorized Service Stations.

When a motor owner feels entitled to free service and the Authorized Service organization does not agree, all charges should be paid by the owner, and a motor Service Request Form listing all facts should be forwarded with the material in question to the factory for final decision. If our examination sustains the customer's claim, proper adjustment will cheerfully be made.

BRIGGS & STRATTON CORP.

MILWAUKEE, WIS., U. S. A.



BRIGGS & STRATTON MOTOR TUNE-UP AND PROCEDURE

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INSTRUCTIONS FOR ADJUSTMENTS AND REPAIRS

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NECESSITY OF MOTOR TUNE-UP

To operate efficiently a motor must have good carburetion, ignition and compression, and the oil and gasoline used must be fresh, clean and of the recommended grade.

A motor that is not functioning properly can, in most cases, be put back into satisfactory operating condition by a Tune-Up. An occasional Tune-Up is recommended for every motor as it improves performance and extends service life.

A Briggs & Stratton Motor Tune-Up consists of restoring all essential adjustments to factory limits. It is simple and will correct practically all the conditions which impair the efficiency of Briggs & Stratton motors.

In order to perform a correct Tune-Up you must have:

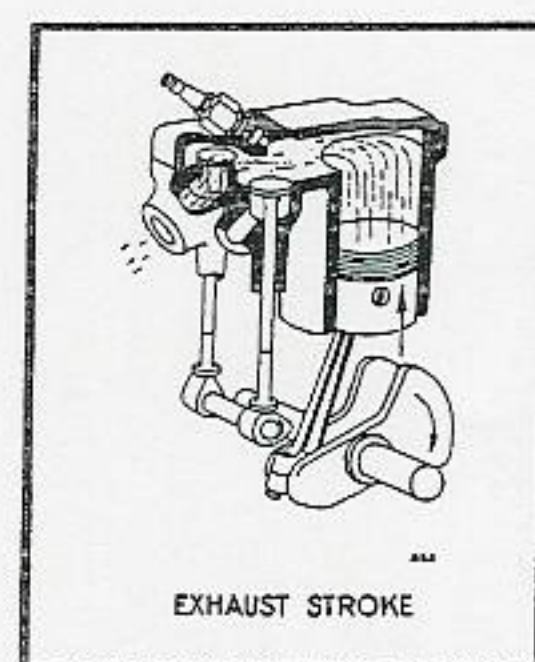
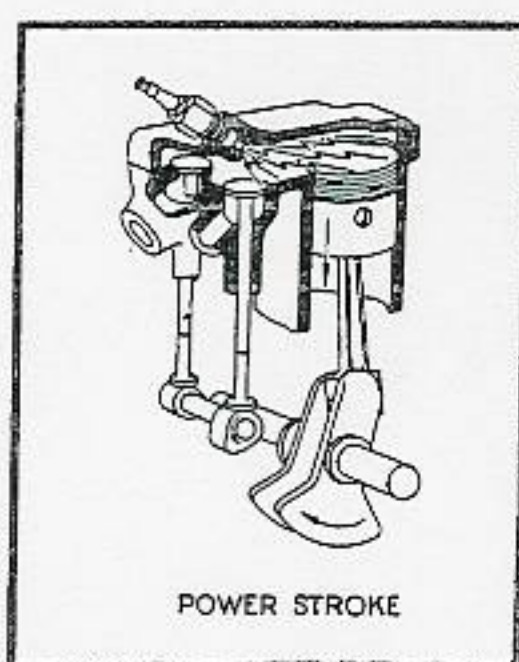
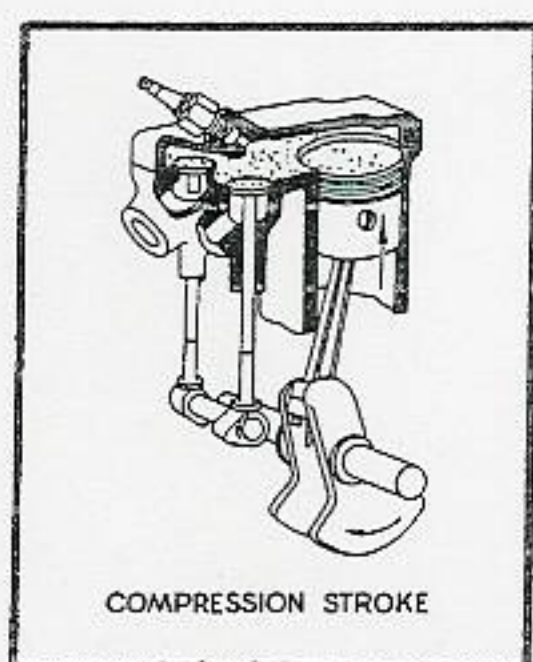
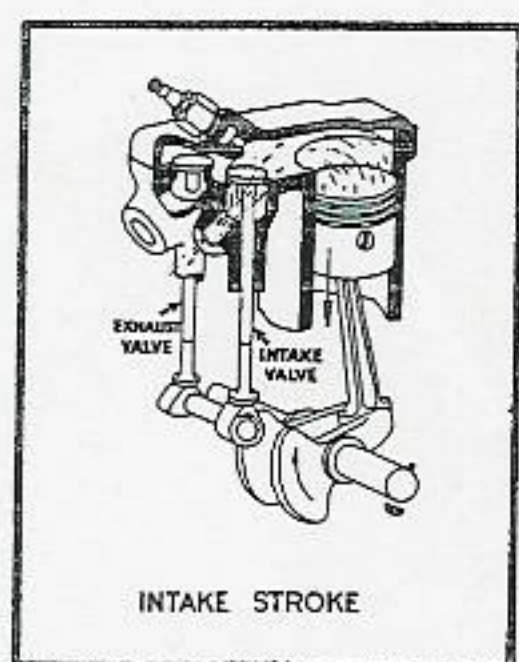
1. Knowledge of adjustments, procedures and the factory tolerances and standards.
2. Proper tools. (See Page 45.)
3. Original motor parts.



GENERAL INFORMATION AND RECOMMENDATIONS

How A 4-Cycle Motor Operates. On the intake stroke the piston goes down, producing a vacuum in the cylinder, thereby drawing fuel up through the carburetor so that the space above the piston becomes filled with combustible gas. During this stroke the intake valve is open. Next, the piston comes up on the compression stroke with both valves closed. At the top of the compression stroke a spark occurs at the spark plug, firing the highly compressed gas. This produces an explosion above the piston which forces it down on the power stroke. Both valves are closed. On the next upstroke of the piston, called the exhaust stroke, the exhaust valve is open, and the burned gasses driven out. See Plate No. 1.

Plate No. 1
The 4-Stroke Cycle



Use Clean Gasoline. A good clean, fresh, third-grade gasoline is recommended. A gasoline of too high test may form vaporlock in gas line when motor gets hot. This interrupts the flow of gasoline and causes the motor to stop.

Gummy Gasoline. If a gum deposit is found in the gas tank, carburetor or other parts of the fuel system, instruct motor owner to change to another brand of gasoline. Gum content can be determined by evaporating a half pint of gasoline in an open dish.

Correct Lubrication is Important. We recommend the use of MOBIL OIL "ARCTIC" or other high grade oil having a low carbon residue and a body not heavier than S.A.E. No. 20. Oil should be added to the top of the filler plug opening after each 5 hours of motor operation.

Oil should be changed after every 25 hours of motor operation. In the normal running of any motor, small particles of metal from the cylinder walls, pistons and bearings will gradually work into the oil. Dust particles from the air also get into the oil. Sludge, a gummy mass, forms which clogs up the oil passages. If the oil is not changed regularly, these foreign particles causes increased friction and a grinding action which shortens the life of the motor. Fresh oil also assists in cooling, for old oil gradually becomes thick and loses its cooling as well as its lubricating properties.

GENERAL MOTOR TUNE-UP PROCEDURE

The following procedure should be followed in every instance to be sure that the motor is functioning properly. The customer may report trouble that is aggravated by causes which can only be detected and remedied by a complete Tune-Up.

All the adjustments, repairs and replacements covered by the following procedure are illustrated and described in the following pages.

NOTE: All motors that have a model letter suffixed to the basic model letter such as AH - AHL - AP etc., use the same parts and method of repair as the basic model except where special instructions or parts are mentioned. See page 4 for list of basic model motors and their adaptations.

Fuel System and Carburetor

Clean the gasoline line, gas filter and petcock.
Clean the gas pipe, check valve and screen.
Clean the gasoline tank and cap.
Clean the carburetor and parts.
See that governor works freely.
Clean and check air cleaner.

Ignition System

Check spark plug: Clean points and set gap to .025".
Check cable.
Clean and adjust contact points to .020".
Check condenser connections.
Check armature connections and terminals.

Compression

Check for leaky or sticky valve.
Check and adjust valve clearances when cold. (See chart on page 5)

Starter

Check and align starter, lever, sector and gears.

Final Test

Check crankcase, drain, flush and refill with MOBIL OIL "ARTIC" or other good grade of S.A.E. 20 oil of low carbon residue.

Fill gas tank with a good, clean, fresh, third-grade gasoline

Start Motor.

Adjust carburetor so that motor runs smoothly.

Adjust governor to the correct motor speed.



MODEL DATA

Table No. 1

NOTE: Each Briggs & Stratton motor carries a basic model letter, such as A, B, I, etc. This will be found stamped on the metal nameplate. Motors having special features are identified by additional letters or numerals affixed to the basic model letter such as AP, AR-6, etc. For example: Model AR-6 motor is a Model A with a 6-to-1 gear reduction.

Use the same parts and method of repair as the basic model; except where special instructions or parts are mentioned. The following table explains the letter symbols used:

EXPLANATION OF LETTERS SUFFIXING BASIC MODEL LETTERS

DESIGNATION	EXAMPLE
G - Generator	WMG is Model WM with Generator
H - High Speed	AH is Model A with High Speed
L - Aluminum	AHL is Model A with High Speed and Aluminum parts
P - Direct Crankcase Mounting	AHLP is Model A with High Speed, Aluminum parts and Direct Mounting
R - Reduction Drive	AR is Model A with Reduction Gear
R4 - Reduction Drive (4 to 1)	AR, or AR4 is Model A with Reduction Gear(4 to 1)
R6 - Reduction Drive (6 to 1)	AR6 is Model A with Reduction Gear(6 to 1)
M - Marine Conversion	AM is Model A with Marine Conversion
T - Marine Transmission	AMT is Model A with Marine Conversion and Transmission

COMPLETE LIST OF BASIC AND SPECIAL MOTOR MODELS

BASIC MODELS	CORRESPONDING SPECIAL MODELS
A	AGR-4, AH, AHL, AHLP, AHP, AHM, AHMT, AHR-4, AHR-6, AL, ALP, ALR-4, ALR-6, AP, AM, AMT, AR-4, AR-6.
B	BH, BHL, BHLP, BHP, BHM, BHR-4, BHR-6, BHLR-4, BHLR-6; BL, BLP, BLR-4, BLR-6, BM, BMG, BP, BR-4, BR-6.
FH	FHI
FI	
FJI	FJ2
H	HM.
I	IB, IBHP, IBLP, IBP, IL, ILR-6, IMT, IP, IR-6, IS.
K	KL, KLP, KLR-4, KLR-6, KM, KP, KR-4, KR-6.
L	LA
M	MC, MB, MF, MH

BASIC MODELS	CORRESPONDING SPECIAL MODELS
N	NP, NR-2, NR-6
PB	
Q	
R	RC
S	SC
T	TA
U	UR-2, UR-6.
W	WA
WI	WIBP, WR-6.
WM	WMG
WMB	WBG
WMI	WMIP
Y	
Z	ZH, ZHL, ZHLP, ZHP, ZHLR-4, ZHLR-6, ZHM, ZHR-4, ZHR-6, ZL, ZLP, ZLR-4, ZLR-6, ZM, ZP, ZR-4, ZR-6.
ZZ	ZZL, ZZLP, ZZP, ZZR



GENERAL TUNE UP CHART

Table No 2

MODEL MOTOR	CHAMPION PLUG NO.	AUTO-LITE PLUG NO.	SPARK PLUG GAP	VALVE CLEARANCE				CARBURETOR ADJUSTMENT TURNS OPEN	
				INTAKE		EXHAUST		IDLE SCREW	NEEDLE VALVE
				MAX.	MIN.	MAX.	MIN.		
A-AGR-AH-AHL-AHLP AHP-AHR4-AHR6-AL ALP-ALR4-ALR6-AP AR4-AR6	6M		.025	.007	.005	MOTORS WITH 6 DIGIT TYPE NUMBERS OR WITH EXHAUST VALVES MARKED - sil. XCR .013 .011 MOTORS WITH 5 DIGIT TYPE NUMBERS AND WITH EXHAUST VALVES MARKED - silch.#1 .009 .007		None	1 to 1½
AHM-AHMT-AM-AMT	7		.030	.007	.005	.009	.007	None	1 to 1½
B-BH-BHL-BHLP- BHLR4-BHLR6-BHP- BHR4-BHR6-BL-BLP- BLR4-BLR6-BP-BR4- BR6	6M		.025	.007	.005	MOTORS WITH 6 DIGIT TYPE NUMBERS OR WITH EXHAUST VALVES MARKED - sil. XCR .014 .012 MOTORS WITH 5 DIGIT TYPE NUMBERS AND WITH EXHAUST VALVES MARKED - sil.-1-EX. .009 .007		½ to ¾	1 to 1½
BHM-BM-BMG	7		.030	.007	.005	.009	.007	½ to ¾	1 to 1½
FH-FHI	6M		.025	1/16	1/32	.013	.011	None	1 to 1½
FI	7		.030	.007	.005	.007	.005	None	¾ to 1
FJ1-FJ2	6M		.025	.011	.009	.021	.019	None	1 to 1½
H	6M		.025	.011	.009	.021	.019	None	1 to 1½
HM	7		.030	.011	.009	.021	.019	None	1 to 1½
I-IS	J8	AN7	.025	.007	.005	.009	.007	½ to ¾	½ to ¾
IB-IBHP-IBLP-IBP- IL-ILR6-IMT-IP- IR6	J8	AN7	.025	.007	.005	.009	.007	None	½ to ¾
K-KL-KLP-KLR4- KLR6-KP-KR4-KR6	6M		.025	.007	.005	.015	.013	½ to ¾	1 to 1½
KM	7		.030	.007	.005	.015	.013	½ to ¾	1 to 1½
L-LA	6M		.025	.011	.009	.021	.019	None	1 to 1½
M-MC-MH	6M		.025	.007	.005	.009	.007	None	1 to 1½
MB-MF	6M		.025	.007	.005	.009	.007	½ to ¾	1 to 1½
N-NP-NR2-NR6	J8	AN7	.025	.007	.005	.012	.010	½ to ¾	½ to ¾
PB	6M		.025	3/32	1/16	.021	.019	None	¾ to 1
Q	6M		.025	.007	.005	.009	.007	None	¾ to 1
R-RC	7		.030	.007	.005	.009	.007	½ to ¾	1 to 1½
S-SC	6M		.025	.007	.005	.009	.007	None	1 to 1½
T-TA	6M		.025	.007	.005	.009	.007	None	1 to 1½
U-UR2-UR6	J8	AN7	.025	.007	.005	.012	.010	None	1½ to 1¾
W-WA	6M		.025	.007	.005	.009	.007	½ to ¾	1 to 1½
WBG-WI-WIBP-WM- WMB-WMG-WMI-WMIP- WR6	J8	AN7	.025	.007	.005	.009	.007	None	1 to 1½
Y	6M		.025	.011	.009	.021	.019	None	1 to 1½
Z-ZH-ZHL-ZHLP- ZHLR4-ZHLR6-ZHP- ZHR4-ZHR6-ZL-ZLP- ZLR4-ZLR6-ZP-ZR4- ZR6	6M		.025	.007	.005	.015	.013	½ to ¾	1 to 1½
ZHM-ZM	7		.030	.007	.005	.015	.013	½ to ¾	1 to 1½
ZZ-ZZL-ZZLP-ZZP- ZZR6	6M		.025	.021	.019	.021	.019	½ to ¾	1 to 1½

CONTACT POINT GAP-ALL MODELS .020"

*SEE SPECIAL ADJUSTMENT PAGE 9



MOTOR SPEED SETTINGS FOR SPECIAL TYPE NUMBERS

Table No. 3

NOTE: To find the correct speed at which motor should be set: First, check to see if type number (stamped on nameplate) is listed in this table. The speeds of these motors are established to meet special operating requirements and differ from standard models. If the type number is not listed, refer to Table No. 4.

All speeds listed in Tables No. 3 and 4 are to be set when unit is operated under load. When speed is set without load, add 200 R.P.M. to listed speed settings.

TYPE #	RPM	TYPE #	RPM	TYPE #	RPM	TYPE #	RPM	TYPE #	RPM	TYPE #	RPM	TYPE #	RPM
20005	1850	25458	2000	95403	2025	206364	2800	300177	1800	300312	3600	304228	2200
20018	2500	25459	1800	95461	2300	206367	3300	300181	2300	300314	2200	304234	2200
20025	1750	25460	2000	95462	2300	206371	2800	300183	1725	300329	2800	304236	2600
20058	1725	25461	1800	95467	1900	206372	3400	300185	2900	302087	1950	304237	2900
20080	1800	25463	2000	95486	2025	206375	2800	300188	1800	302083	2100	304238	2400
20081	2000	25465	1800	95488	2025	206376	2700	300193	1800	302104	2440	304239	2300
20082	1800	25567	1800	95526	2400	206378	1800	300194	2400	302107	1800	304241	2500
20369	1725	25604	2000	95528	2400	206382	3500	300199	2300	302108	1800	304242	2300
20375	1750	25605	2000	95561	2400	206383	2800	300201	2300	302113	1750	304246	2300
20381	1700	25606	1650	95566	2250	206464	2300	300203	2300	302127	1800	304251	2200
20387	1800	25607	1800	95581	2025	208055	2000	300205	1800	302136	2000	304252	2000
20410	2300	25608	1800	95583	2025	208057	1800	300207	1800	302138	1800	304260	1800
20423	1725	25609	1800	95834	2300	208058	2000	300208	2300	302142	2300	304263	1800
20424	1800	25612	2100	95853	2720	208059	2000	300209	2300	304054	1800	304271	2200
20425	1800	25613	1800	95910	3100	208064	2000	300210	2300	304089	2200	304272	1800
20484	1800	25614	2000	95919	2200	208065	2000	300211	2300	304106	2500	304273	1800
20515	2400	25622	2000	95925	1400	208066	2000	300213	2000	304114	2680	304274	1800
20795	2000	25623	2000	95938	2300	208068	1900	300216	1800	304124	2000	304283	1800
20797	1800	25627	2000	95939	2100	208069	2000	300217	1800	304131	1800	304285	2400
20810	1650	25629	2000	95946	2300	208070	2000	300219	2300	304132	1800	304287	2200
20811	2100	25634	2000	95965	2500	208071	1800	300220	1800	304134	1800	304289	1800
20813	2100	25649	2200	95967	3100	208072	3800	300223	1800	304135	1800	304298	2200
20814	2100	25859	1875	95970	3100	208077	2000	300224	1700	304146	1800	304299	2200
20815	1800	60150	2000	95971	2500	208080	2000	300225	1600	304147	1800	304303	1800
20818	2000	60315	2500	95975	1200	208082	1800	300226	2300	304151	2100	304304	1800
20819	1800	60321	1800	204089	2300	208084	2000	300227	2300	304160	2100	304310	2300
20820	1750	60595	2800	205063	3600	208108	2700	300228	2300	304186	1800	304311	2300
20849	1750		to 3400	205070	3500	208114	1725	300229	1700	304192	2200	304312	2775
20860	1900	60754	1800	205085	3000	208116	1800	300239	1800	304193	2200	304566	1800
20861	1900	60656	1725	205091	3500	208117	1800	300246	2800	304194	1800	304572	2300
20868	3200	60676	1750	205099	3000	208118	2200	300248	2300	304195	2200	304576	2300
20870	4000	60711	1800	205113	2200	208129	1700	300249	2300	304196	2200	304578	1800
20885	4000	60825	3000	205114	3000	208130	1700	300250	2300	304197	2200	304580	2200
20910	2700	60881	1800	205128	3000	208148	1700	300251	1800	304199	2200	304584	1800
20914	3200	60906	1725	205141	4300	208151	1800	300253	2300	304200	1800	304585	2800
20933	1950	60940	1725	205142	3500	208157	1800	300254	380	304202	2200	304591	1800
25030	3800	60975	2000	206158	3300	208158	1800	300259	2300	304203	2100	304596	2100
25046	3800	95011	3400	206160	2800	208159	1800	300265	2500	304204	1800	304597	2100
25048	2300	95065	1925	206177	2700	208160	2000	300266	2100	304205	2200	304598	3000
25177	2800	95090	1800	206180	3100	300065	1800	300275	2800	304207	2200	304602	1800
25226	2850	95170	2800	206190	2600	300085	1800	300280	2800	304208	1800	304604	1800
25256	3000	95172	1700	206327	3000	300096	2800	300282	2100	304209	2200	304606	2400
25282	3600	95204	1800	206330	4000	300099	1800	300285	2300	304210	2200	304607	2300
25300	3600	95261	2800	206340	2700	300108	1800	300287	2200	304211	2200	304614	2300
25305	2440	95285	1800	206341	2800	300119	1725	300292	2500	304212	1800		
25306	2680	95293	1800	206351	3100	300138	1800	300296	2800	304214	2200		
25314	2500	95294	1800	206352	4000	300140	2000	300297	2800	304215	1800		
25381	1800	95302	2400	206359	4000	300145	2100	300300	2500	304216	1700		
25421	1800	95303	2025	206360	4000	300149	2200	300302	2700	304220	2200		
25429	2000	95305	2400	206361	2800	300150	2100	300303	2800	304225	2200		
25453	2000	95306	2300	206362	3600	300155	1800	300306	1600	304226	2800		
25457	2000	95323	2400	206363	2800	300176	1800	300307	1800	304227	2200		

SEE PAGE 7 FOR MOTOR SPEEDS BY MODELS



MOTOR SPEED SETTINGS FOR STANDARD MODELS

Table No. 4

IMPORTANT: Check motor type number (stamped on metal nameplate) against Table No. 4 before using this chart. If type number of motor being adjusted is not listed, then use this chart for setting motor speed. Full load speed setting normally is the middle of the speed range shown.

MODEL	SPEED RANGE R. P. M. FIVE DIGIT TYPE NUMBERS	SPEED RANGE R. P. M. SIX DIGIT TYPE NUMBERS
A	2200-3200	2200-3200
AGR-4	500-600*	
AH-AHL	2200-3200	
AHLP-AHP	2200-3200	
AHM-AHMT	2200-3200	
AHR-4	550-800*	
AHR-6	370-530*	
AL-ALP	2000-2400	2200-3200
ALR-4	500-600*	
ALR-6	330-400*	
AP	2000-2400	2200-3200
AM-AMT	2000-2400	
AR-4	500-600*	
AR-6	330-400*	365-530*
B	2300-2700	2200-3200
BH-BHL	3000-3600	3000-3600
BHLP-BHP	3000-3600	3000-3600
BHM	2200-3200	
BHR-4	750-900*	750-900*
BHR-6	500-600*	500-600*
BHLR-4	750-900*	750-900*
BHLR-6	500-600*	500-600*
BL-BLP	2300-2700	2200-3200
BLR-4	575-625*	
BLR-6	380-450*	
BM	2300-2700	2200-3200
BMG	2300-2700	2200-3200
BP	2300-2700	2200-3200
BR-4	575-625*	
BR-6	380-450*	365-530*
FH-FHI	1750-1800	
FI	1750-1900	
FJ1	3000-4000	
FJ2	1800-2400	
H	1750-2100	
HM	1750-2100	
I	2100-4000	2600-4000
IBHP	2100-4000	
IB-IBLP	2600-3200	
IBP	2600-3200	2600-3200
IL	2600-3200	2600-3200
ILR-6	435-535*	430-670*
IMT-IP	2600-3200	2600-3200
IR-2	1300-1600*	1300-2000*
IR-6	435-535*	430-670*

MODEL	SPEED RANGE R. P. M. FIVE DIGIT TYPE NUMBERS	SPEED RANGE R. P. M. SIX DIGIT TYPE NUMBERS
IS	2600-4200	2600-4200
K-KL-KLP-KP	2300-2700	2300-2700
KLR-4	575-675*	
KLR-6	390-450*	
KM	2300-2700	2300-2700
KR-4	575-675*	575-675*
KR-6	390-450*	390-450*
L-LA	1700-1900	
M-MC-MB-MF	1800-2400	
MH	3000-4000	
N-NP		2600-4000
NR-2		1300-2000*
NR-6		435-670*
PB	2100-2300	
Q	1700-1900	
R-RC	1800-2400	
S-SC	1700-1900	
T-TA	1700-1900	
U		2200-3200
UR-2		1100-1600*
UR-6		365-530*
W-WA	1800-2400	
WBG	2300	2300
WI-WIBP	2200-3200	
WM-WMB	2250-3000	2250-3000
WVG	2300	
WMI-WMIP	2100-2500	
WR-6	365-530*	
Y	1700-1900	
Z	2200-2600	2200-3200
ZH-ZHL	2200-3200	2200-3200
ZHLP-ZHP	2200-3200	2200-3200
ZHLR-4	550-800*	
ZHLR-6	370-530*	
ZHM	2200-3200	
ZHR-4	550-800*	550-800*
ZHR-6	370-530*	370-530*
ZL-ZLP-ZP-ZM	2200-2600	2200-3200
ZLR-4	550-650*	
ZLR-6	360-430*	365-530*
ZR-4	550-650*	
ZR-6	360-430*	365-530*
ZZ		2200-3200
ZZL-ZZLP-ZZP		2200-3200
ZZR-6		365-530*

*On gear reduction models the speed is the same as standard when checked from the magneto side. The speed of crankstarter motors can only be checked at the power take-off shaft. The speed on the power take-off side is reduced by reduction gears to approximately 1/2, 1/4 or 1/6 of motor speed as indicated by numeral following model letters.



FUEL SYSTEM

Briggs & Stratton motors have two types of fuel systems -- suction feed and gravity feed. The suction feed type has the gas tank below carburetor level with a gas pipe to it. The gravity feed type has the tank above carburetor level and a float in the carburetor, as in an automobile.

Gas Line. Remove and blow through to clear. When replacing, be sure that all connections are tight.

Gas Filter. To clean, first close the shut-off valve, then loosen thumb screw at bottom of glass bowl. Remove and clean glass bowl, gasket and screen. Open shut-off valve to see if gasoline flows freely from the tank. If you find a gummy varnish-like substance, it should be removed with alcohol or acetone.

Gas Tank Cap. Remove dirt in vent hole. Blow through to clear. The gas tank cap on the Model "U" motor has no vent hole and must seal tank air tight.

Gas Feed Pipe. Models WI-WM-WMB-WMI-Y-L. Remove from tank. Brush dirt from screen but do not remove or damage. Blow through pipe from screen end to see if check ball is free. Blow through opposite end to determine if ball seats and closes passage. If clogged, clean with alcohol or acetone. Be sure to replace gasket when replacing pipe in tank. See Plate No. 2.

Model "U" - The gas feed pipe is the same as the "WI" above in all respects, except it has a disc valve and valve retainer. The valve retainer must be assembled with the convex side down or toward the disc valve. See Plate No. 2A.

Models "FH"- "S" - Gas feed pipe is located below carburetor. See Plate No. 6. Remove carburetor from base and unscrew pipe. Clean as explained above. The end of gas pipe must clear inside bottom of base by 1/16".

Gas Tank. Flush tank with clean gas to remove dirt and water. Use alcohol or acetone to dissolve gum. The hole in the vacuum line connecting of the Model "U" motor must be open from .025" to .028".

Gummy Gas. If the above parts show deposits of a gummy, sticky substance with a peculiar obnoxious smell, they should be thoroughly cleaned with alcohol or acetone. This gum comes from the gasoline and frequently clogs the parts of the fuel system.

The customer should be instructed to change to another brand of gasoline. To check for gum content, evaporate a half pint of gasoline in an open dish. Gum trouble can be avoided if owner will keep tank full when motor is not in use. If used only occasionally, drain tank completely and refill when used. This is necessary because the continued evaporation of stale gasoline causes most gum deposits.

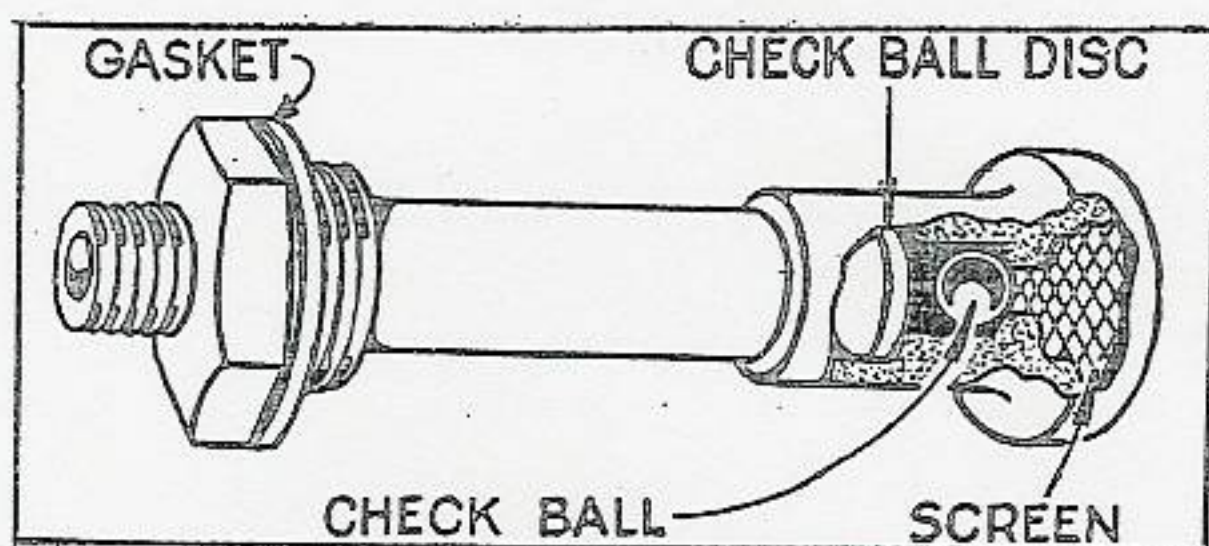


Plate No. 2

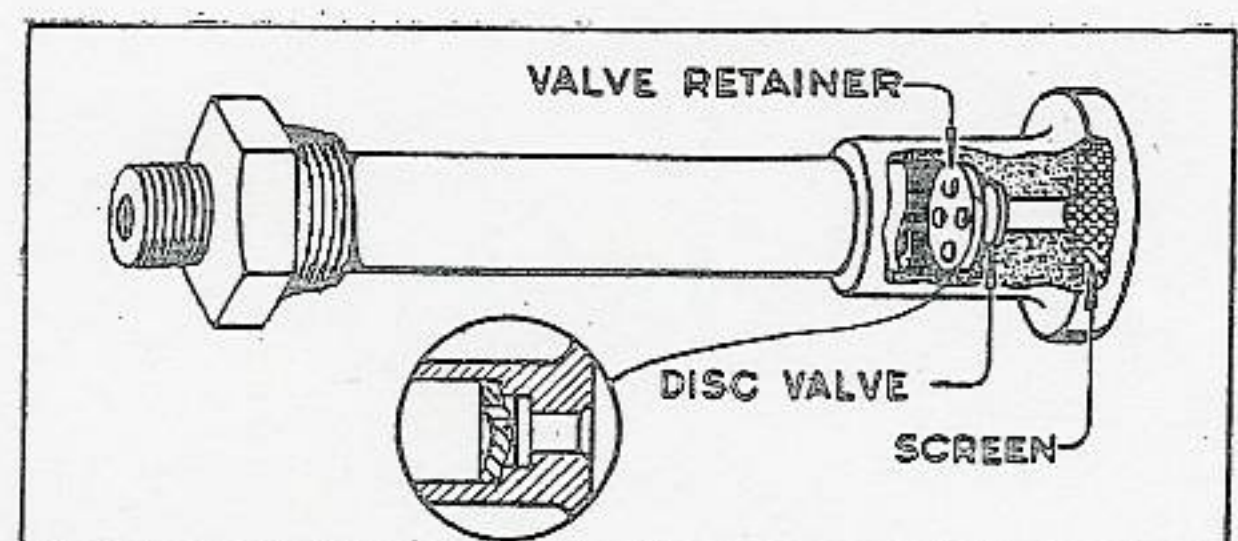


Plate No. 2A

Types of Carburetors. Gravity and suction feed. See chart on page 10 for type of feed on each model.

To Clean Carburetor. Carburetor openings must be clean. If clogged, blow out. But do not attempt to clear by using wire or tool. Clean carburetor and parts in alcohol or acetone - do not scrape. The gravity feed type carburetors sometimes leak at the inlet valve. When this occurs you will find that the inlet valve and seat are dirty or worn, or both.

Check for Wear. If carburetor throttle, throttle shaft, or body is worn it will cause motor to run erratically. Replace worn parts. If needle valve head is broken, drill small hole in needle valve and use end of file to turn it out.

Idle Adjustment. Set the carburetor throttle lever adjustment screw so that motor will idle at about 1600 R.P.M.

Float Level. The carburetor float level on gravity feed carburetors can be adjusted in all cases except those marked "F" in the chart on page 10. The exceptions have a float with fixed position and need not be adjusted. All others can be adjusted by either bending the tang or float lever.

Model - U

Special Adjustment. To adjust the carburetor, hold throttle at idling position until you complete the following adjustments:- Turn needle valve until motor runs evenly. Then open needle valve until motor starts to run unevenly. Now close needle valve just a little until motor starts to run evenly. This adjustment will be a little rich, but you will find it correct for full throttle range.

TO REMOVE AND REPLACE CARBURETORS

For all models, except those marked with an asterisk (*) on page 10, (which are explained below) removal and replacement of carburetors will be easy by referring to the chart on page 10 and to the plates or illustrations indicated.

Model I

Disconnect gas line at gas filter, then remove blower case with gas tank attached. Unhook throttle spring at lower end and remove carburetor mounting screws and throttle link carefully so as not to bend link. See Plate No. 10.

Model-N

The same as for Model "I" except see Plate No. 18C.

Models WI-WM-WMB-WMI

Disconnect gas line at carburetor and remove blower case, valve cover plate, and carburetor mounting bolts. Remove carburetor carefully and, without stretching, unhook governor spring at lower end. Do not remove governor spring or link from throttle arm. See Plate No. 16.

To remove the throttle with a steel throttle lever, loosen set screws that hold the choke valve and throttle in place. The throttle is easily removed with the fingers. To reassemble, replace choke valve and insert throttle in the carburetor body as far as it will go. Line up hole in sleeve with locating hole in body and throttle stop between forked points of throttle lever. Insert a small tool between throttle lever and sleeve, and push sleeve in place so that locating hole lines up with set screws. See Plate No. 17.

The later throttle and choke valve set screw now has a special tip, and a 3/32" locating hole in the throttle sleeve. For the earlier type with large hole use screw No. 90211, and for the new type with small hole use screw No. 63854.

To remove throttle with a die cast throttle lever, remove cotter pin and washer and slip throttle from body. See Plate No. 17.



CARBURETOR ADJUSTMENT CHART

Model Motor	Type Feed	Idle Adj. Screw Turns Open	Needle Valve Adj. Turns Open	See Plate No.	
				Hook Up	Float Level
A-AGR4-AH-AHL-AHLP-AHP-AHM-AHMT-AHR4-AHR6-AL-ALP-ALR4-ALR6-AP-AM-AMT-AR4-AR6	5 and 6 Digit Type Nos. G	5 Digit early models have none-later models $\frac{1}{2}$ to $\frac{3}{4}$ 6 Digit $\frac{1}{2}$ to $\frac{3}{4}$	5 and 6 Digit Type Nos. 1 to $1\frac{1}{4}$	5 Digit 3 6 Digit 18B	F 18E
B-BH-BHL-BHLP-BHP-BHM-BHR4-BHR6-BHLR4-BHLR6-BL-BLP-BLR4-BLR6-BM-BP-BR4-BR6-	G	$1/2$ to $3/4$	1 to $1-1/4$	5	18E
FH	S	none	1 to $1-1/2$	6	none
FI-FH1	G	none	$3/4$ to 1	7	18F
FJ1-FJ2	G	none	1 to $1-1/4$	3	F
H-HM	G	$1/2$ to $3/4$	1 to $1-1/4$	9	F
*I-IB-IBHP-IBLP-IBP *IL-ILR6-IMT-IP-IR6 *IS	5 and 6 Digit Type Nos G	5 Digit have none 6 Digit $\frac{1}{2}$ to $\frac{3}{4}$	5 and 6 Digit Type Nos. 1 to $1\frac{1}{4}$	5 Digit 10 6 Digit 18A	F 18E
K-KL-KLP-KLR4-KLR6-KM-KP-KR4-KR6	G	$1/2$ to $3/4$	1 to $1-1/4$	5	18E
L-LA	S	none	1 to $1-1/2$	4	none
M-MC	G	none	1 to $1-1/4$	3	F
MB-MF	G	$1/2$ to $3/4$	1 to $1-1/4$	8	18G
MH	G	none	1 to $1-1/4$	3	F
* N-NP-NR2-NR6	G	$1/2$ to $3/4$	$1/2$ to $3/4$	18C	18E
PB	G	none	$3/4$ to 1	12	18F
Q	G	none	$3/4$ to 1	15	18F
R-RC	G	$1/2$ to $3/4$	1 to $1-1/4$	14	18G
S-SC	S	none	1 to $1-1/2$	11	none
T-TA	G	none	1 to $1-1/4$	3	F
* U-UR2-UR6	S	none	$3/4$ to 1*	18D	none
W-WA	G	$1/2$ to $3/4$	1 to $1-1/4$	14	18G
*WBG-WI-WIBP-WM-WMB- *WMG-WMI-WMIP-WR4- *WR6	S	none	1 to $1-1/4$	16	none
Y	S	none	1 to $1-1/2$	13	none
Z-ZH-ZHL-ZHLP-ZHLR4-ZHLR6-ZHM-ZHP-ZHR4-ZHR6-ZL-ZLP-ZM-ZP-ZLR4-ZLR6-ZR4-ZR6	G	$1/2$ to $3/4$	1 to $1-1/4$	5	18E
ZZ-ZZL-ZZLP-ZZP-ZZR	G	$1/2$ to $3/4$	1 to $1-1/4$	5	18E

S - Suction Feed

G - Gravity Feed

* - See special adjustment Page 9

F - Float level not adjustable.



GOVERNOR SPEED ADJUSTMENT CHART

Model Motor	Type Gov.	Peak Output R.P.M		TYPE Adjuster	Increase Speed	Decrease Speed	Plate No.	
		X5 Digit	X6 Digit				X5 Digit	X6 Digit
A-AL-ALP-AP	*	2200	3200	Clip	Raise	Lower	3	18B
AGR	*	† 560		Clip	Raise	Lower	3	
AH-AHL-AHLP-AHP	*	3100		Clip	Raise	Lower	3	
AHM-AHMT	None	3100		Lever	Up	Down	3	
AHR4	*	† 775		Clip	Raise	Lower	3	
AHR6	*	† 515		Clip	Raise	Lower	3	
AM-AMT	None	2200	3200	Lever	Up	Down	3	18B
ALR4-AR4	*	† 560	† 800	Clip	Raise	Lower	3	18B
ALR6-AR6	*	† 360	† 533	Clip	Raise	Lower	3	18B
B-BL-BLP-BP	*	2500	3200	Nut	Right	Left	5	5
BH-BHL-BHLP-BHP	*	3200		Nut	Right	Left	5	5
BHM	None	3200		Lever	Right	Left		
BHR4-BHLR4	*	† 870		Nut	Right	Left	5	5
BHR6-BHLR6	*	† 540		Nut	Right	Left	5	5
BLR4-BR4	*	† 660	† 870	Nut	Right	Left	5	5
BLR6-BR6	*	† 410	† 540	Nut	Right	Left	5	5
BM-BMG	None	2500	3200	Lever	Right	Left	5	5
FH	*	1750		Clip	Raise	Lower	6	
FH1	None	1750		None	None	None	18	
FI	**	1900		Clip	Right	Left	7	
FJ1	*	3900		Clip	Raise	Lower	8	
FJ2	*	2200		Clip	Raise	Lower	8	
H-HM	**	1750		Clip	Left	Right	9	
I-IL-IP	**		4000	Nut	Right	Left		18A
IB-IBLP-IBP-IP	**	2900		Nut	Right	Left	10	
IBHP	**	4200		Nut	Right	Left	10	
ILR6-IR6	**	† 455	† 670	Nut	Right	Left	10	18A
IMT-	**	2900	4000	Rod	Up	Down		
IR2	**	†1450	†2000	Nut	Right	Left	10	18A
IS	**		4200	Nut	Right	Left		18A
K-KL-KLP-KP	*	2500	2500	Nut	Right	Left	5	5
KLR4-KR4	*	† 680	† 680	Nut	Right	Left	5	5
KLR6-KR6	*	† 410	† 410	Nut	Right	Left	5	5
KM	None	2500	2500	Lever	Right	Left		
L-LA	*	1750		Clip	Raise	Lower	4	
M-MC	*	2200		Clip	Raise	Lower	3	
NB-MF	*	2200		Clip	Raise	Lower	8	
MH	*	3900		Clip	Raise	Lower	8	
N-NP	**		4000	Nut	Right	Left		18C
NR2	**		†2000	Nut	Right	Left		18C
NR6	**		† 670	Nut	Right	Left		18C
PB	None	2200		None	None	None	12	
Q	**	1800		Clip	Left	Right	15	
R-RC	*	2400		Clip	Right	Left	14	
S-SC	*	1800		Clip	Right	Left	11	
T	*	1800		Clip	Raise	Lower	3	
TA	*	1800		Clip	Raise	Lower	8	
U	**		2800	Nut	Right	Left		18D
UR2	**		†1400	Nut	Right	Left		18D
UR6	**		† 468	Nut	Right	Left		18D
W-WA	*	1800		Clip	Right	Left	14	
WBG-WMB	**	2300	2300	Nut	Right	Left	16	16
WI-WIBP	**	2700		Nut	Right	Left	16	
WM-WMG-WMI-WMIP	**	2300		Slide	Lower	Raise	16	
WR6	**	† 425		Nut	Right	Left	16	
Y	**	1750		Nut	Right	Left	13	
Z-ZL-ZLP-ZP	*	2400	2900	Nut	Right	Left	5	5
ZH-ZHL-ZHLP-ZHP	*	2900	2900	Nut	Right	Left	5	5
ZHM	None	2900	2900	Lever	Right	Left		
ZHLR4-ZHR4	*	† 765	† 765	Nut	Right	Left	5	5
ZHLR6-ZHR6	*	† 480	† 480	Nut	Right	Left	5	5
ZLR4-ZR4	*	† 635	† 725	Nut	Right	Left	5	5
ZLR6-ZR6	*	† 395	† 480	Nut	Right	Left	5	5
ZM-ZMG	*	2400	2900	Lever	Right	Left		
ZZ-ZZL-ZZLP-ZZP	*		3200	Nut	Right	Left	5	5
ZZR6	*		† 533	Nut	Right	Left	5	5

* Centrifugal

** Pneumatic

† Repeat as of * note on bottom of Page 5

X 5 Digit and 6 digit indicates the number of digits in the motor type number.



CORRECT MOTOR SPEED

Gasoline motor speed directly reflects the power output. The best efficiency will be obtained at the peak output speed shown in the Governor Speed Adjustment Chart on page 11. The cooling and lubrication, crankshaft counterweights, valve timing, governing and spark advance have each been designed to function best at this speed. For best general results the operating speed should be held closely to "peak output speed". Lower speeds than those recommended are permissible, although at the sacrifice of efficiency and, eventually, motor life.

Types of Governors. Pneumatic and centrifugal. See chart on page 11 for type of governor on each model motor. The pneumatic type governor is operated by air blown from the flywheel fins. The centrifugal or fly-ball type is operated by weights either in the governor housing or on the governor gear.

To Adjust Centrifugal Governor. If the lever of this type governor has been loosened or removed from the shaft, it is easily reset. With the carburetor attached to motor and hooked up to governor lever with throttle link, loosen screw holding governor lever on the shaft. Push the governor lever toward the left as far as it will go. Hold it in this position and turn the governor shaft to the right with pliers until it strikes a stop in the crankcase. Tighten screw that holds governor lever to shaft until the lever is snug. Push governor lever to the right as far as it will go and tighten screw securely.

Model FH

Special Centrifugal Type Governor. If proper speed cannot be obtained, bend governor arm in either direction so that throttle plate moves freely from one throttle stop to other. When throttle plate is against either stop there should be no play in the link. See Plate No. 6.

Remote Throttle and Governor Controls. To secure full speed range of motor on models using remote throttle and governor controls, it is necessary to adjust the position of the control lever on the control wire. This adjustment should be made while the motor is running.

Move control lever either against the front or rear stop of control lever base, as the case may be, so that motor will run with the throttle lever against the idling stop of the carburetor and still have enough tension on the throttle spring not to unhook. To change position of control lever loosen swivel screw on control lever assembly and move lever against the stop. Then tighten swivel screw and cut off surplus wire.

A short control wire that does not permit the carburetor throttle to close enough so that motor will idle at proper speed, or one that will not permit full travel of remote control lever, should be replaced by a longer one. See various illustrations on pages 13 to 17.

Plate No. 3

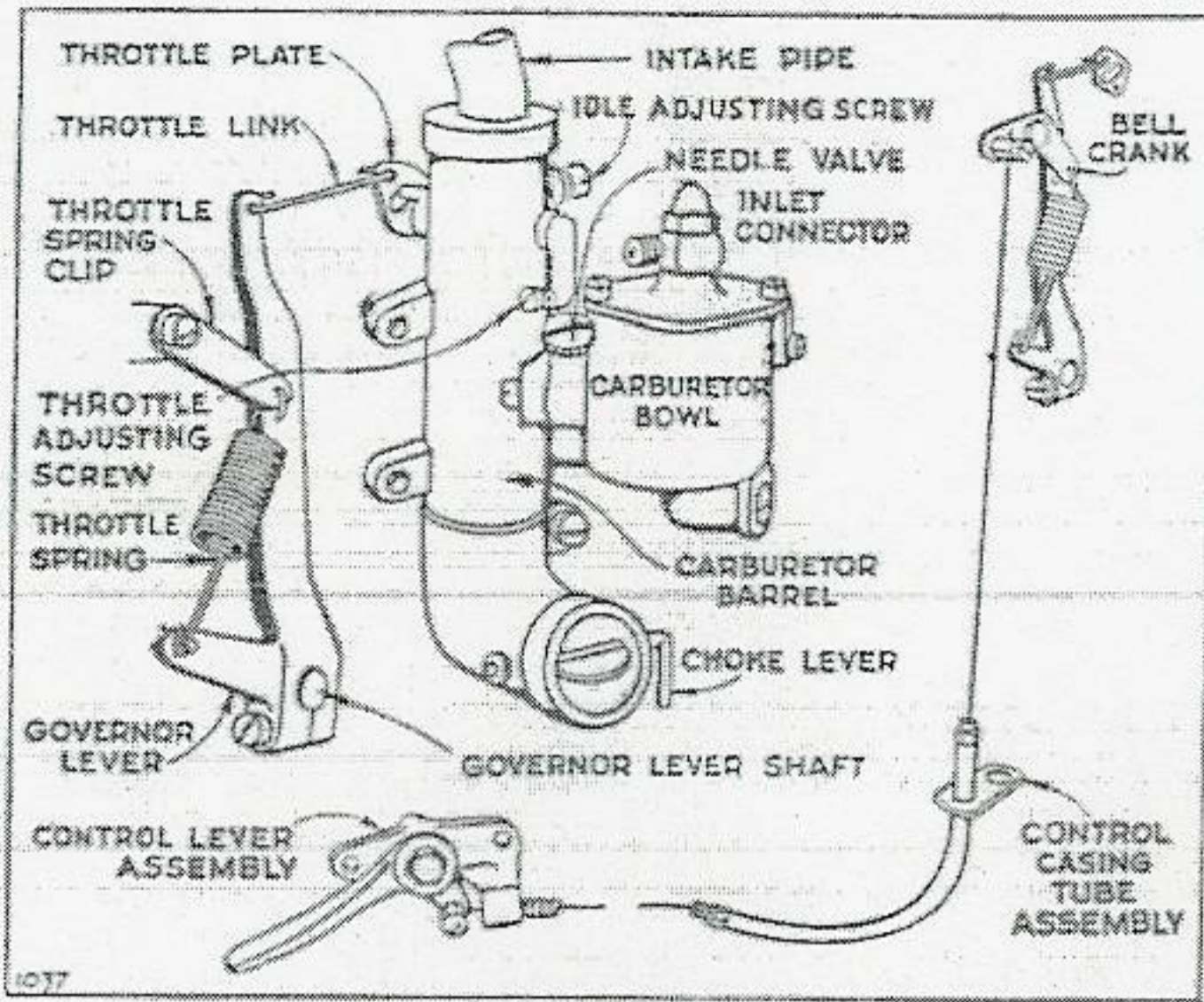


Plate No. 4

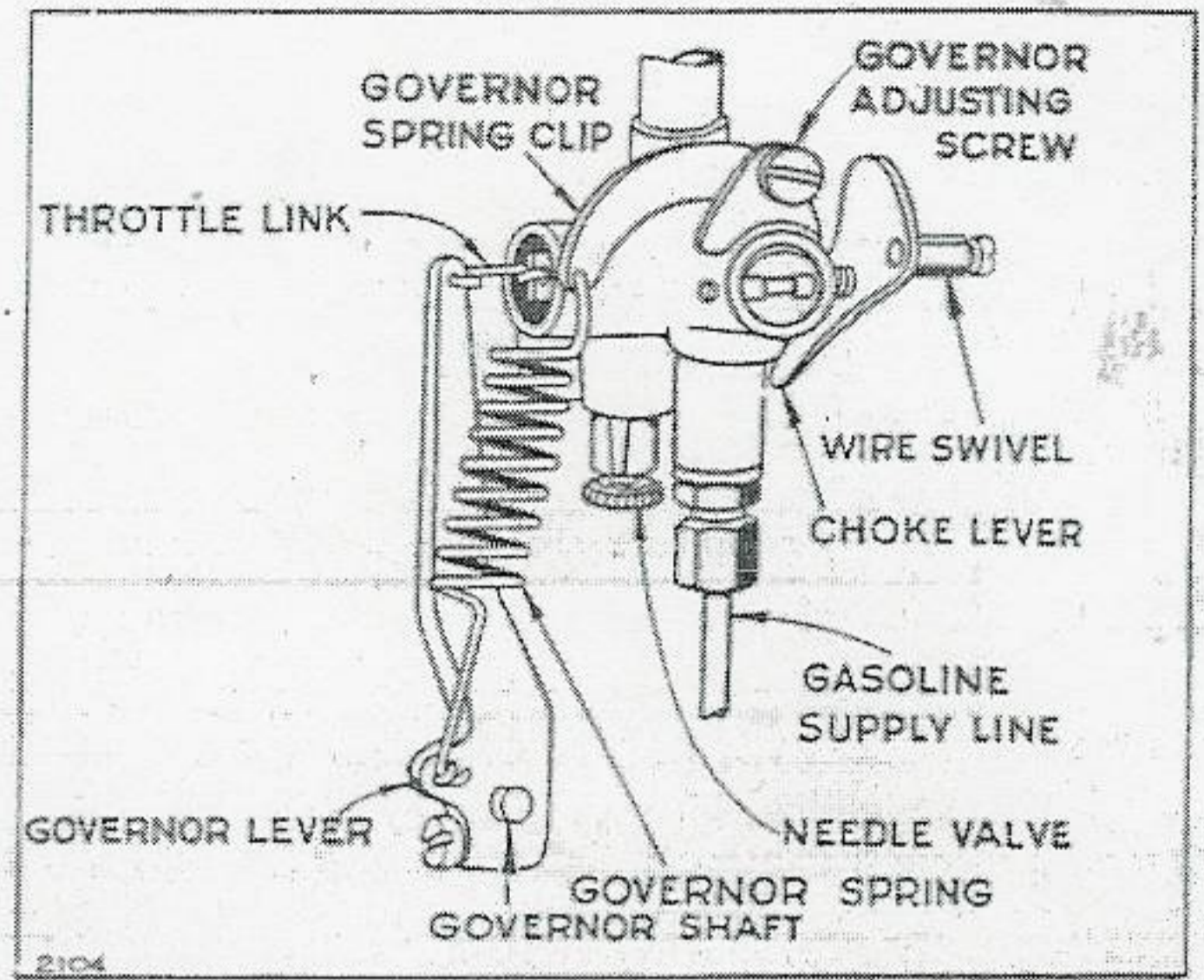


Plate No. 5

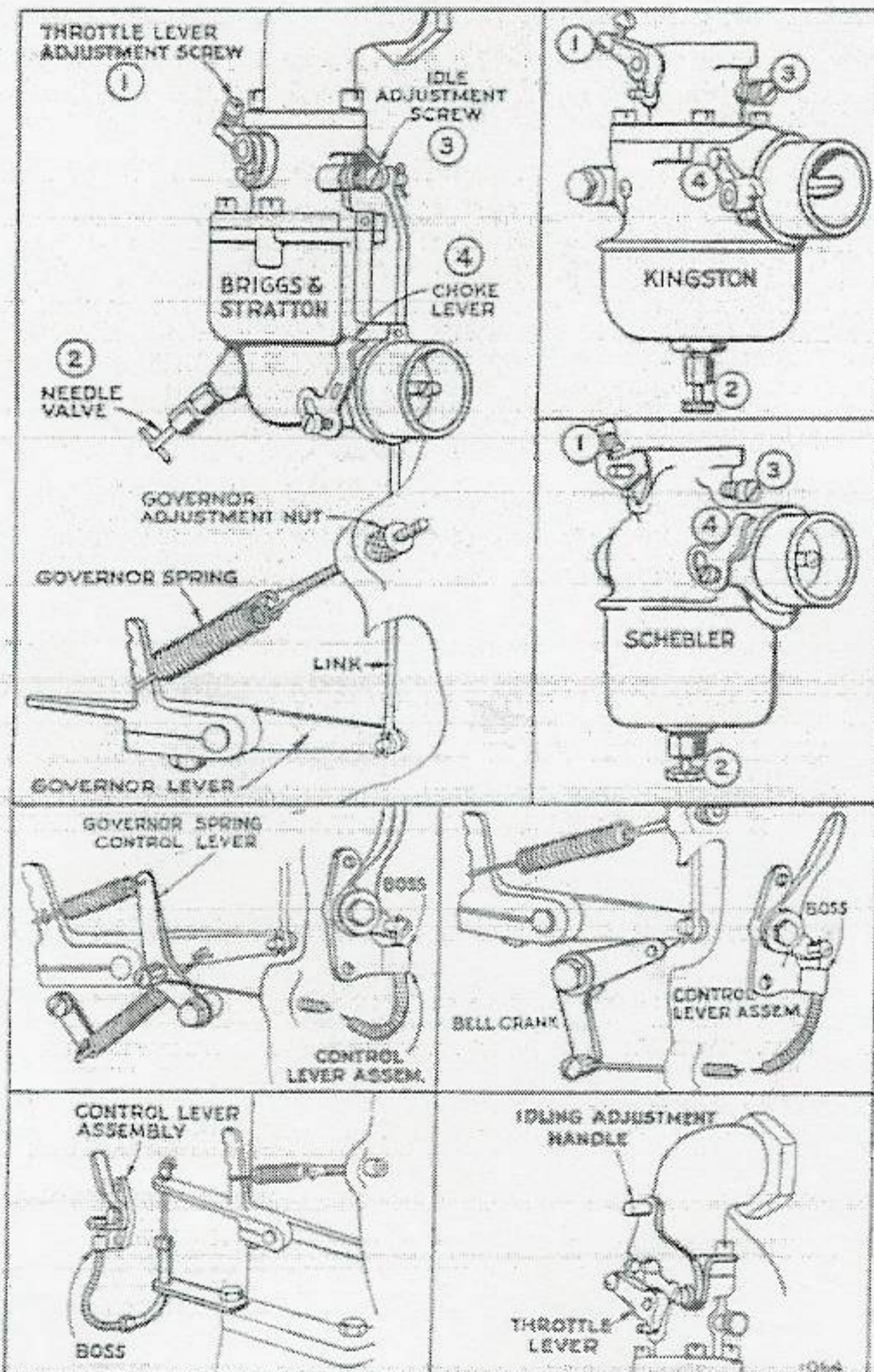


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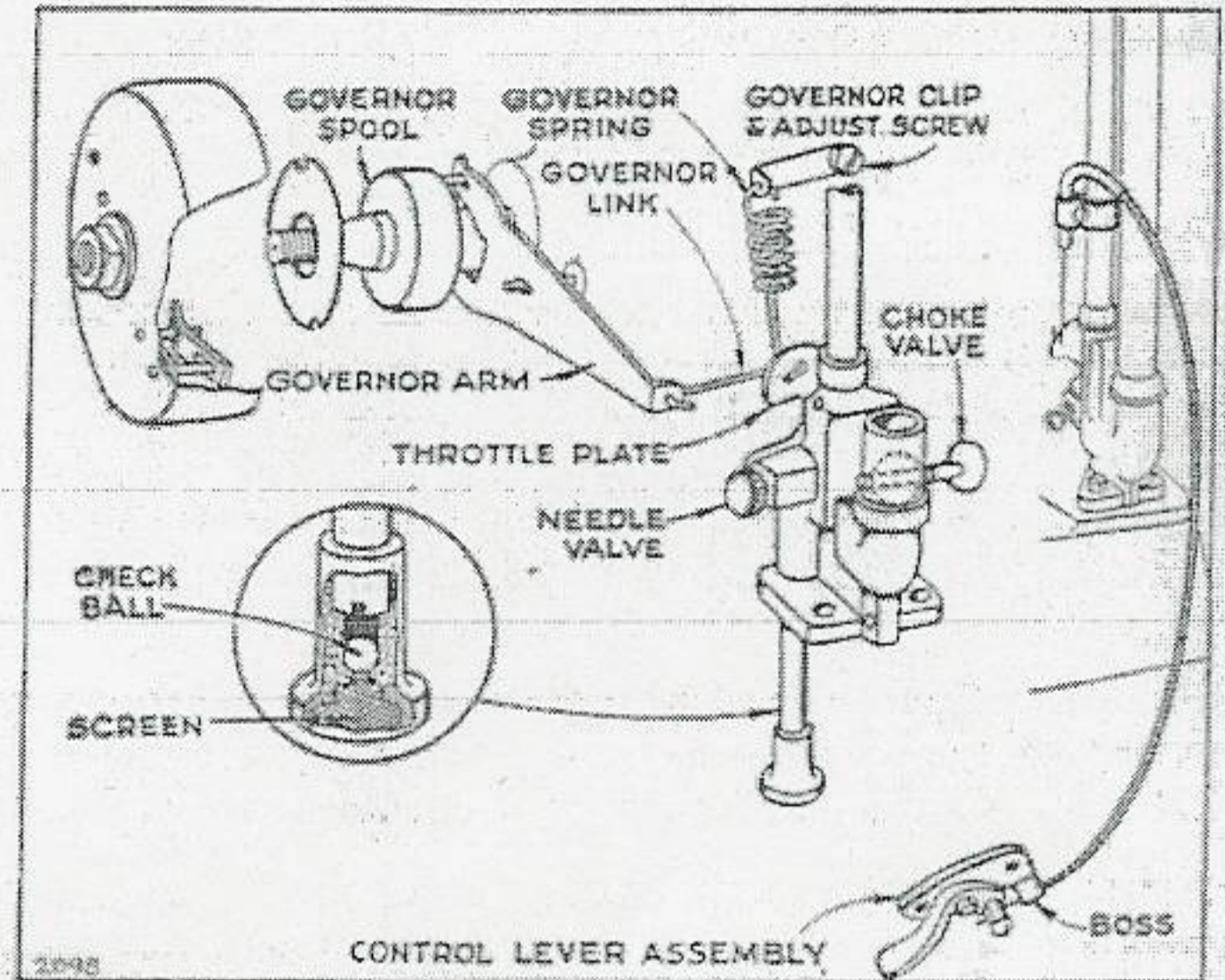


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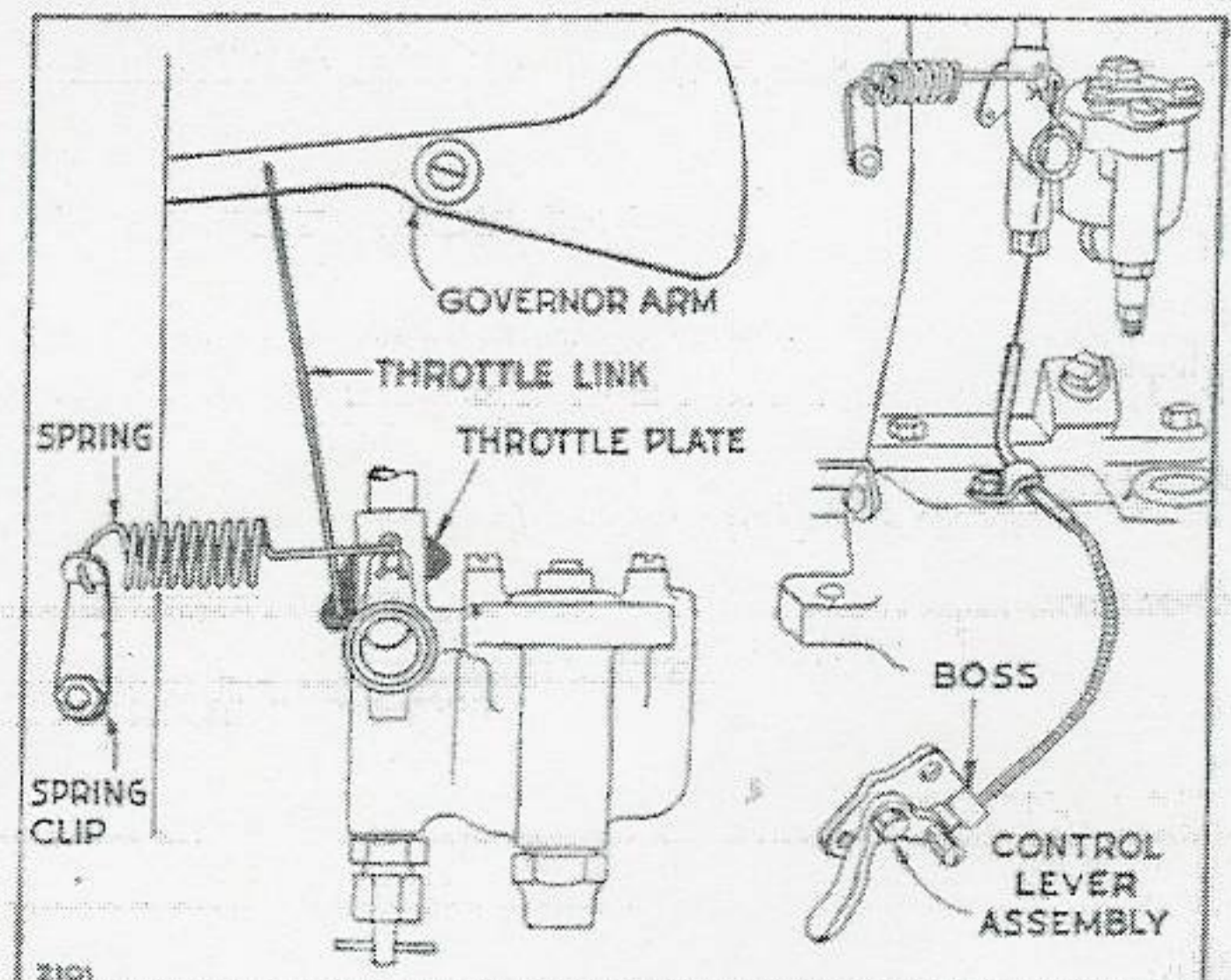


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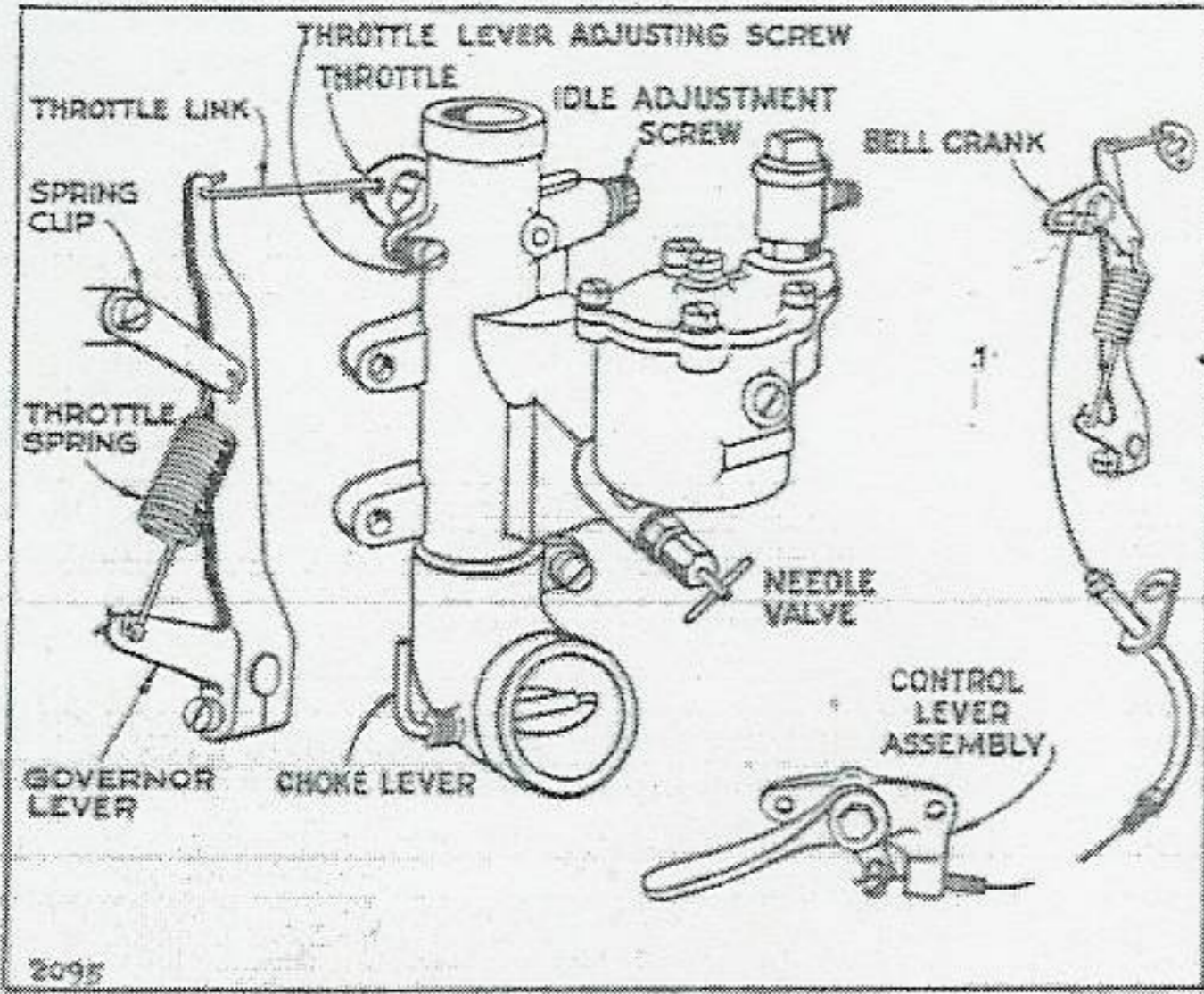


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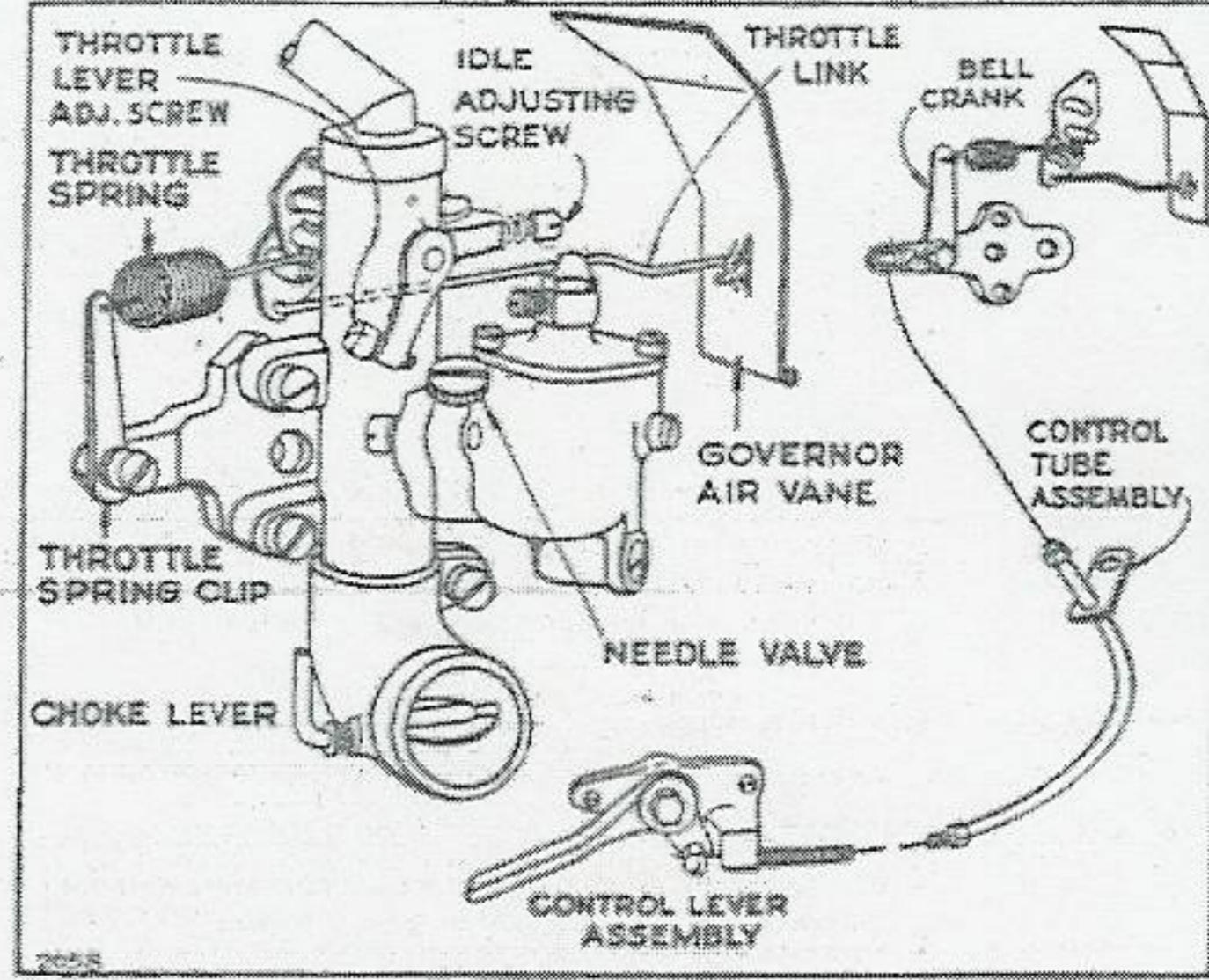


Plate No. 10

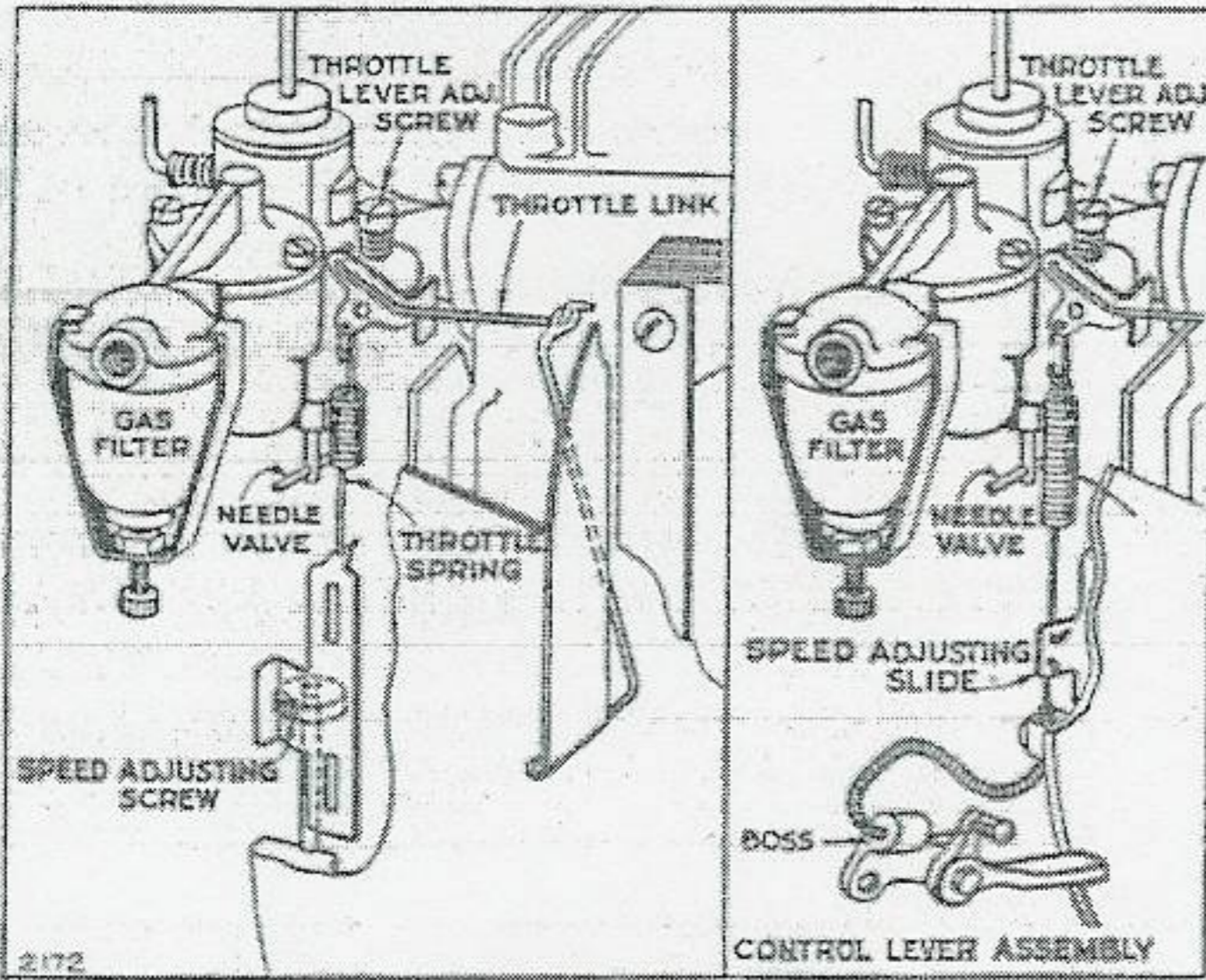


Plate No. 11

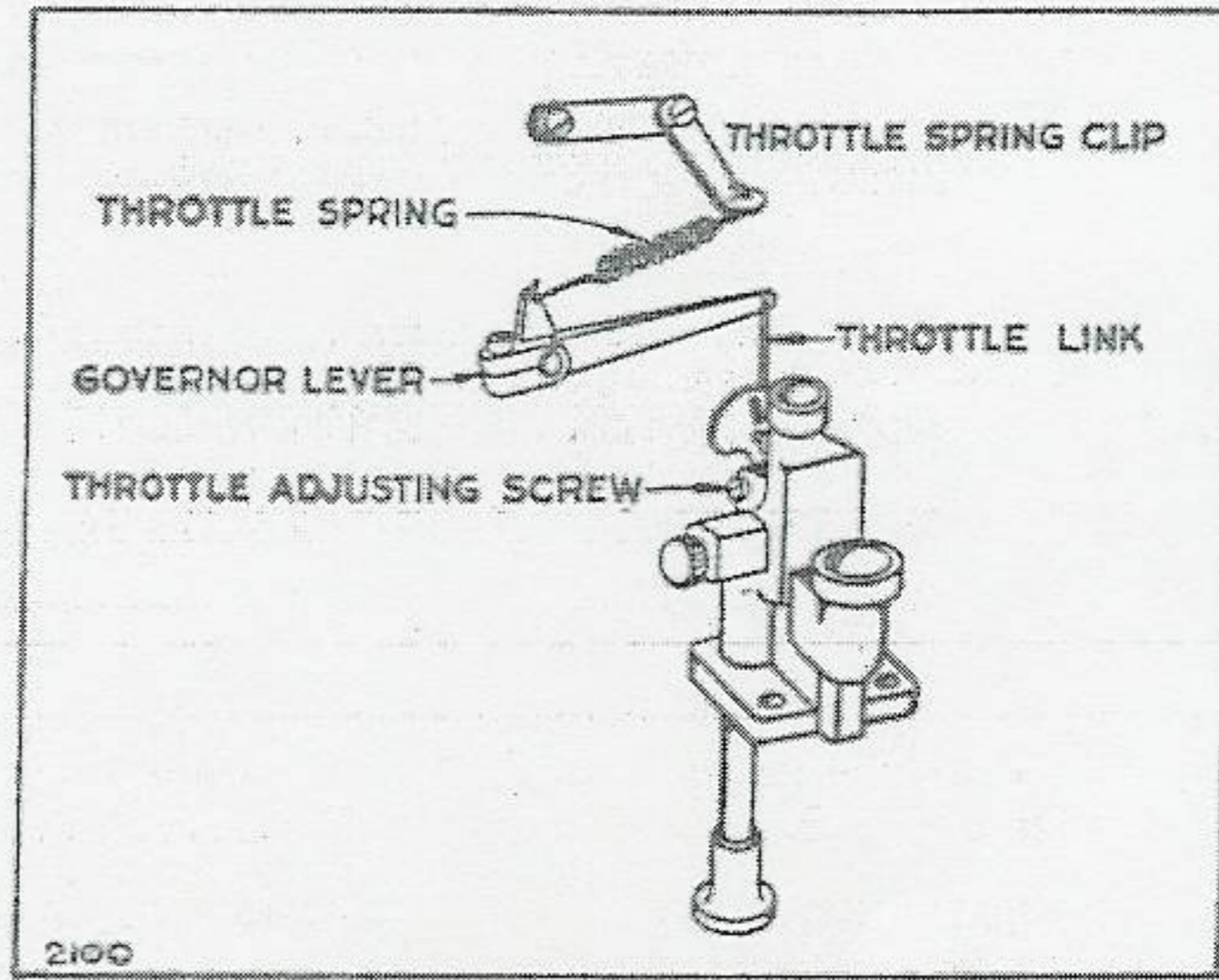


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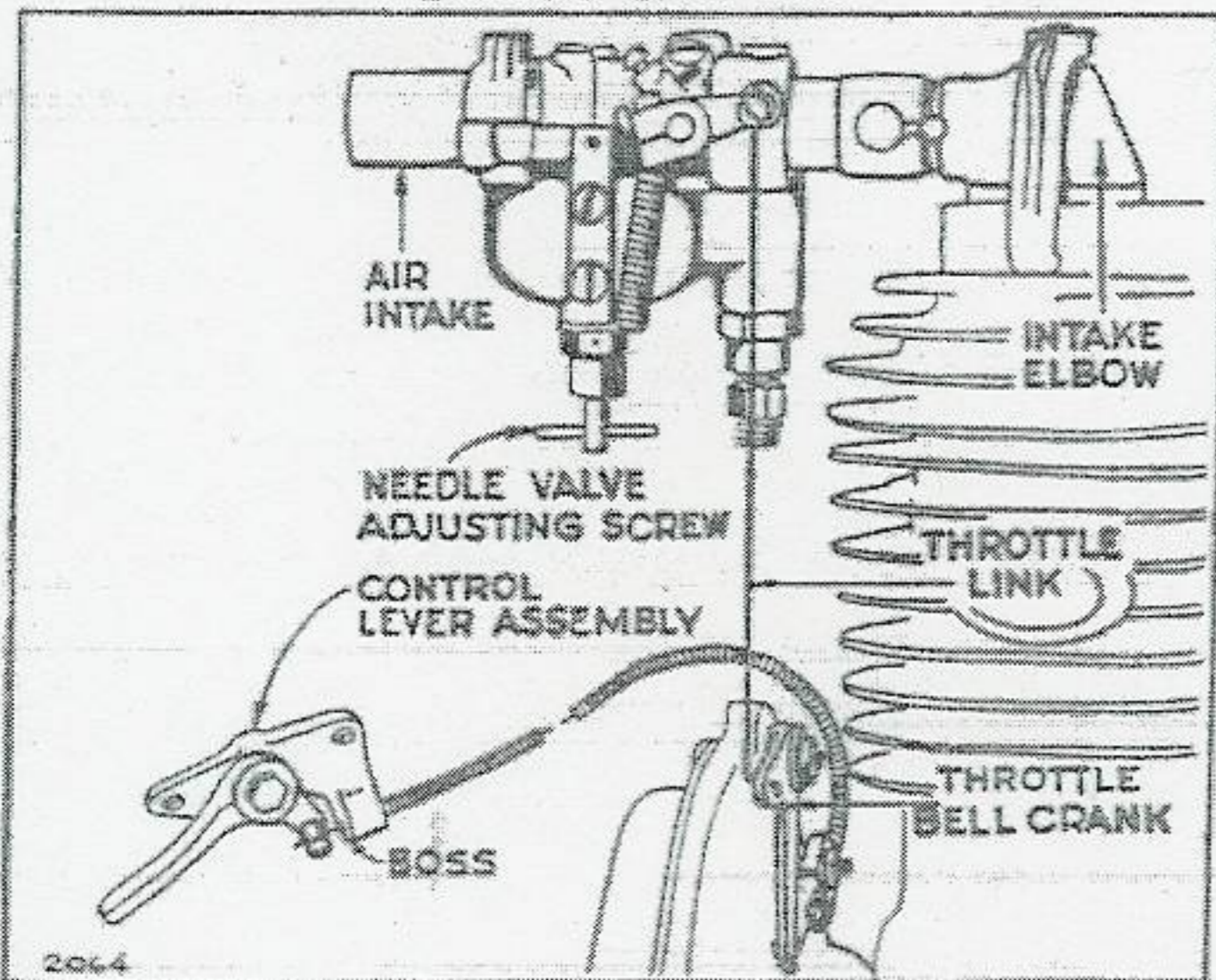


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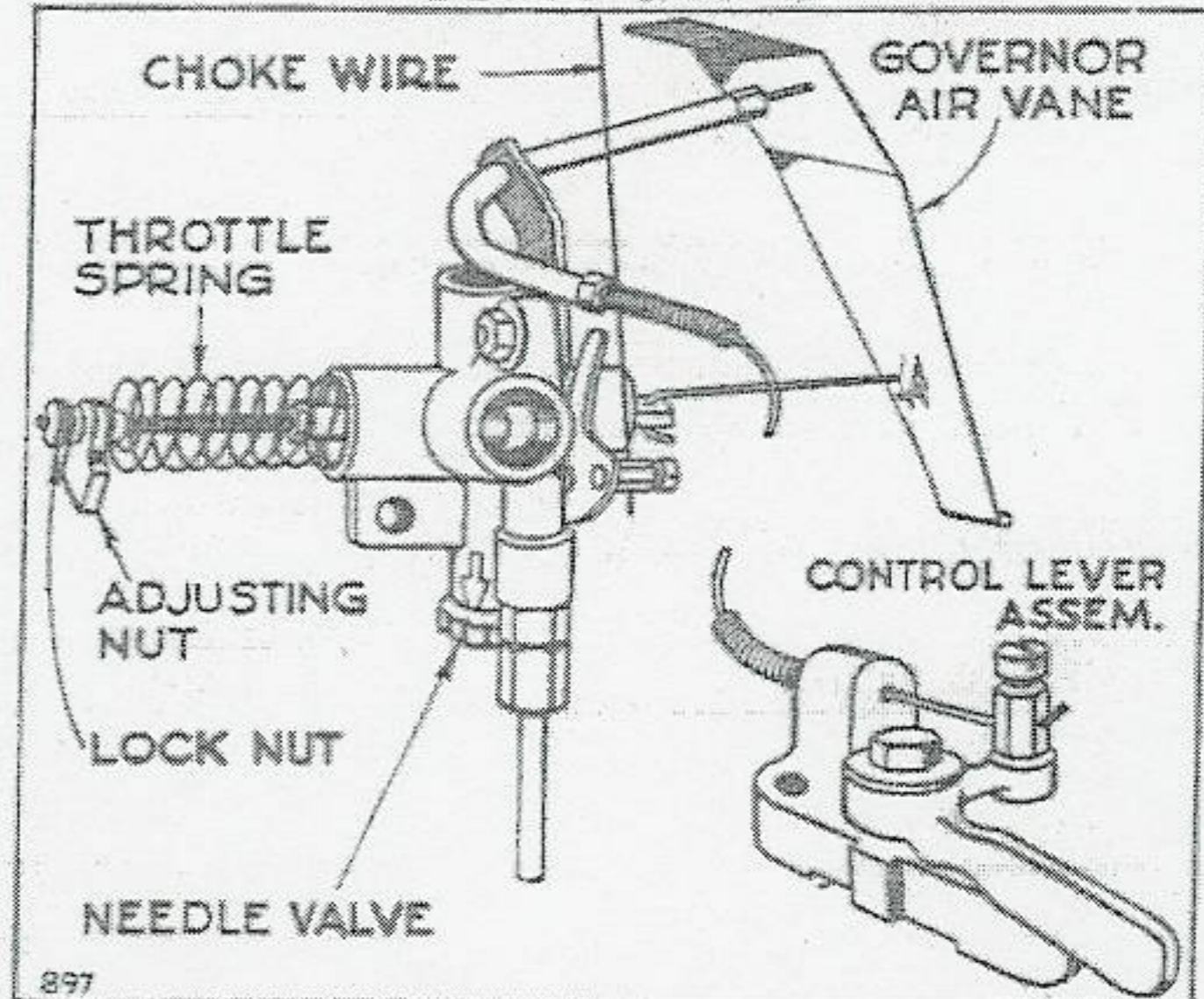


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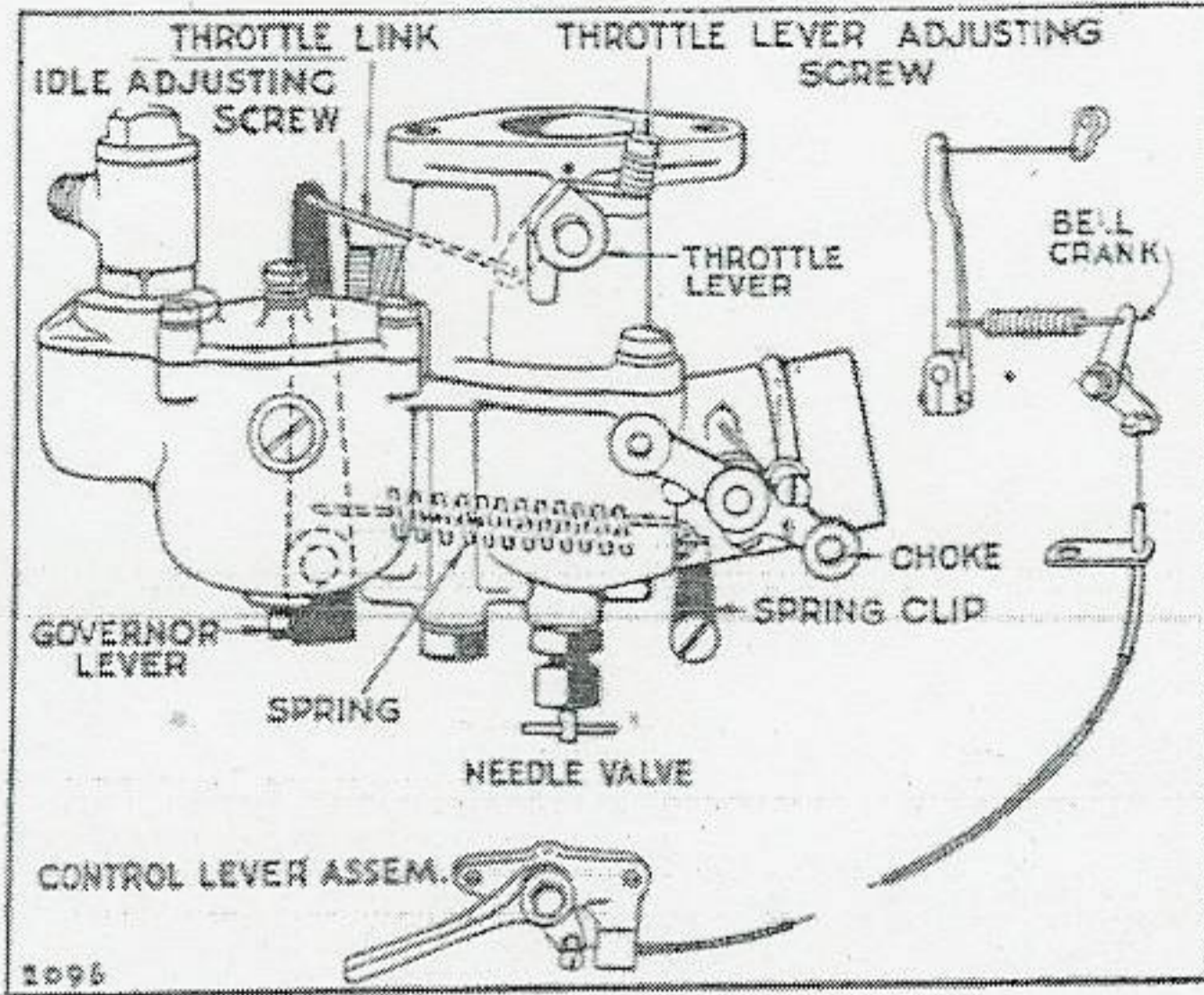


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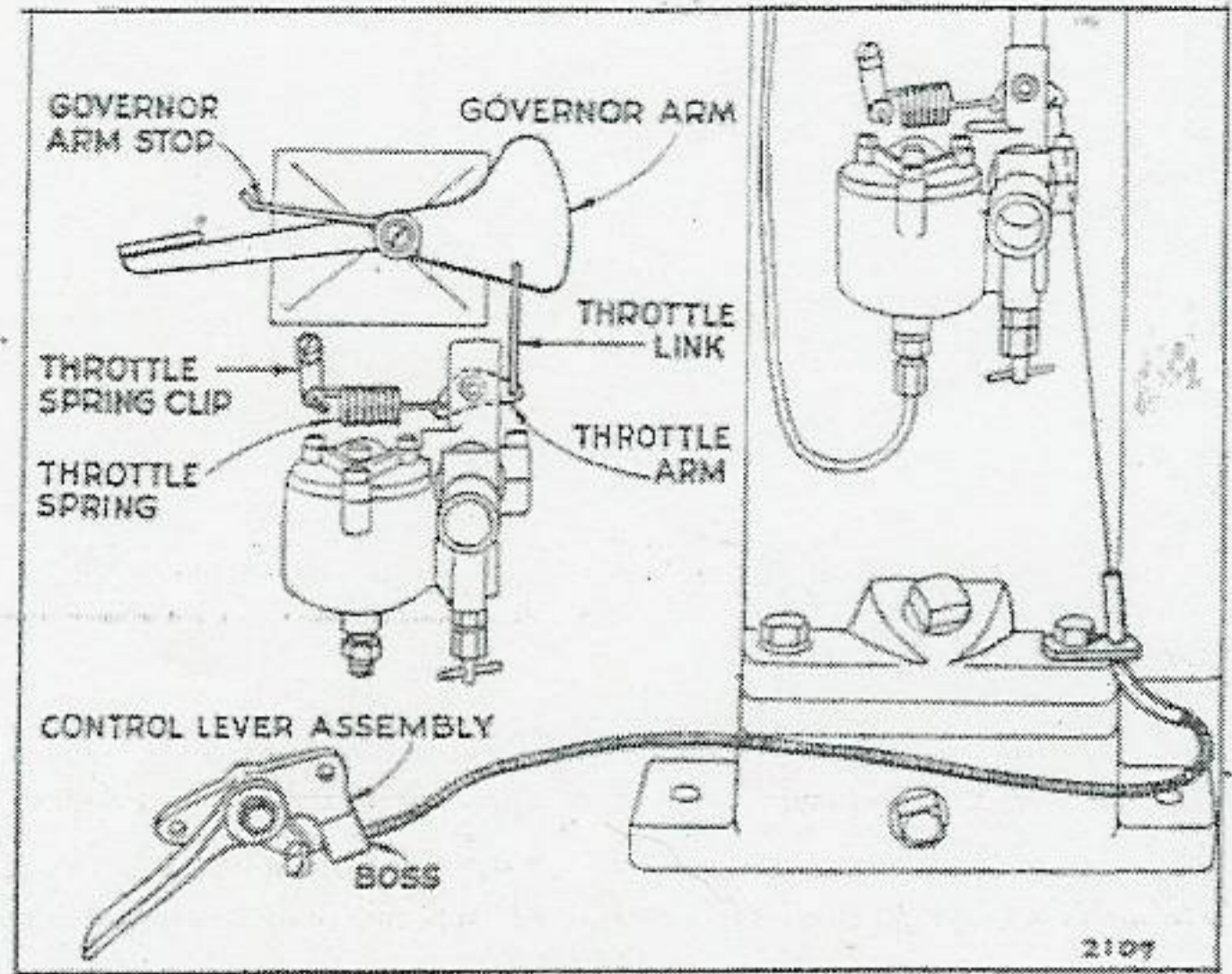


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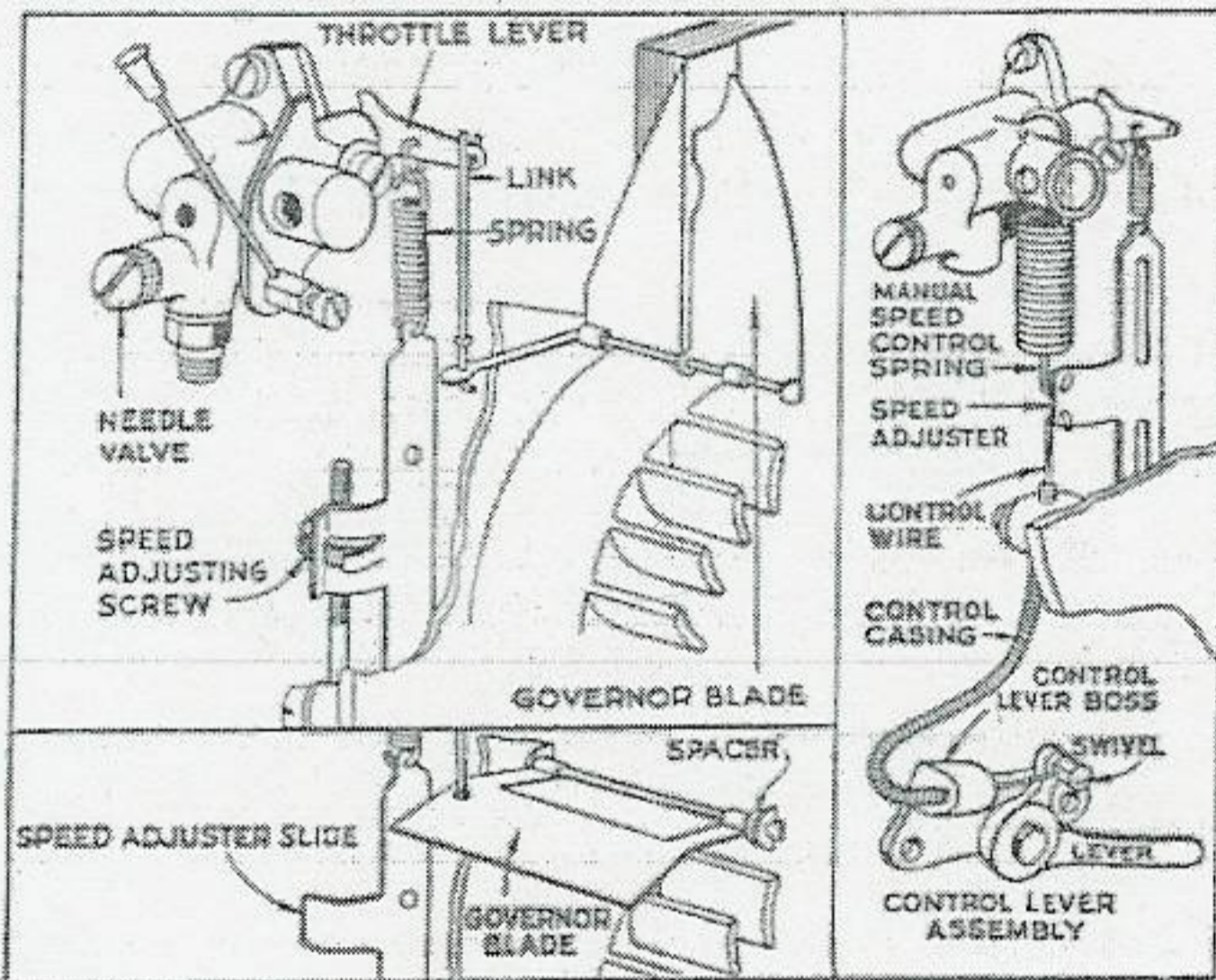


Plate No. 17

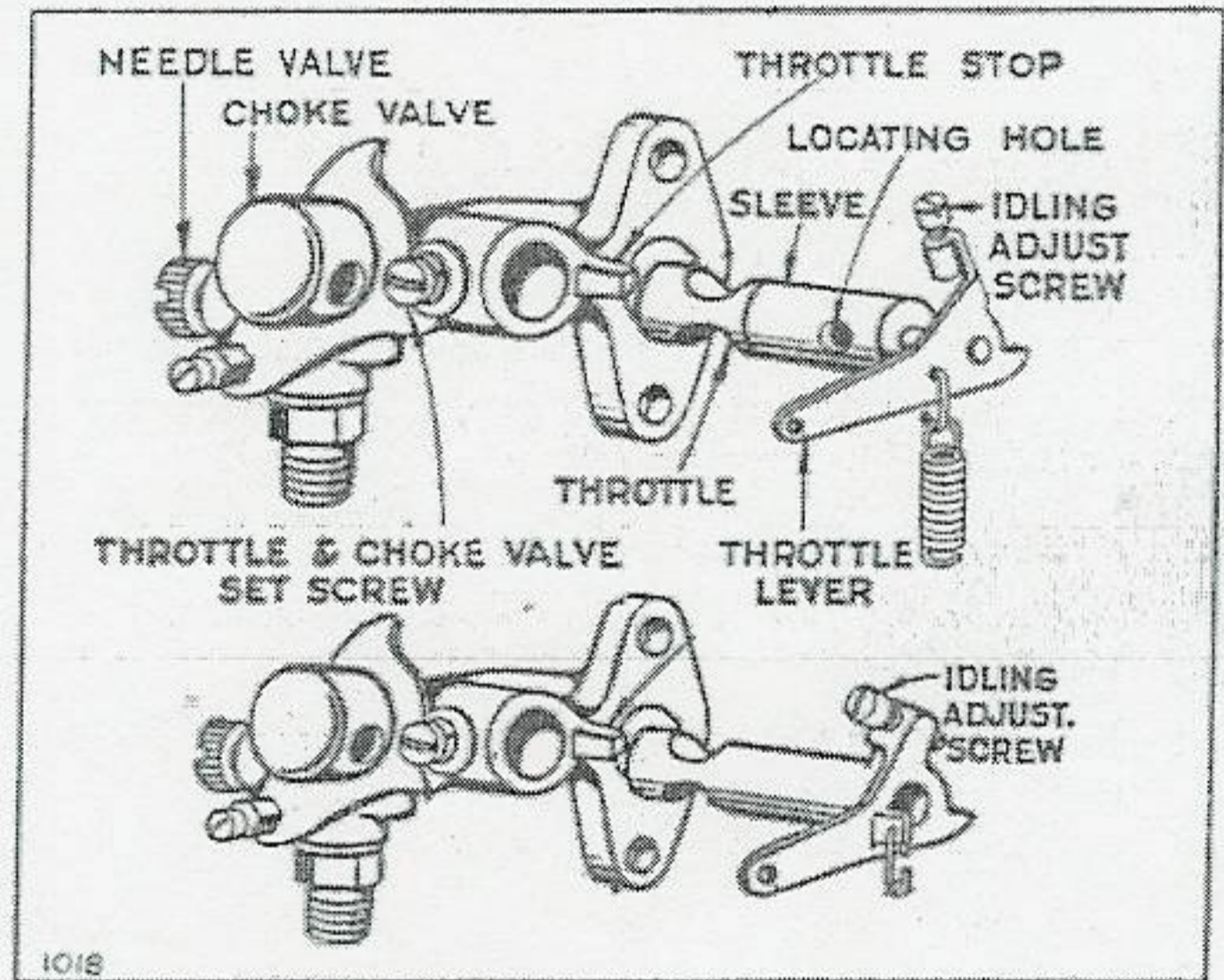


Plate No. 18

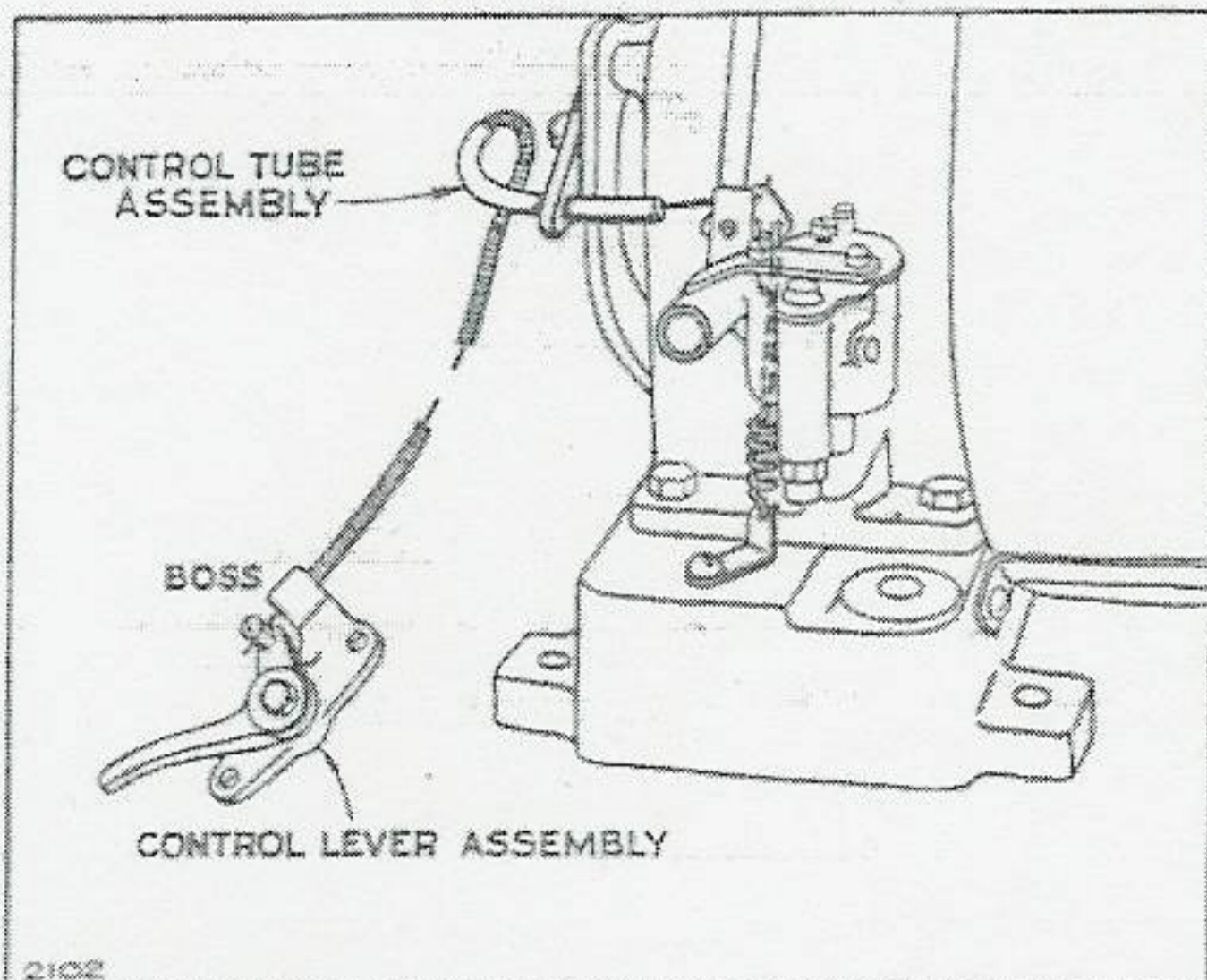


Plate No. 18A

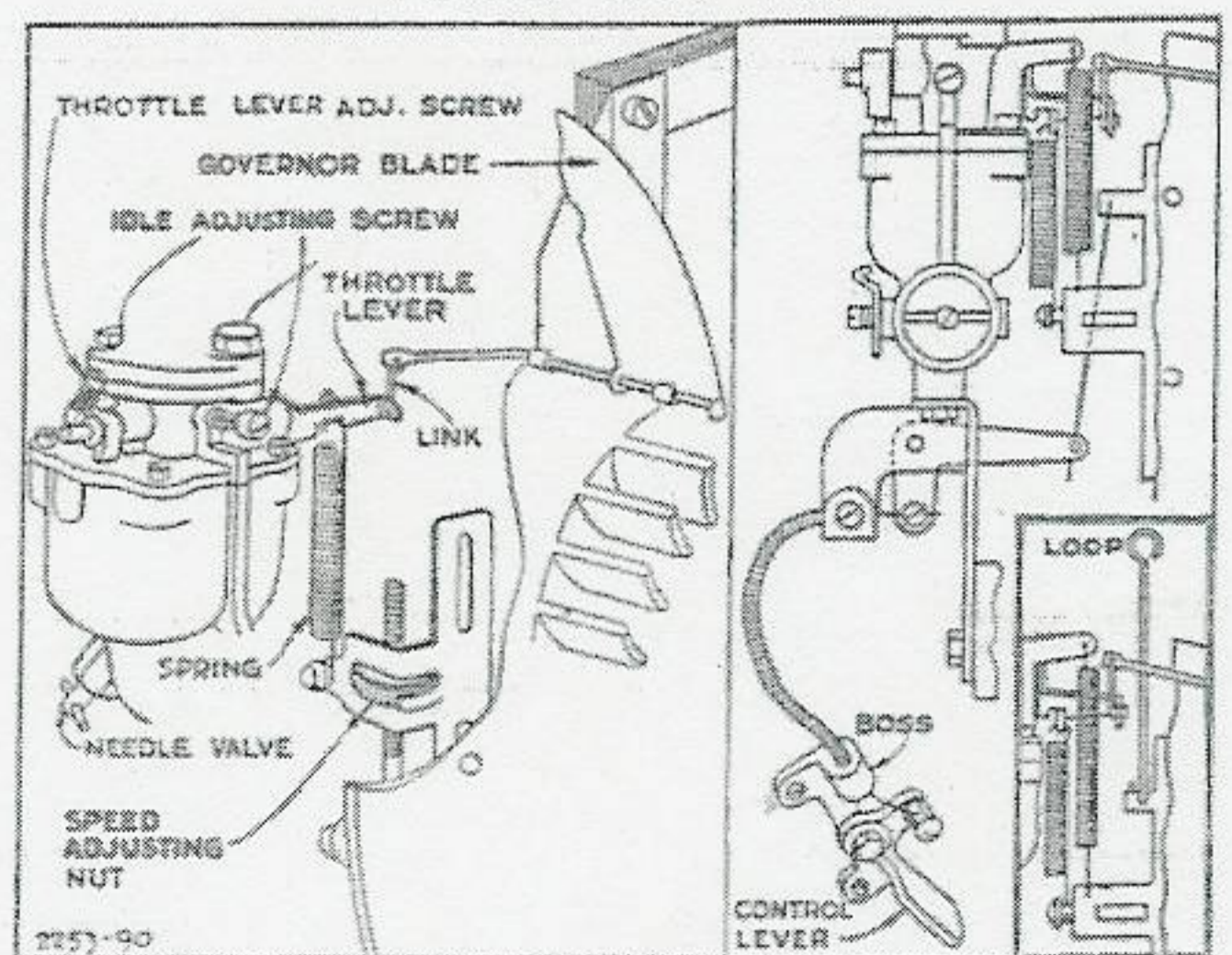


Plate No. 18B

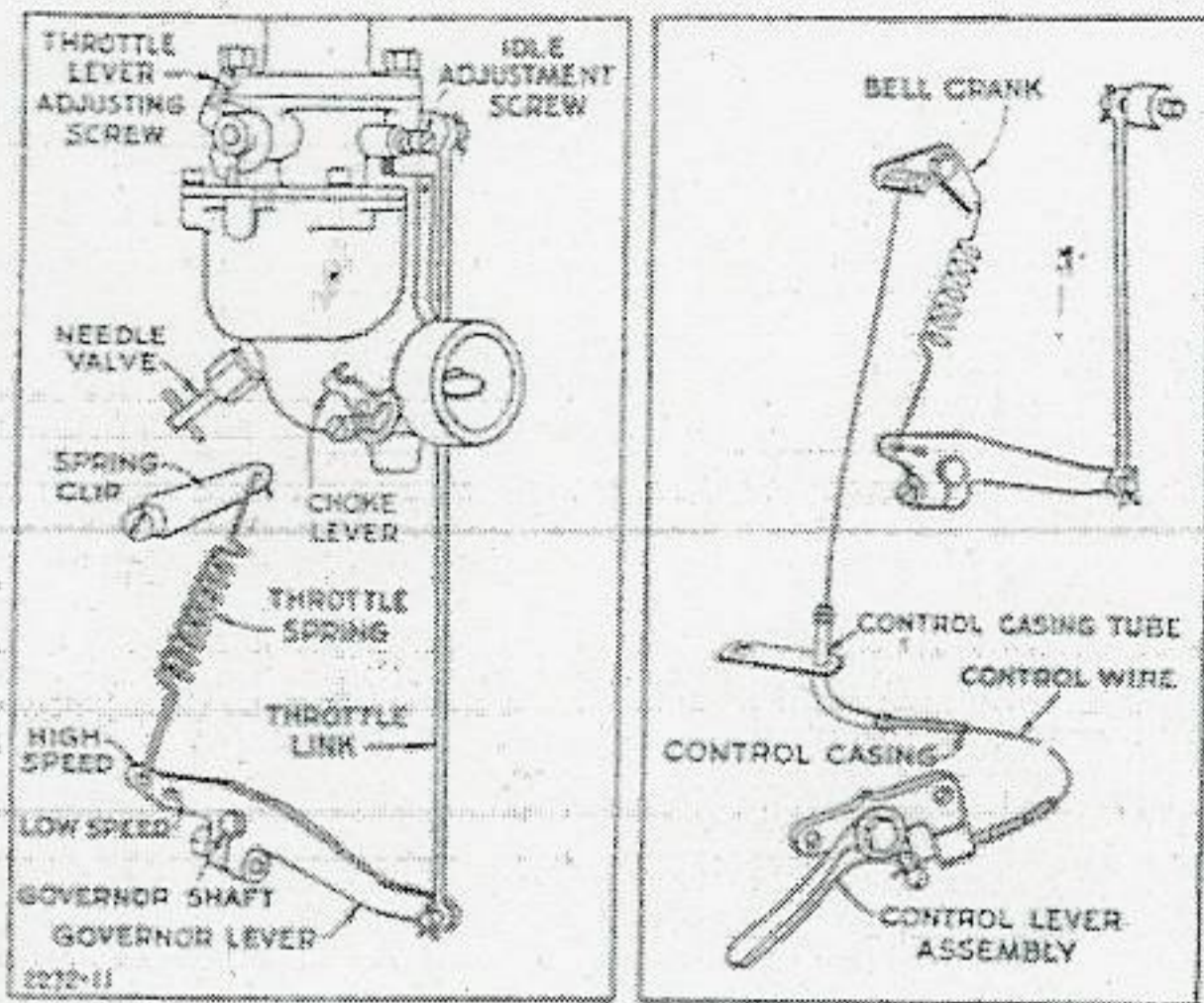


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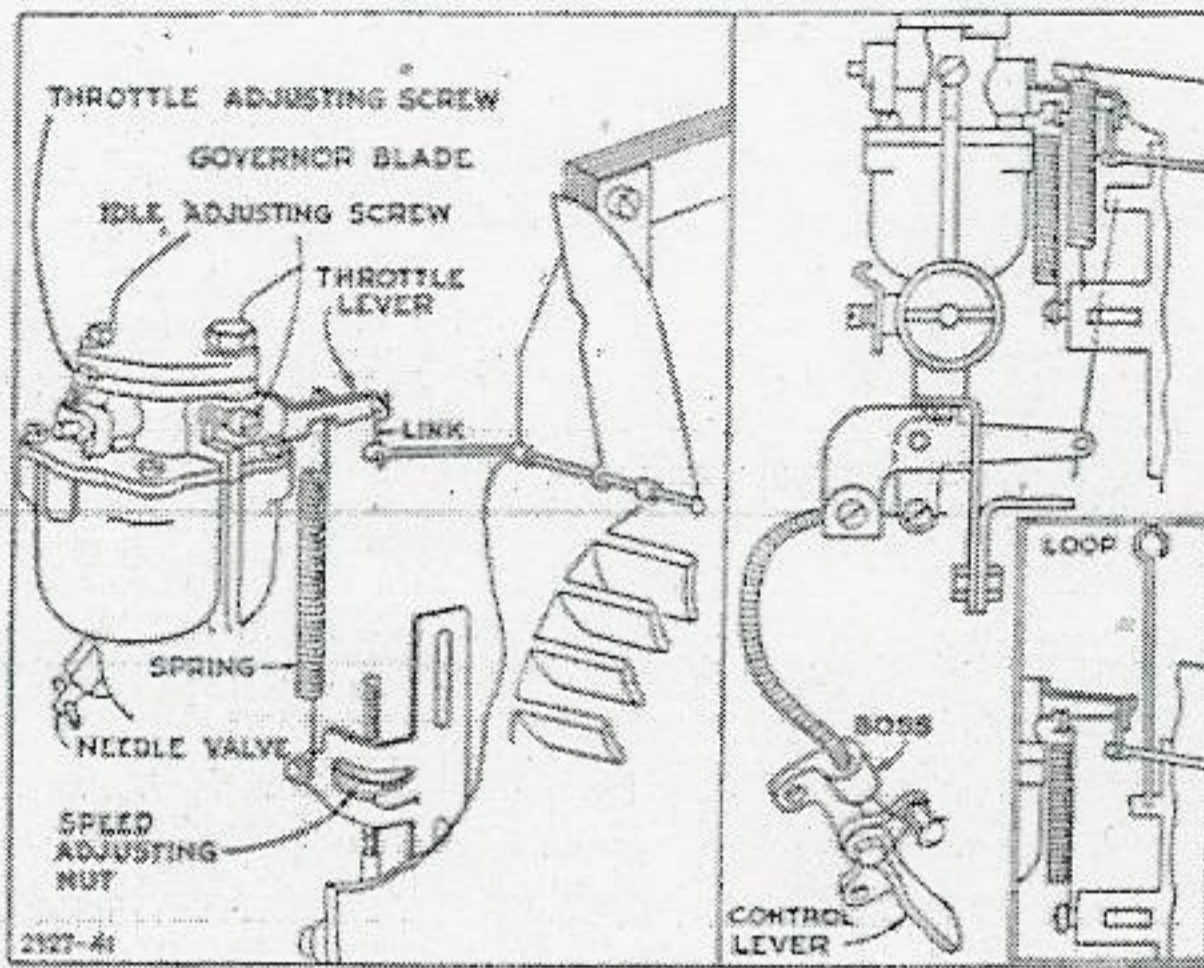


Plate No. 18D

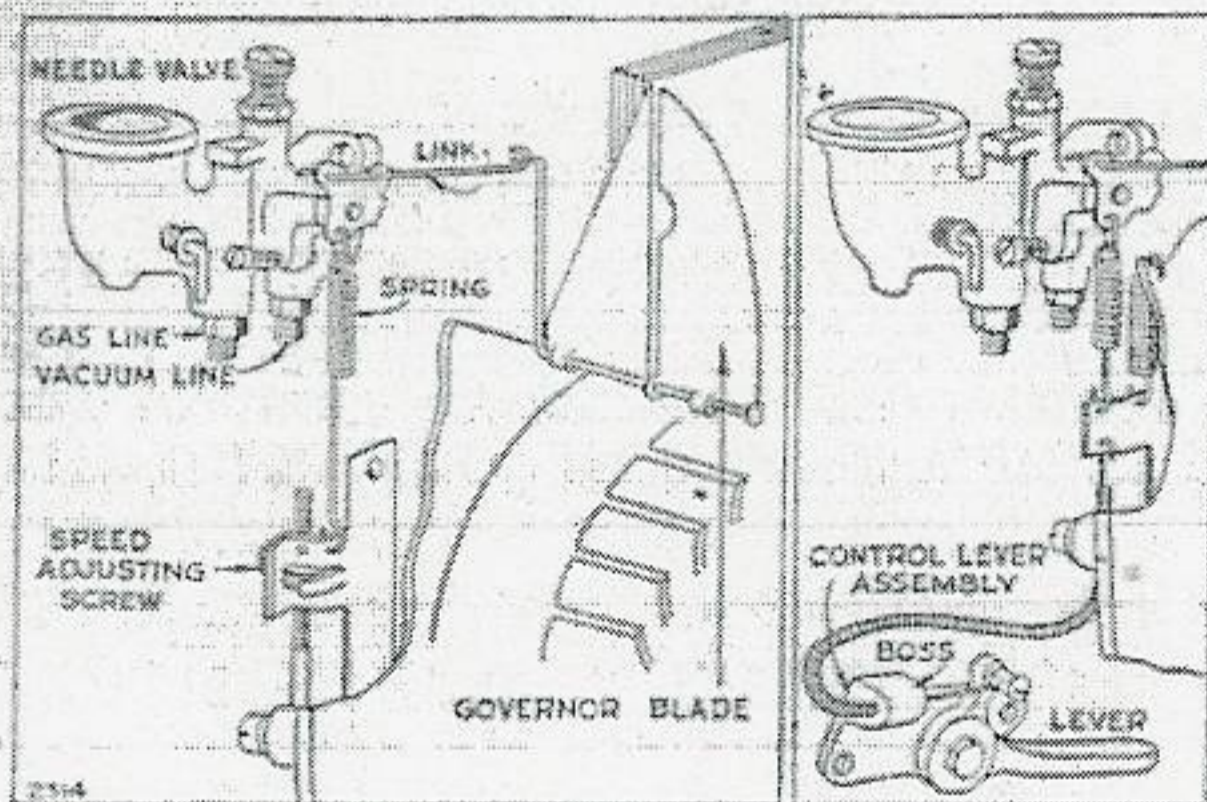


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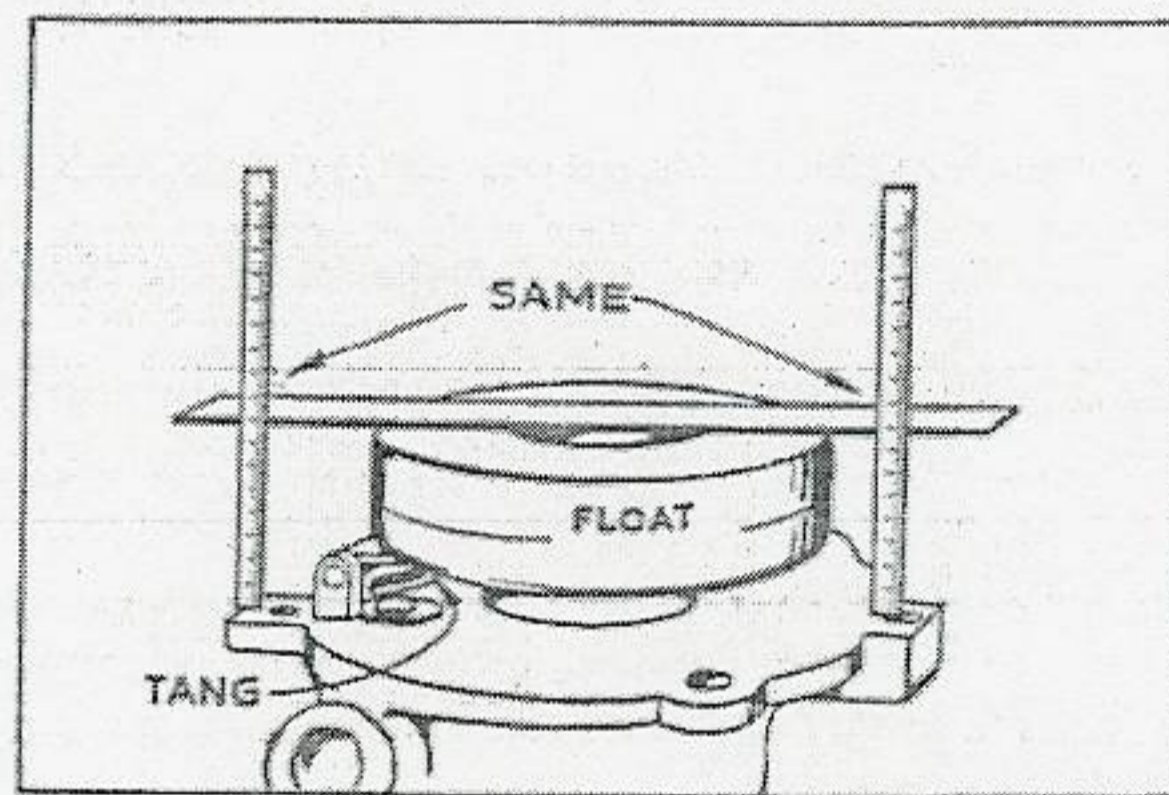


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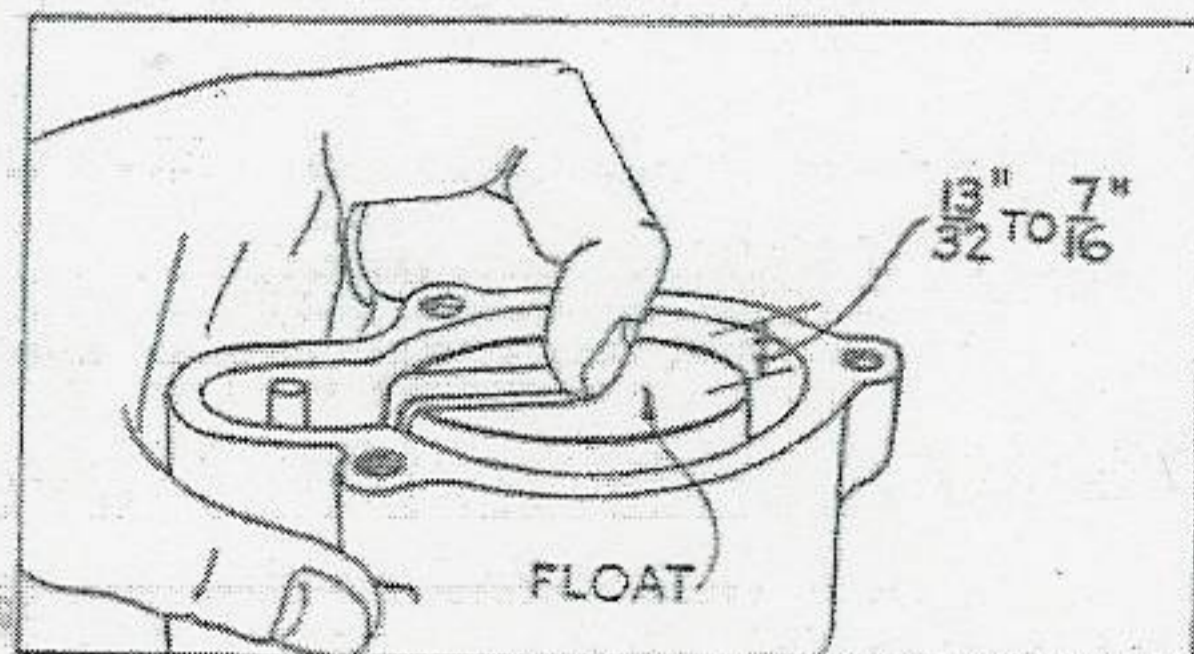
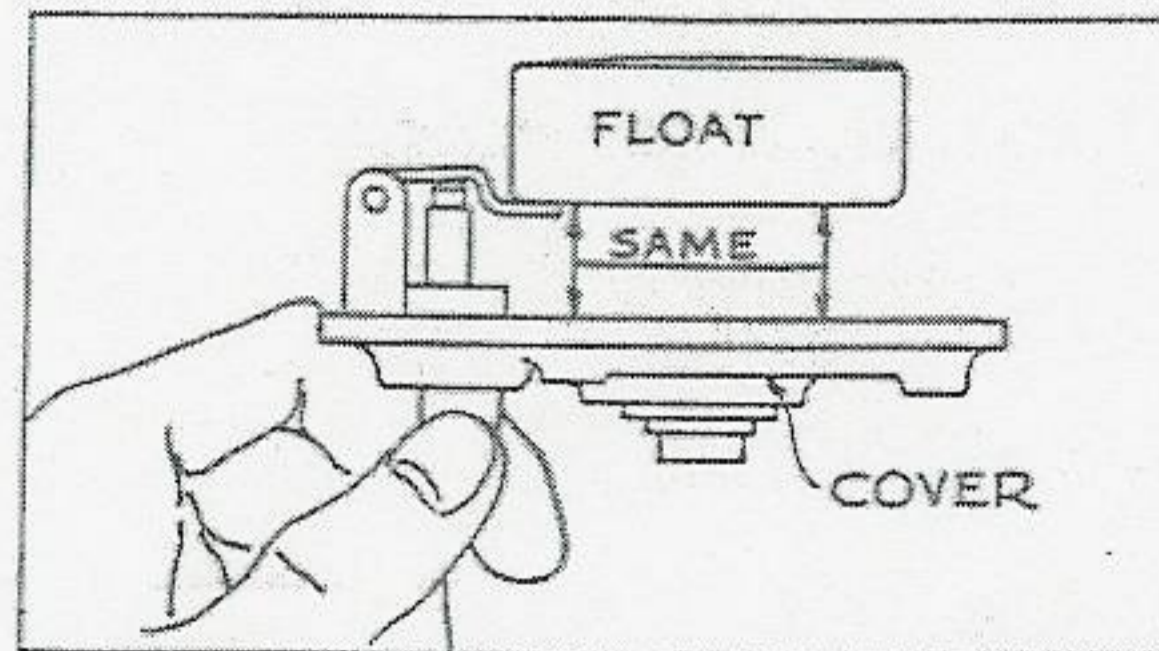


Plate No. 18G



GOVERNORS (MODELS N-I)

Instructions for Correcting Lag in Governor Operation and Throttle Hunting

Plate No. 18H

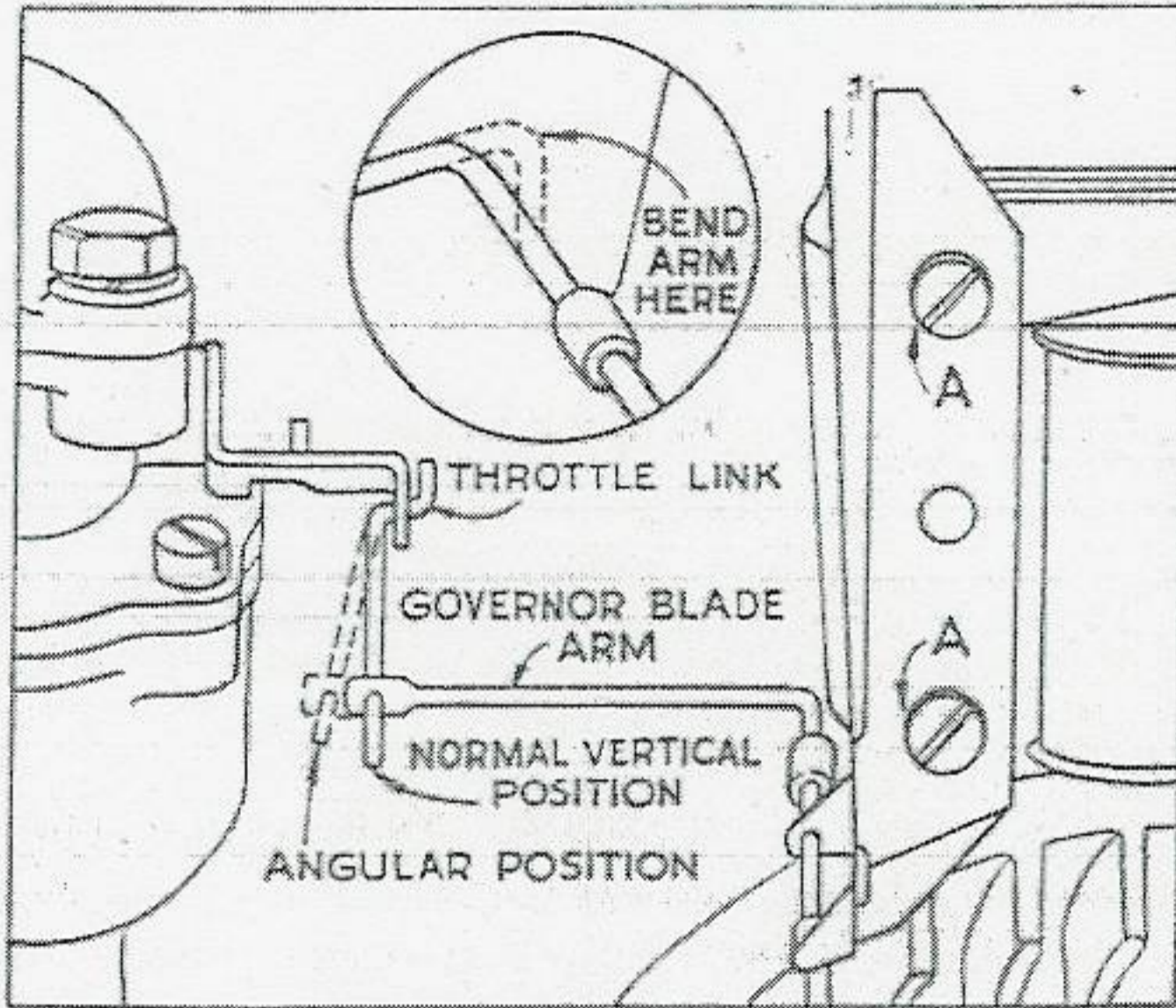


Plate No. 18I

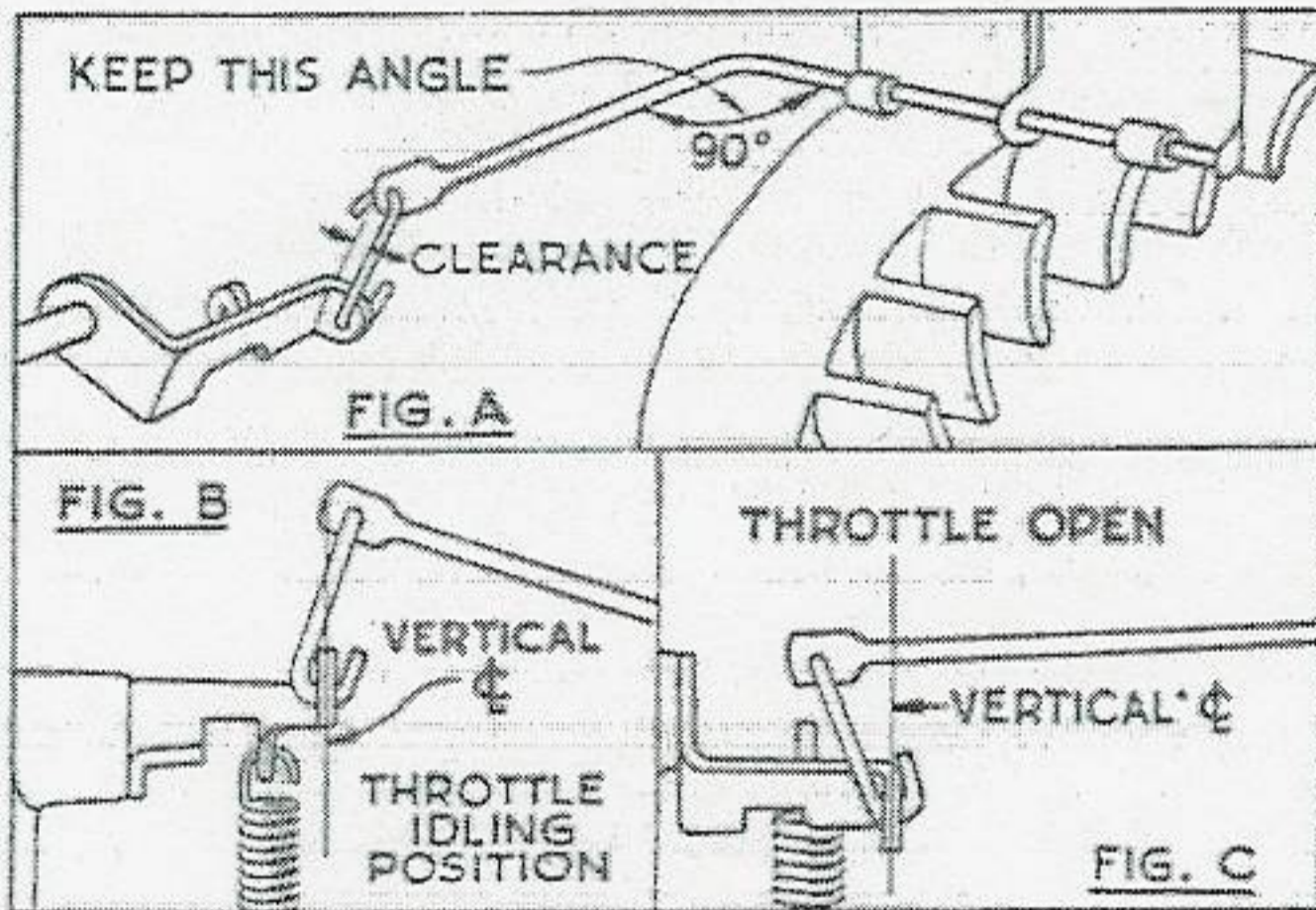
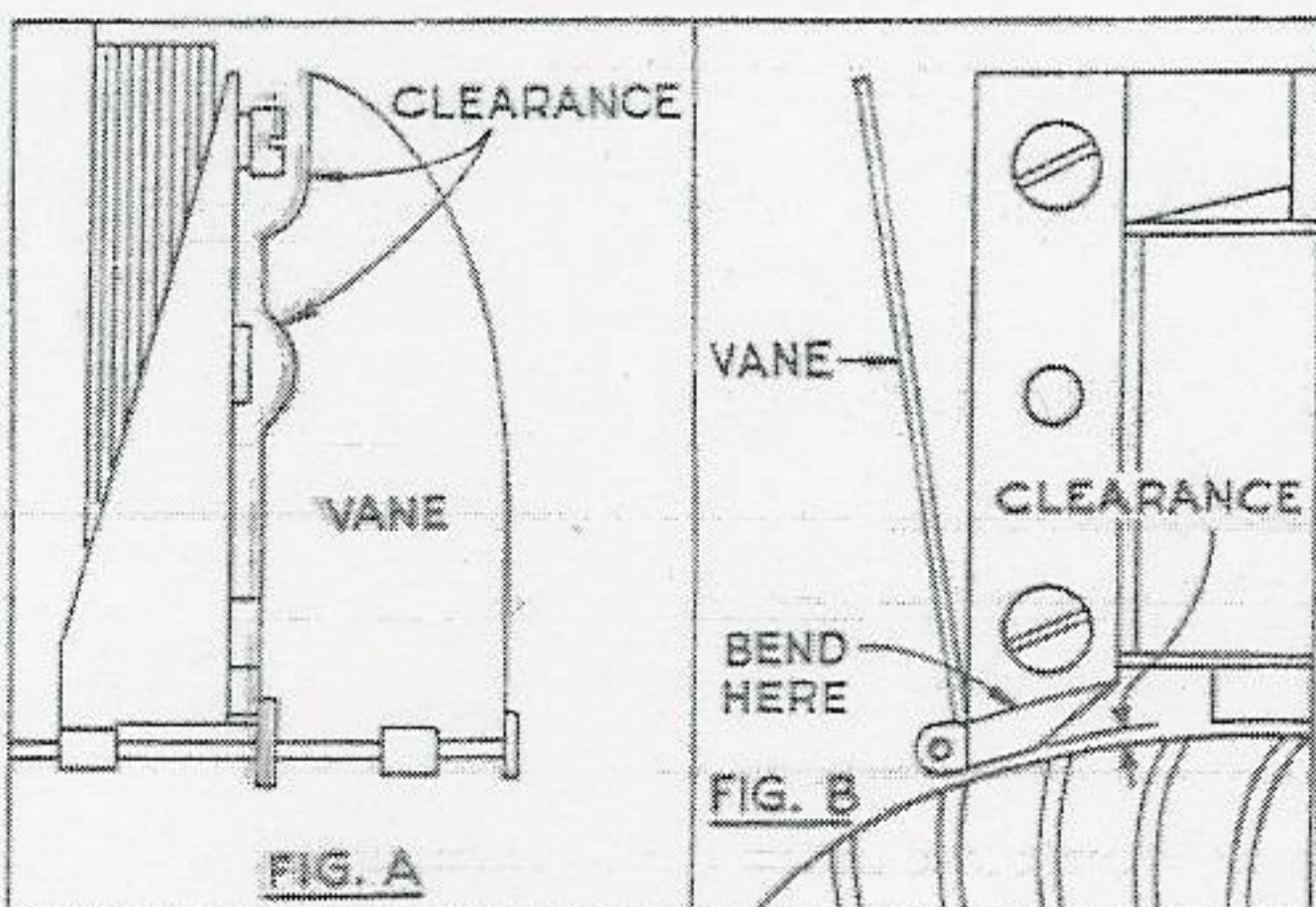


Plate No. 18J



Model—N

TO CHECK ANGULARITY OF THROTTLE LINK. Remove blower housing. The throttle link should be in a vertical position when looking at it from the magneto side. If it is in an angular position, remove governor blade assembly by removing two screws marked "A", then unhook governor link from governor blade arm. Bend governor blade arm sufficiently at point shown to bring link back to vertical position. This may require several trials. See Plate No. 18H. In reassembling, governor blade arm should be below carburetor throttle lever.

Model—I

TO CHECK ANGULARITY OF THROTTLE LINK. Remove blower housing. The throttle link, when observed from the carburetor side of motor, should clear the throttle lever as shown in Plate No. 18I Fig. A, when throttle is in wide open position. The angle of the governor blade arm should be as close to 90° as possible. When looking at the throttle link from the magneto side and with carburetor throttle in wide open position, the link should be in a slight angular position to the left of the vertical center line. See Fig. C, Plate No. 18I. In the idling position it should be approximately an equal amount to the right of the vertical center line. See Fig. B, Plate No. 18I. Bend governor blade arm as on model "N" to correct angular position of throttle link. See Plate No. 18H. In reassembling governor, blade should be above throttle lever. See Plate No. 18I Fig. A.

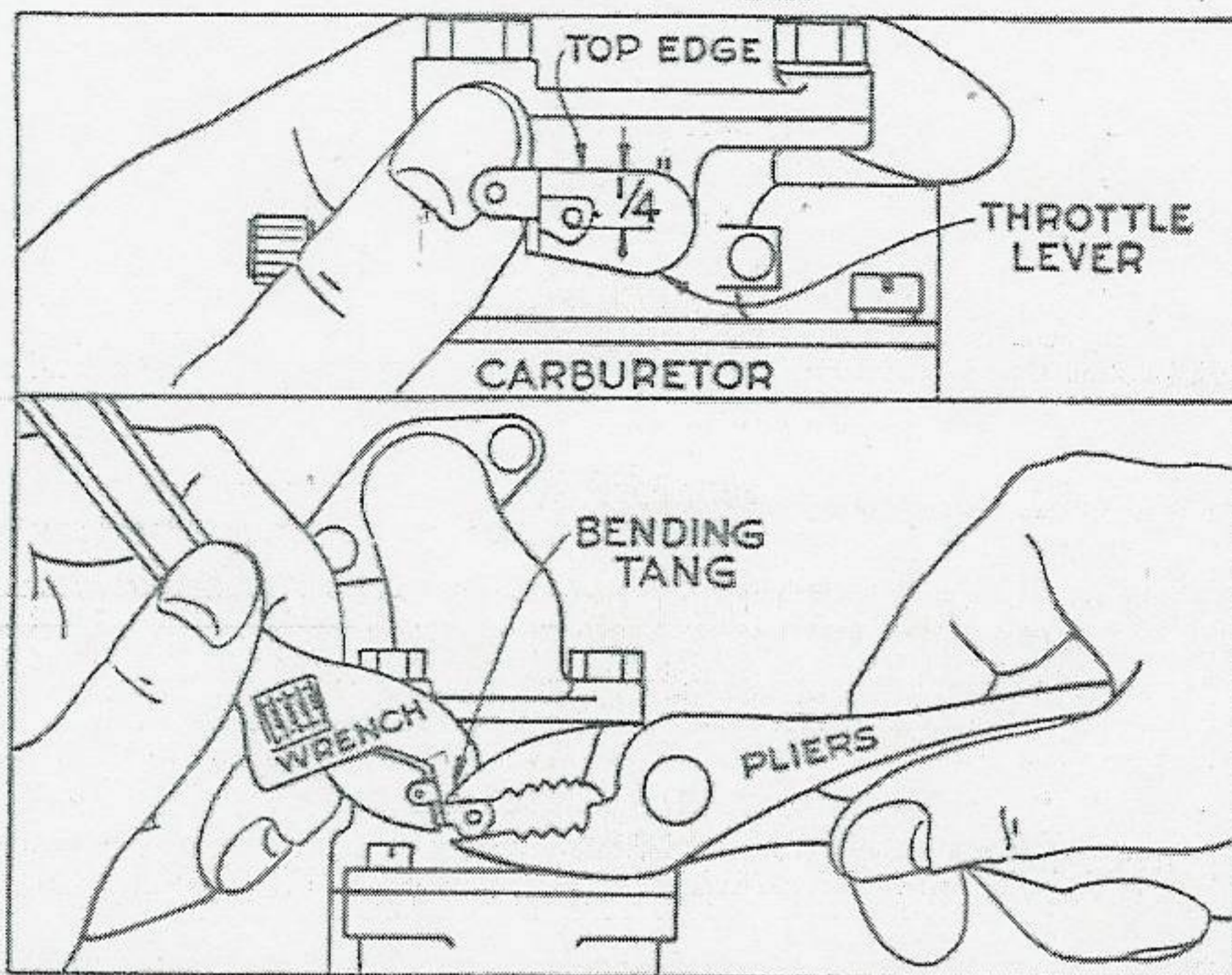
Models N—I

TO CHECK GOVERNOR BLADE CLEARANCE. Turn carburetor throttle lever so as to move governor linkage from idling to wide open position and check to see if governor vane clears armature core and screws. See Plate No. 18J Fig. A. If it does not clear, bend governor vane bracket or file blade enough to clear. Do not bend bracket too far or it will rub on flywheel. See Plate No. 18J Fig. B.

(See other side)

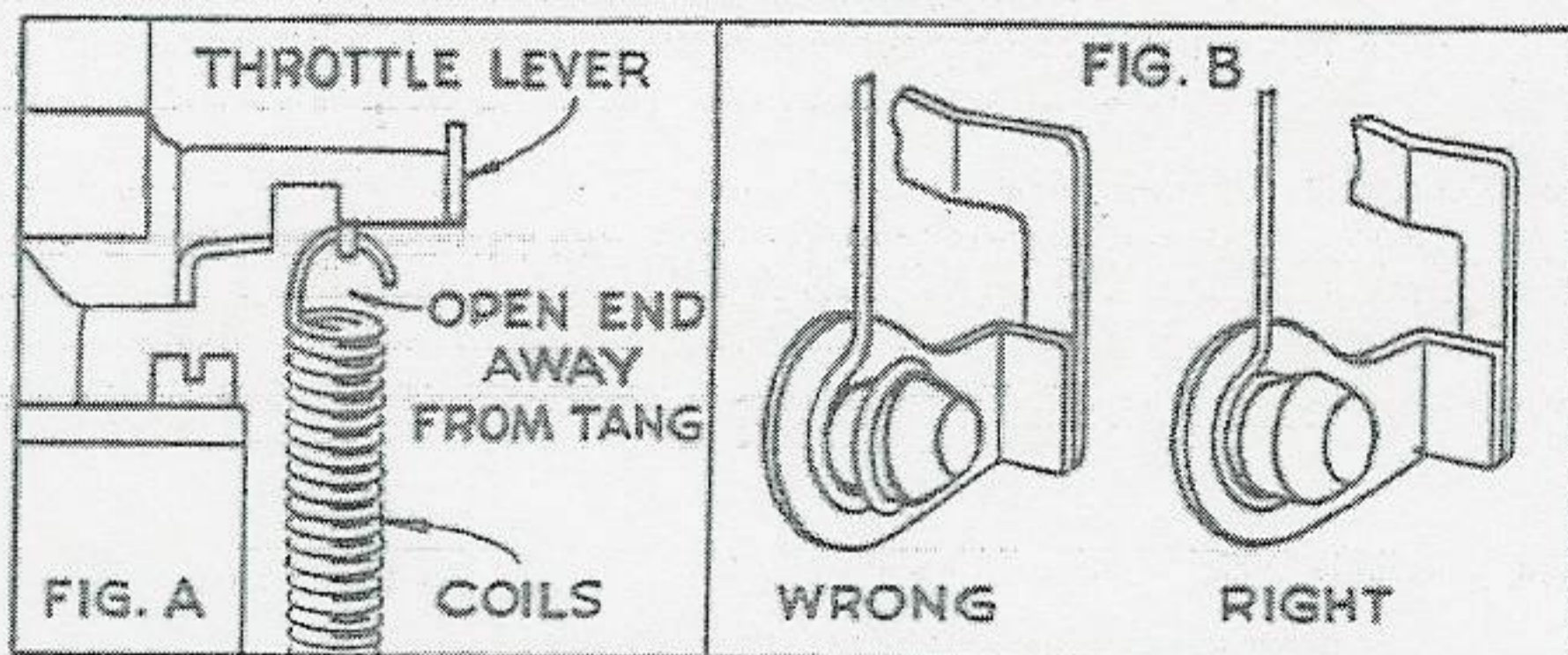
GOVERNORS (MODELS N-I)

Plate No. 18K



TO CHECK POSITION OF THROTTLE SPRING TANG ON LEVER (Models N-I)
 Remove carburetor from motor and measure the distance from the top edge of throttle lever to the bottom of the throttle spring hole in tang. This distance should be $\frac{1}{4}$ ". If not, take steps to correct it by bending tang down with a crescent wrench and pliers. See Plate No. 18K Solder the neck of the tang, if it cracks in bending.

Plate No. 18L



TO CHECK THROTTLE SPRING (Models N-I)

Be sure the coils of the throttle spring on these motors do not touch any object that might restrict free spring action. The loop at the lower end of the spring which is coiled should not be spread for it then acts as a compression spring and causes binding on shifter plate knob. See Plate No. 18L Fig. B.

On model "I" motors assemble throttle spring to lever with open end of the top loop toward end of lever as shown in Fig. A, Plate No. 18L
TO RELEASE AIR TRAPPED IN FILTER BOWL. If air bubbles appear in bowl after assembling parts and opening gas tank shut-off valve, loosen thumb nut until gasoline overflows the filter bowl.

Ignition Test. To prove that a satisfactory spark is being delivered by the magneto, remove ignition cable from spark plug and while motor is running, place guage (MPJ-T7) as shown in Plate No. 19. If spark jumps gap without missing, ignition system is O.K. However, if motor cannot be started, test the spark by removing ignition cable from spark plug and holding it about 1/8" from any metal part of the cylinder head, as shown in Plate No. 20. Turn motor and if spark jumps the gap, the ignition system, with possible exception of the spark plug, is O.K.

Plate No. 19

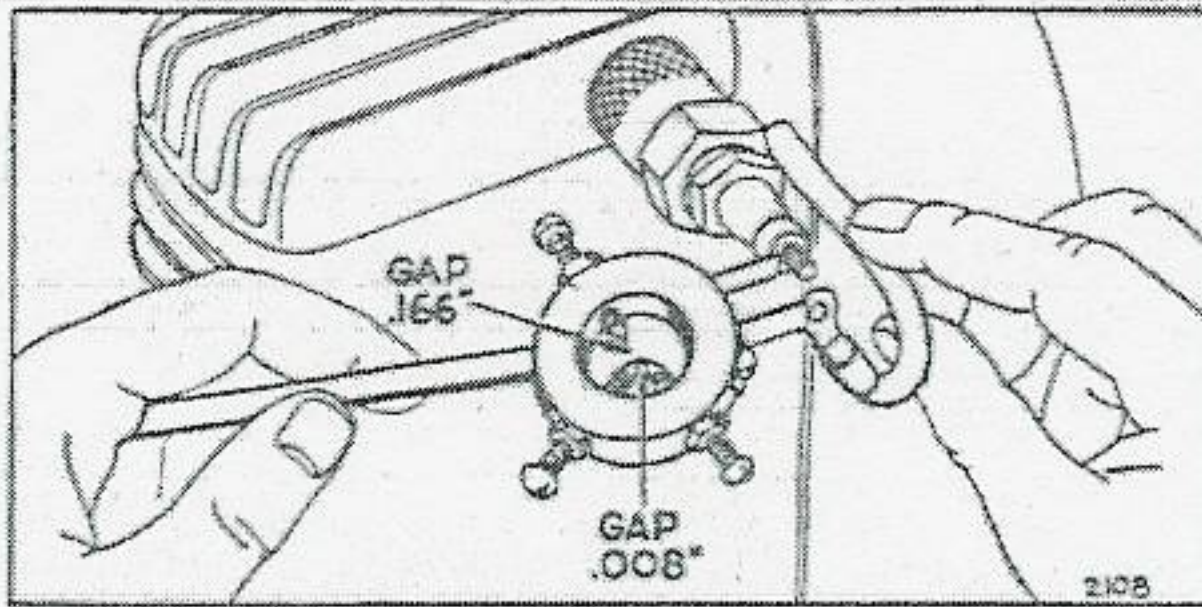
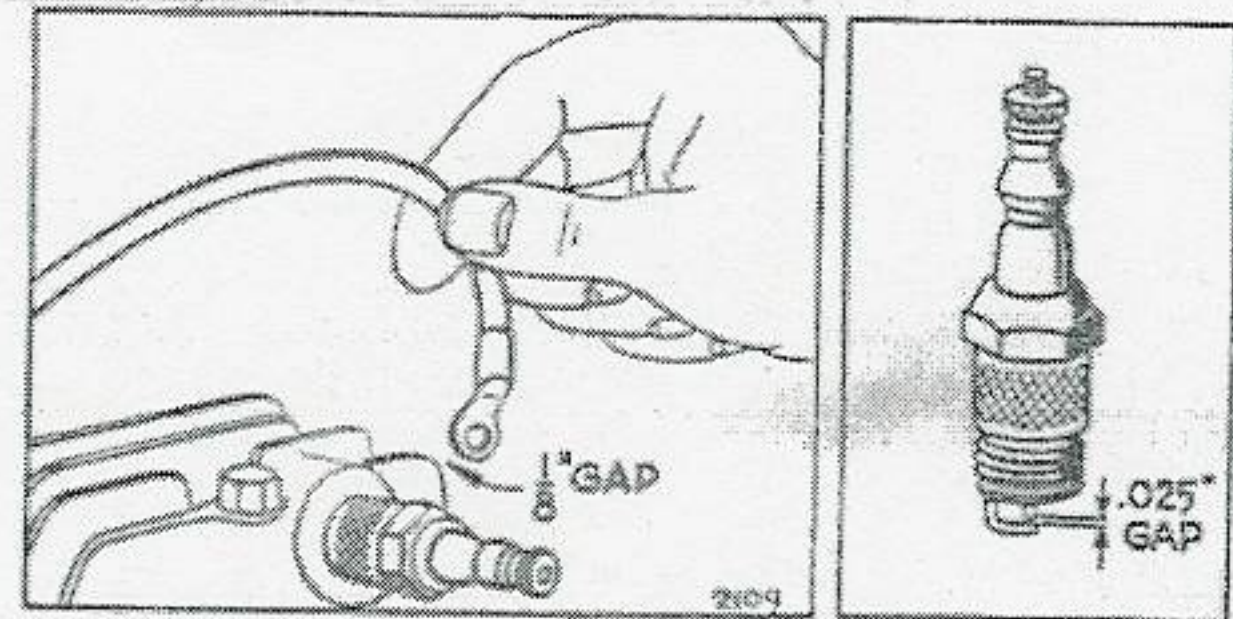


Plate No. 20



Spark Plug. Check for broken porcelain and burned points. Clean and then adjust gap to .025". When replacing spark plug be sure that it is of proper specification (as below), or exact equivalent, with gap properly adjusted. On Model FI check spark plug firing hole in cylinder head. If larger than 1/4" install a spark plug nipple (part No. 67773).

Model Motor	Auto-Lite	Champion	Gap
I-IB-IBHP-IBLP-IBP-IL-ILR6-IMT-IP-IR6-IS-N-NP-NR2-NR6	AN-7	J8	.025"
U-UR2-UR6-WBG-WI-WIBP-WM-WMB-WMG-WMI-WMIP-WR6	AN-7	J8	.025"
AHM-AHMT-AM-AMT-BHM-BM-BMG-FI-HM-KM-R-RC-ZHM-ZM		7	.030"
All other Models		6M	.025"

Ignition Cable. Ignition cable must not be oil soaked, deteriorated, or broken. This condition will ground the spark. End of cable must be securely wound around high tension terminal of the coil, and soldered.

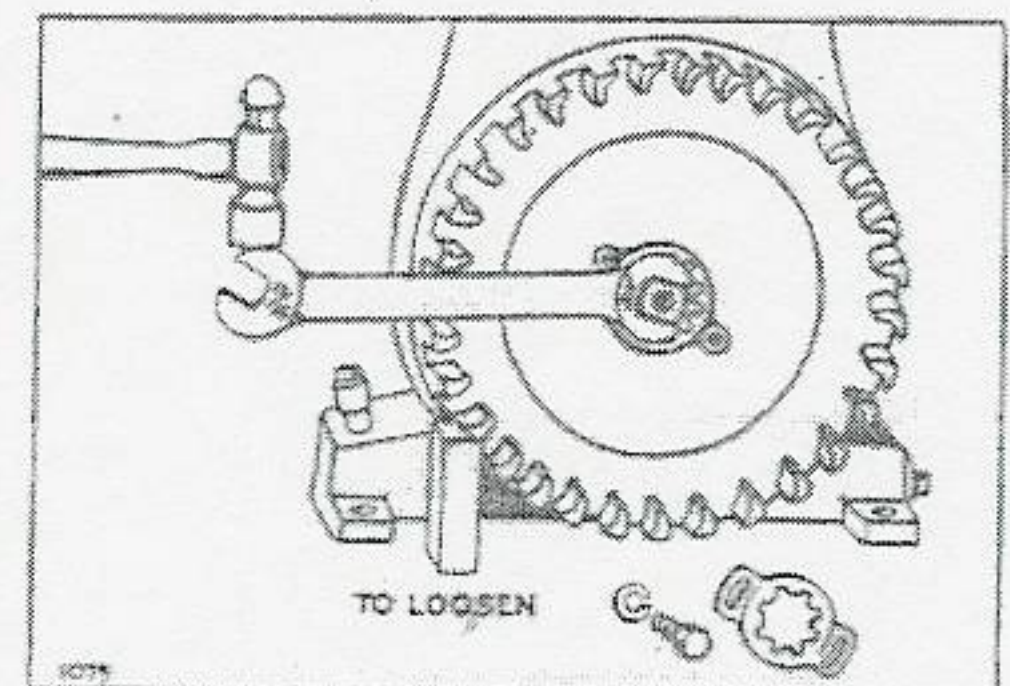
FLYWHEELS

(To Remove, Assemble or Repair)

Model A

The flywheel is securely mounted to the crankshaft by means of a taper fit, a soft flywheel key, right-hand threaded starter pulley and lockwasher or crank pinion gear and lock or ratchet nut. Remove the blower housing, placing a wood block under flywheel fin on left side of flywheel to hold it rigid and prevent turning. See Plate No. 21.

Plate No. 21



FLYWHEELS (Model A Cont'd.)

On crank starter motors remove cap screws and pinion locking plate. Place a 3/4" open end wrench on starter pinion and tap lightly. Tap carefully so that you do not break a flywheel fin. Remove flywheel with flywheel puller (No. 29157). This puller is provided with each motor.

On rope starter motors place a long bar or a heavy screw driver through hole in starter pulley. Tap bar or screw driver lightly, being careful not to break flywheel fin. After removing pulley, remove the screws and lockwashers so that flywheel puller (No. 29157) can be used to remove flywheel.

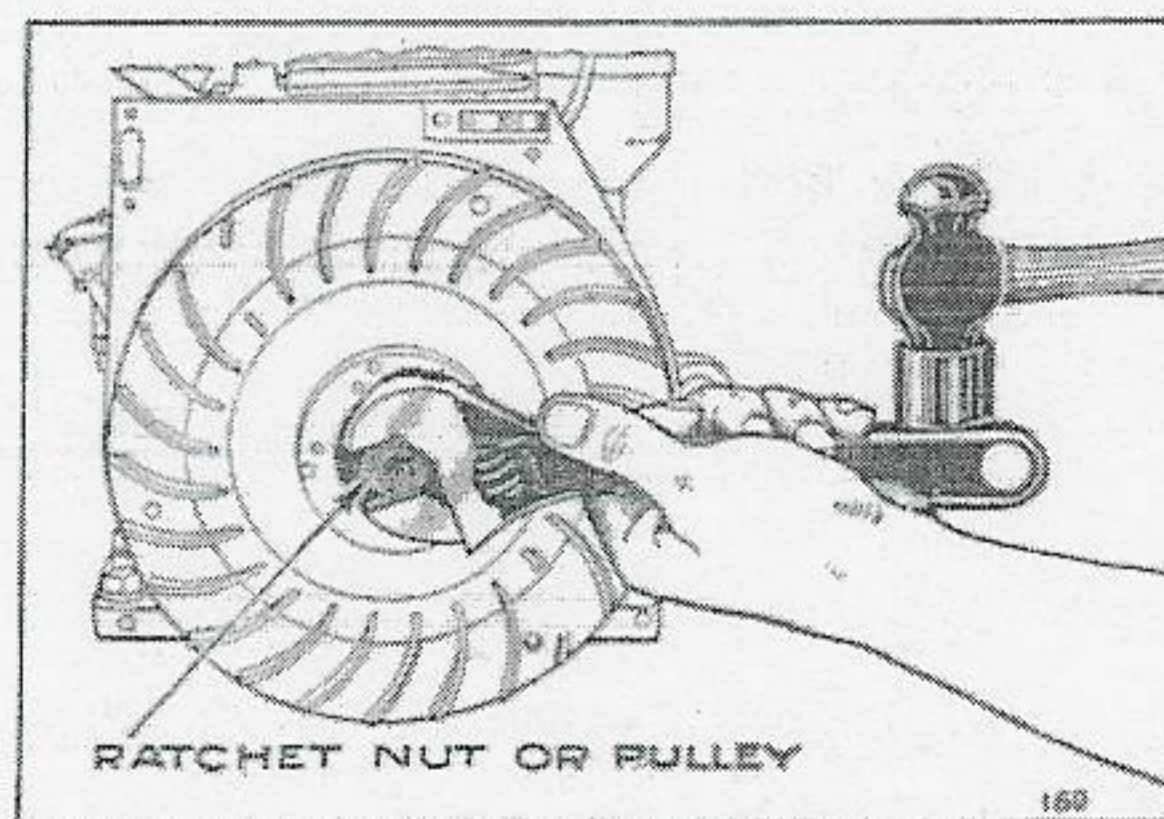
On hand lever starter motors remove ratchet nut, use a 1" open-end wrench. To start nut, tap end of wrench lightly with hammer, being careful not to break flywheel fin. Remove nut and ratchet, pawl assembly and spacer. Then remove the screws and lockwashers so that flywheel puller (No. 29157) can be used to remove flywheel.

To assemble, locate flywheel on crankshaft with key (No. 66403). Reverse operations given in above paragraphs. Draw starter pulley, pinion or ratchet nut up very tight by tapping bar or wrench handle with hammer.

Models AGR-FH-FHI-FI-FJ1&2-L-M-PB-Q-R-S-T-W

The flywheel is securely mounted to the crankshaft by means of a taper fit, a key, a right-hand threaded nut and a lockwasher. Remove blower housing and loosen ratchet nut by using a 7/8" T or L-socket wrench, holding flywheel as shown in Plate No. 22, and tapping wrench with hammer. Loosen nut two turns so that end of crankshaft will not be battered. Then strike nut with a wooden or rawhide hammer to loosen flywheel.

Plate No. 22



Model B

To assemble, locate flywheel on crankshaft with key (No. 66403) and install flywheel washer, starter pulley, starter ratchet parts, lockwasher and nut. Draw nut up very tight by tapping wrench with hammer.

The flywheel is securely mounted to the crankshaft by means of a taper fit, a soft key, a right-hand threaded nut, and a lockwasher on rope starter motors, and by a pinion gear and lock on crank starter motors.

On rope starter motors place a rod or punch through the 3/8" hole in the blower housing at gas tank side, so that it passes between

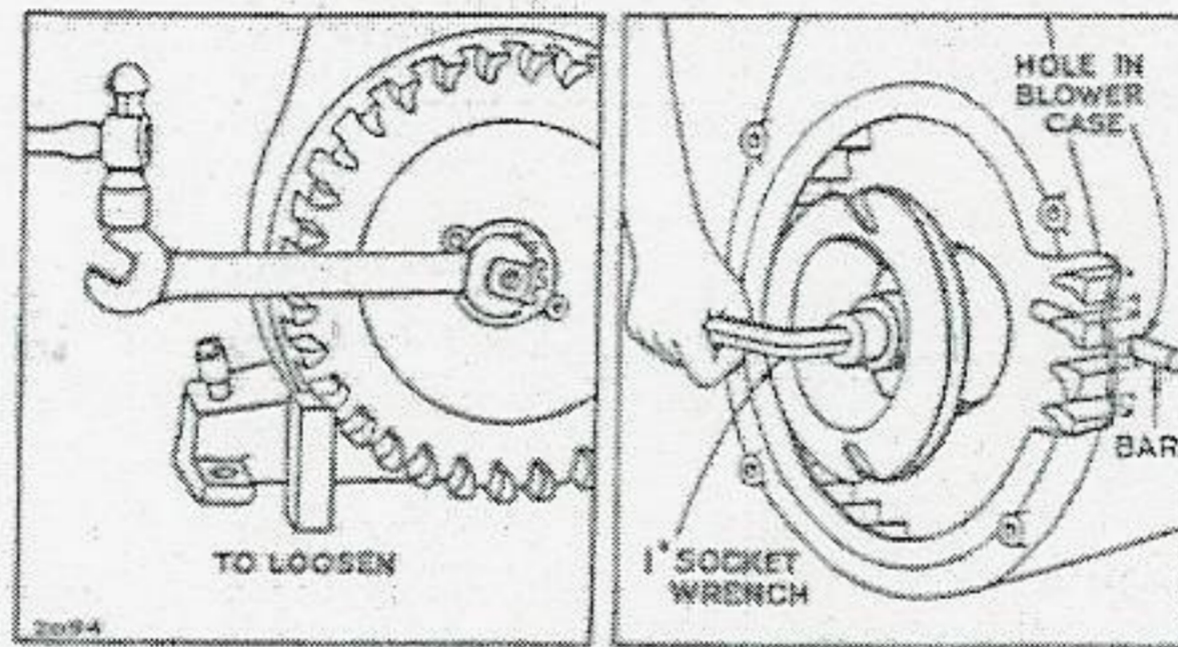
FLYWHEELS (Model B Cont'd.)

fins of the flywheel. See Plate No. 23. Use a 1" socket wrench with a T or L-handle. Tap wrench to remove nut and pulley. Use puller (No. 29157) to remove flywheel.

On crank starter motors remove blower housing. Then remove cap screws, lockwashers, and pinion gear lock. Place a wood block under flywheel fin, see Plate No. 23. Use a 3/4" open end wrench on starter pinion and tap lightly. Remove flywheel with flywheel puller (No. 29157).

To assemble, locate flywheel on crankshaft with key (No. 66403). Reverse operations given in above paragraphs. Draw nut or starter pinion up very tight by tapping wrench with hammer.

Plate No. 23



Models H—Y

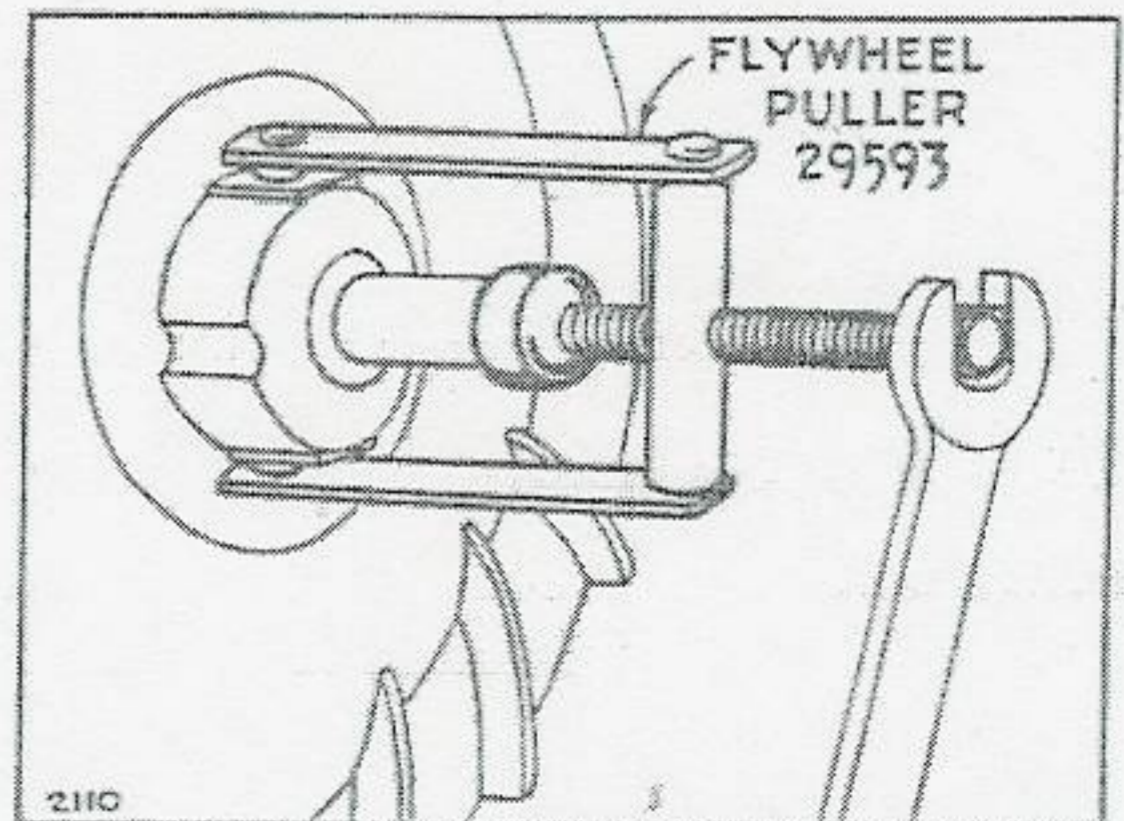
The flywheel is mounted to the crankshaft with a bolt and nut. Remove the starter lever, pedal or pulley and blower housing. Loosen flywheel nut and bolt so that you can remove starter clutch assembly. Mark flywheel and crankshaft on the bolt head side. The flywheel hub has two shoulders, the one on the bolt head side is higher than the other. Remove nut and bolt. Use flywheel puller (No. 29593). See Plate No. 24.

To assembly reverse operations - be sure the bolt head is to the side with the high shoulder.

If the crankshaft extension is more than .001" undersize or less than low limit of .936" on 75% of its surface the crankshaft must be replaced with a new one. A loose flywheel fit on the crankshaft also indicates that flywheel replacement is necessary.

To check bolt hole, file roughness from both edges of bolt hole in crankshaft. Insert new flywheel bolt in crankshaft bolt hole before flywheel is mounted. If the bolt enters bolt hole with either a press or slip fit (without side play) it is not necessary to ream bolt hole.

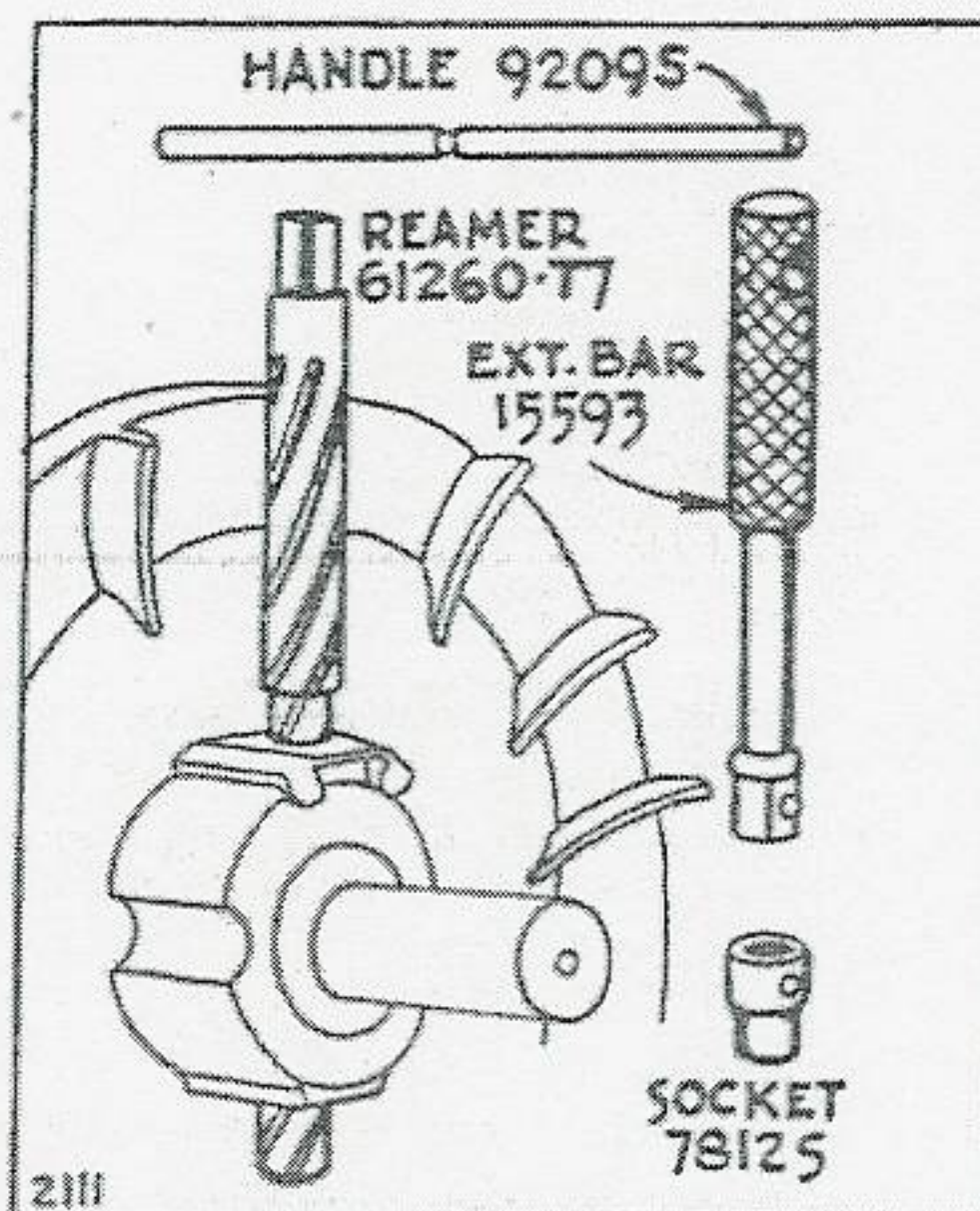
Plate No. 24



FLYWHEELS (Models H—Y Cont'd.)

Plate No. 25

However, if the flywheel bolt hole in the crankshaft is worn eggshape, or bolt fits loosely, the hole in both flywheel and crankshaft must be reamed oversize for oversize bolt (No. 91681). To do this, assemble retainer clip and flywheel to crankshaft and ream all holes in one operation as shown in Plate No. 25. The latest type oversize flywheel bolt (No. 91681) has an O.S. stamped on its head. The early type can be identified by the painted red head. If a motor is received with a bolt that has an O.S. stamped on the head, or the head painted red, and the bolt is loose in either the crankshaft or the flywheel, replacement of the worn part is necessary.

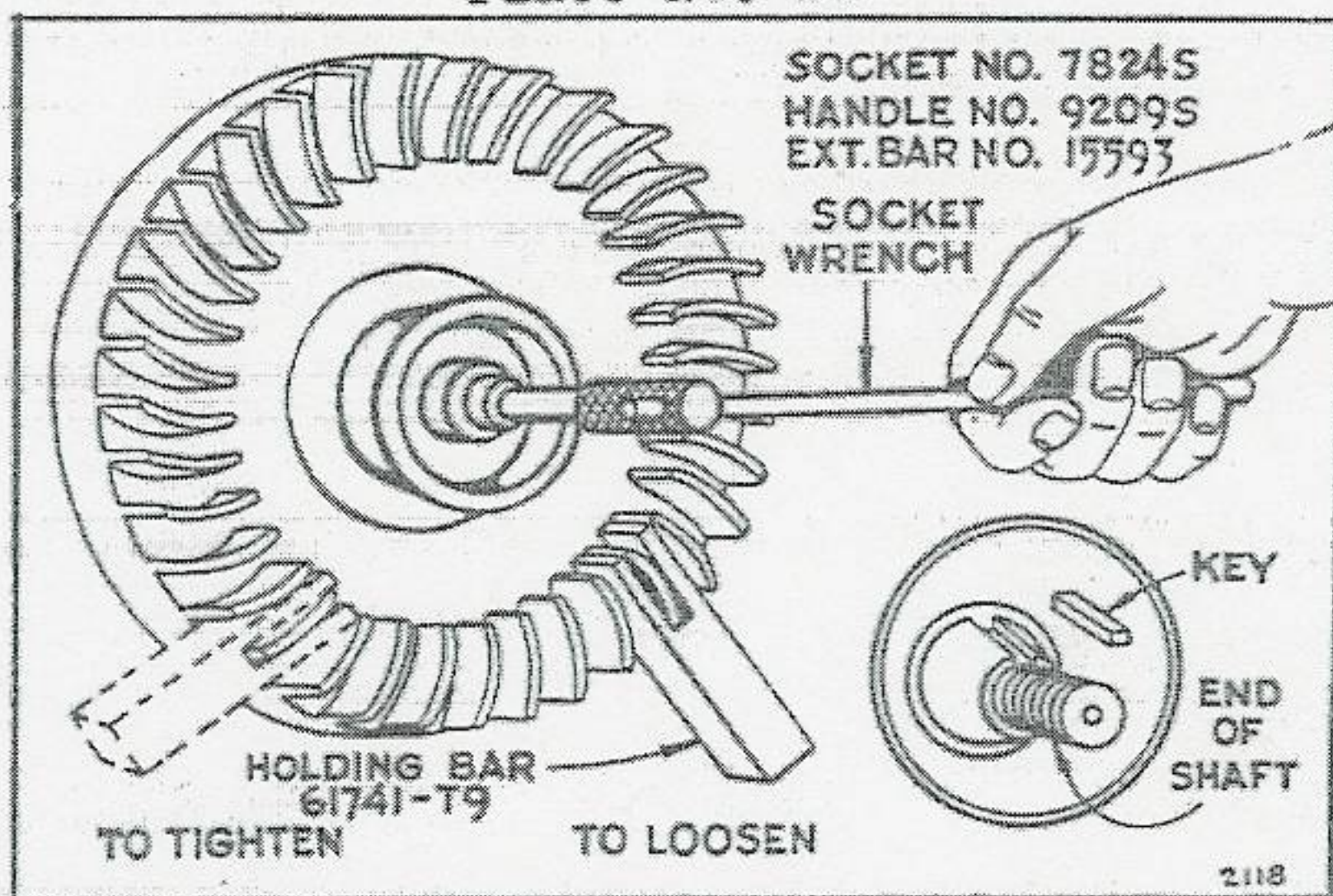


Models I—N—U—WI—WM—WMB—WMI

The flywheel is held in place by means of a taper fit, soft key, washer, and a left-hand threaded nut. To remove flywheel, use tools shown in Plate No. 26. Loosen flywheel nut about 1 turn then strike nut with a wood or rawhide mallet.

To assemble flywheel, reverse above operations with flywheel holding-bar in position shown by dotted line in Plate No. 26.

Plate No. 26



Models K—Z—ZZ

Follow instructions for Model B (pages 20 and 21), except use hole drilled in flywheel, in place of fins, to lock flywheel on rope starter motors. Use 1-1/16" socket wrench and (No. 29020) flywheel puller.



CONTACT POINTS
(To Check and Adjust)

Turn crankshaft to see if points open and close properly. Points must be clean and line up squarely to make good electrical contact. To clean, use fine sandpaper or fine grit hone - do not use file. If either or both contact points are burned or pitted, always replace both.

Turn crankshaft until contact points are at their widest gap and adjust all models to gap of .020" as follows:

Models A-B-H-K-Y-Z-ZZ

Line up contact points by loosening contact spring bolt. Then move contact spring assembly to line up with contact screw point. Tighten contact spring bolt. To adjust contact spring tension place 1/16" gauge between contact spring and round end of contact block, then tighten contact block screws. Check to see that 12 to 16 oz. tension just opens points. Turn contact screw to secure .020" gap and tighten locknut against lockwasher. See Plate No. 27. If either point becomes badly pitted or burned, replace both points (Nos. 63238 and 69754).

Models FH-FI-FJ1&2-L-M-PB-Q-R-S-T-W

Loosen contact bracket screw, move contact bracket point to or from breaker arm point to obtain a gap of .020". Securely tighten contact bracket screw. See Plate No. 28.

Plate No. 27

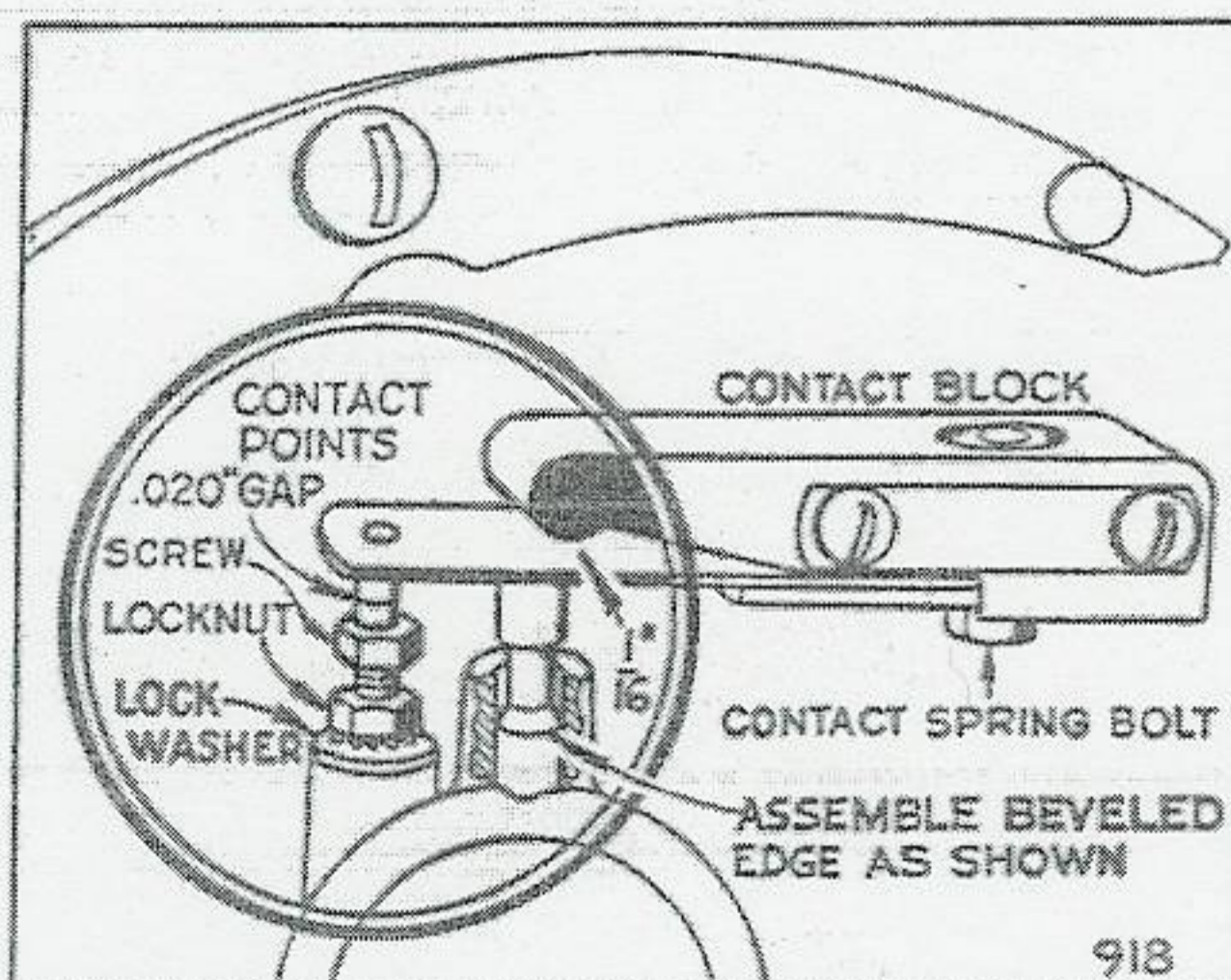
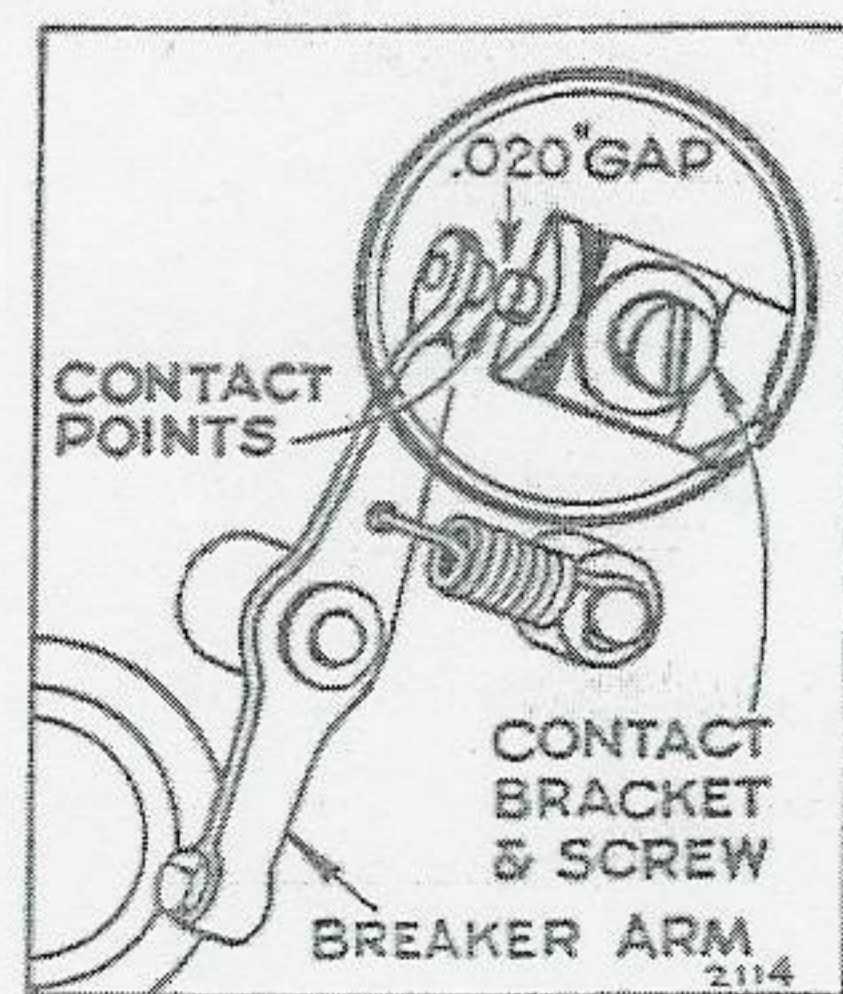
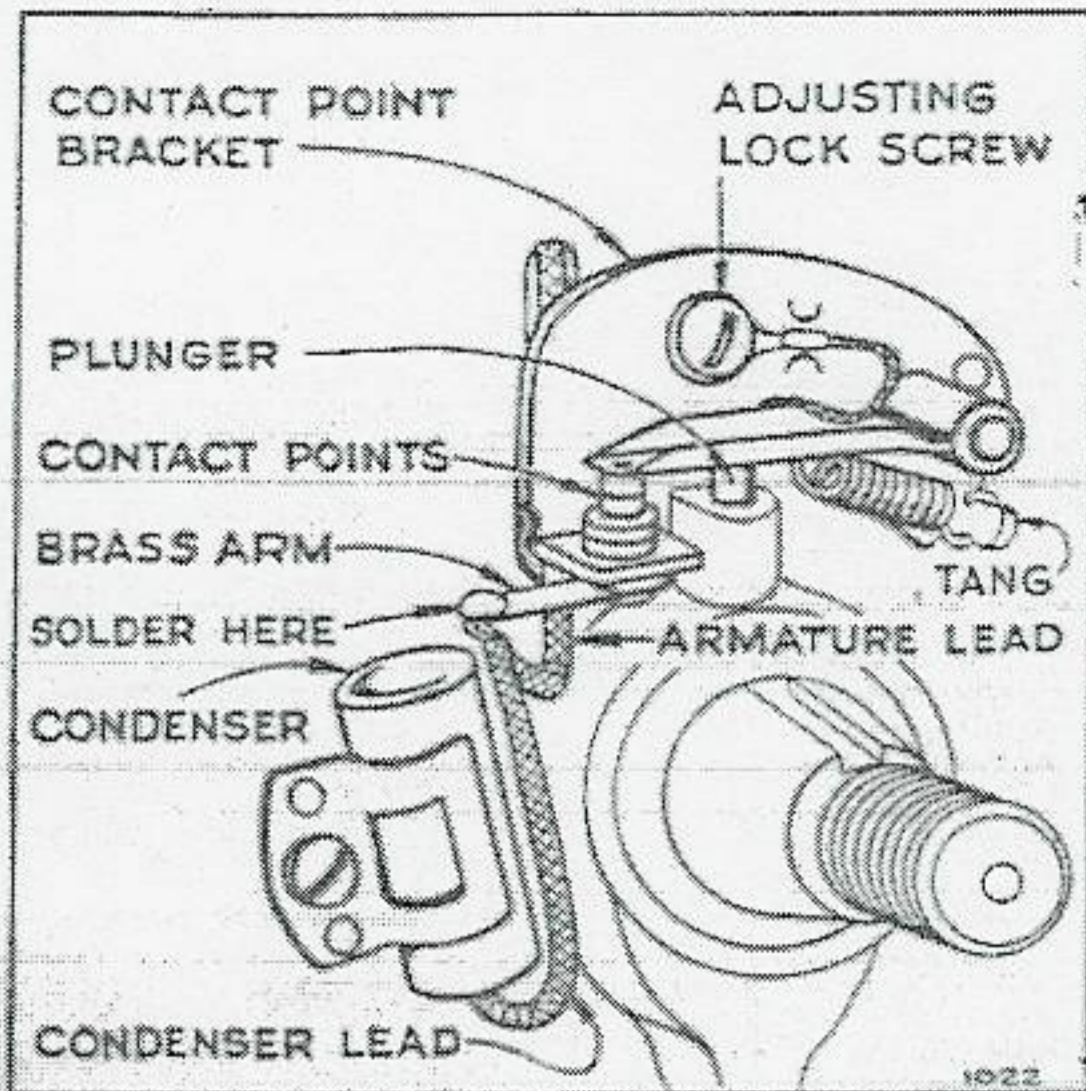


Plate No. 28



CONTACT POINTS

Plate No. 29



Models I-N-U-WI-WM-WMB-WMI

Loosen adjusting lock screw and move contact point bracket up or down to obtain .020" gap. Tighten adjusting lock screw. Turn crankshaft so that contact points are closed. Then check to see that 12 to 16 oz. tension just opens points. If spring tension is too weak bend contact spring tang to get proper tension. See Plate No. 29.

MAGNETO TIMING
(To Check and Adjust)

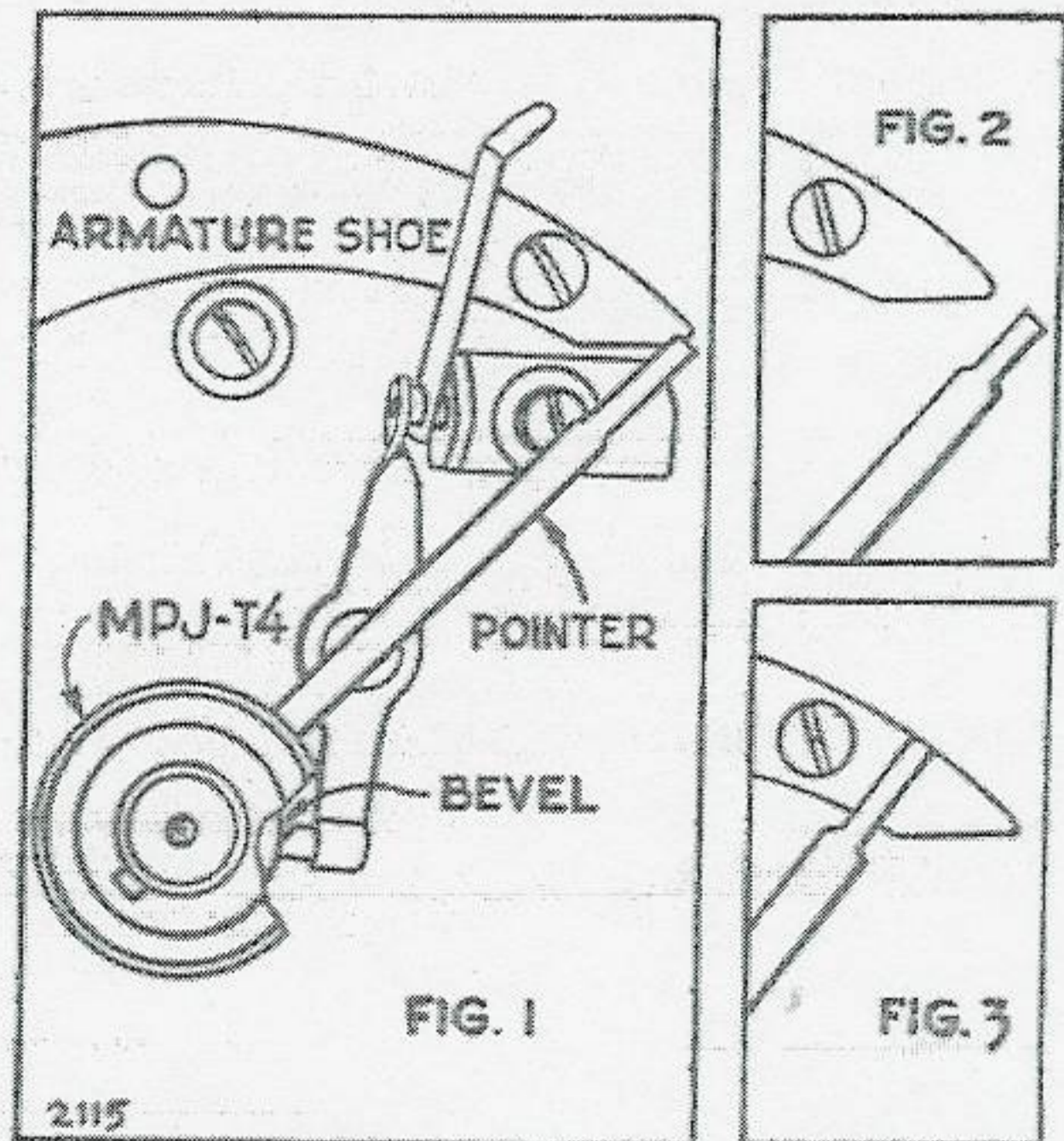
Models A-B-H-I-K-N-U-WI-WM-WMB-WMI-Y-Z-ZZ

The magneto is always correctly timed when the flywheel is properly assembled. Do not attempt to change by relocating any parts or filing crankshaft flat.

Models FH-FI-FJ&2-L-M-PB-O-R-S-T-W

Plate No. 30

With contact points at .020" gap, insert flywheel key in shaft and securely mount gauge (MPJ-T4) on crankshaft. Place .003" feeler between contact points, move crankshaft to the right until feeler moves freely between contact points. When the pointer of gauge lines up with the end of the armature shoe, as shown in (Fig. 1) of plate No. 30, timing is O.K. If the pointer is past the armature shoe (Fig. 2) timing is late. To correct, install a new fibre tip (No. 65014) on breaker arm and recheck. If pointer is ahead of the end of the armature shoe (Fig. 3) file bevel of fibre tip until the pointer lines up with end of shoe.



CONDENSERS

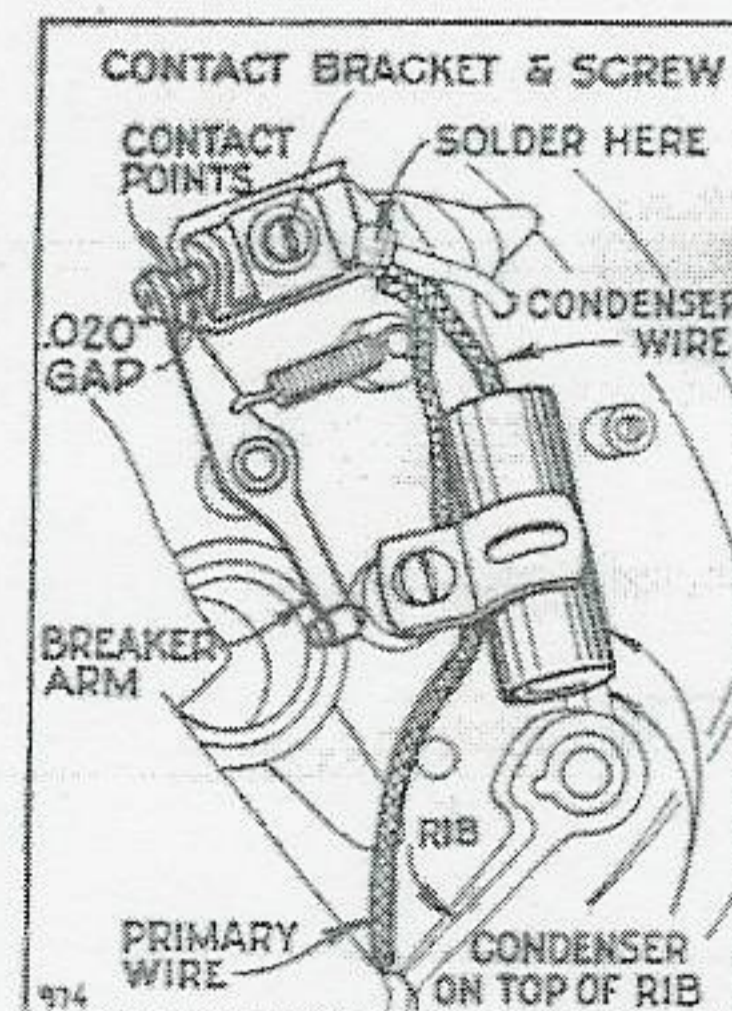
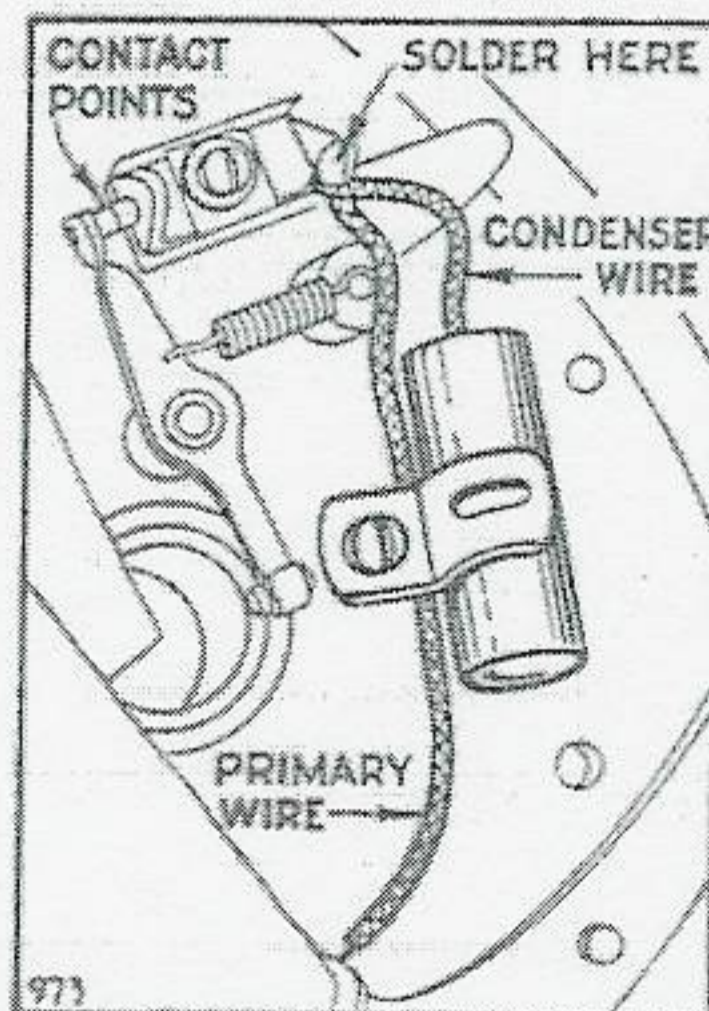
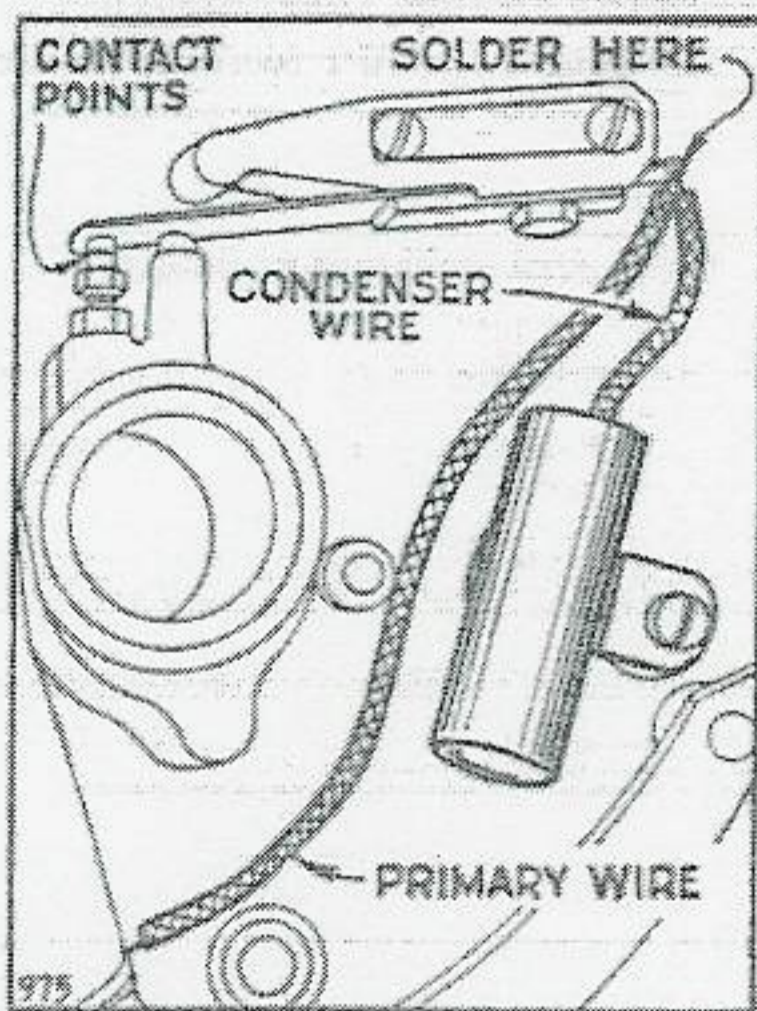
The capacity of all Briggs & Stratton condensers is from .18 to .24 MFD.

A leaky, weak or shorted condenser will cause the motor to start hard, sputter or misfire under load, and should be replaced. See that insulator sleeves are on wires and all connections securely soldered. Use only original Briggs & Stratton condensers which are wax sealed.

Model Motor	Plate No.	Part No.
A-AH-AHL-AHLP-AHP-AHM-AHMT-AHR4-AHR6-AL-ALP-ALR4-ALR6-AP-AM-AMT-AR4-AR6	31	29652
AGR	32	29652
B-BH-BHL-BHLP-BHP-BHM-BHR4-BHR6-BHLR4-BHLR6-BL-BLP-BLR4-BLR6-BM-BMG-BP-BR4-BR6	31	29652
FH-FH1-FI-FJ1-FJ2	32	29652
H-HM	31	29652
I-IB-IBHP-IBLP-IBP-IL-ILR6-IMT-IP-IR6-IS	29	29861
K-KL-KLP-KLR4-KLR6-KM-KP-KR4-KR6	31	29652
L-LA-M-MC-MB-MF-MH	32	29652
N-NP-NR2-NR6	29	29861
PB-Q-R-RC-S-SC-T-TA-W-WA	32	29652
U-UR2-UR6-WBG-WI-WIBP-WM-WMB-WMG-WMI-WMIP-WR6	29	29861
Y-Z-ZH-ZHL-ZHLP-ZHLR4-ZHLR6-ZHM-ZHP-ZHR4-ZHR6-ZL-ZLP-ZLR4-ZLR6-ZM-ZP-ZR4-ZR6-ZZ-ZZL-ZZLP-ZZP-ZZR	31	29652

Plate No. 31

Plate No. 32



ARMATURES AND MAGNETO PLATES

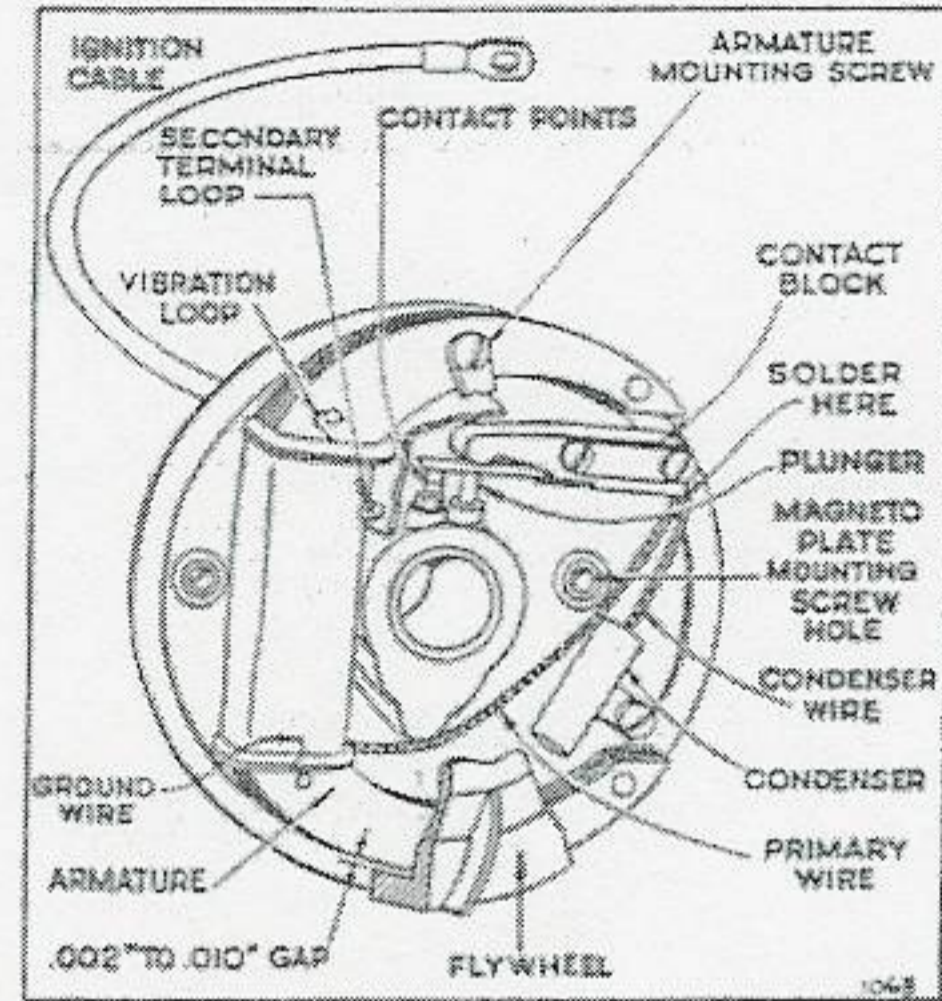
(To Remove, Assemble or Repair)

Handle carefully to avoid breaking wires, insulators at end of winding, or puncturing winding cover.

Models A-B-H-K-Y-Z-ZZ

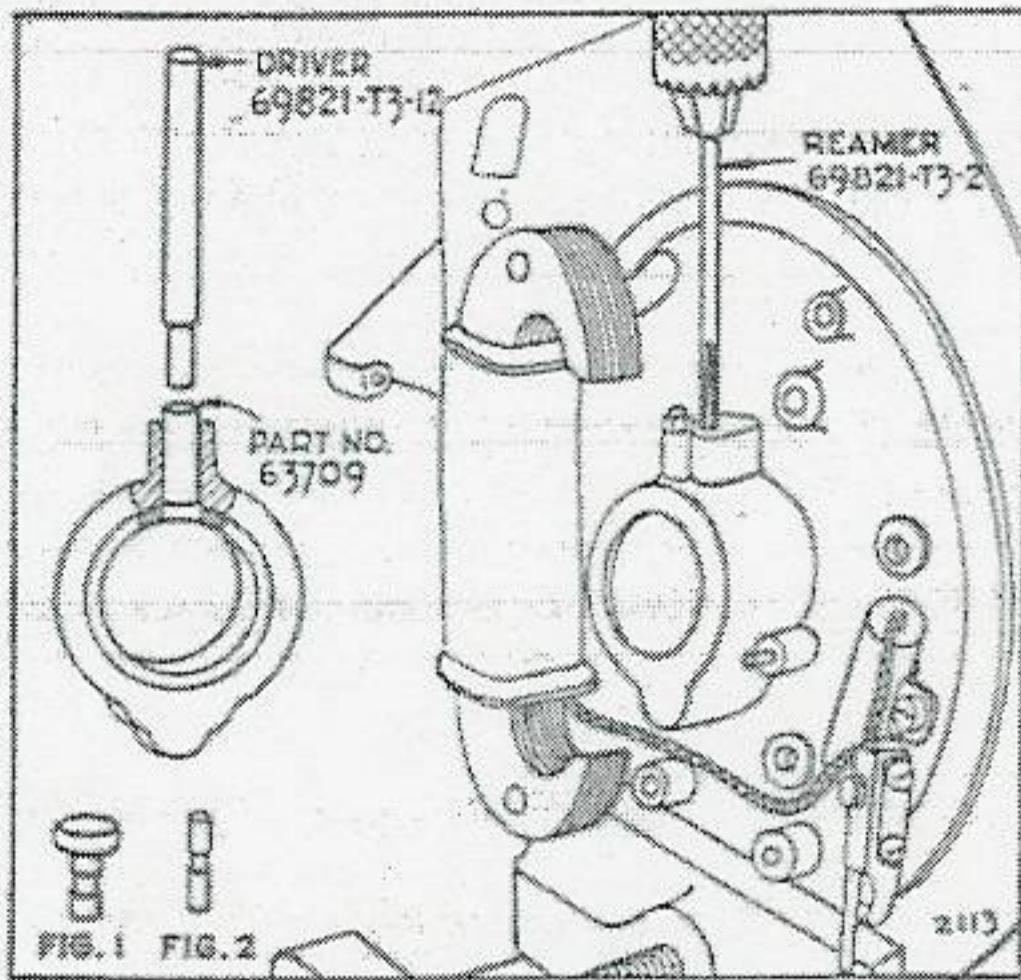
Plate No. 33

Remove armature lead wire from contact spring, and high tension ignition cable from secondary terminal loop in the armature. Both wires are soldered. Unscrew two armature mounting screws and pry armature loose with screw driver. Mount new armature in same position as old one. Fasten armature to plate with two screws. Solder ignition cable to terminal of coil. If armature has a short straight ground wire, replace with new style having vibration loop. See Plate No. 33.



If contact plunger is of type shown in Figure 1 of Plate No. 34, replace with part (No. 65414) shown in Figure 2. If plunger pumps oil the plunger hole is either dirty or worn. Remove plunger, clean hole and check with a 1/4" drill. If drill enters hole loosely and shakes, a new bushing must be installed.

Plate No. 34



To Repair Worn Contact Plunger Hole. Ream hole with tool (No. 69821-T3-2). To do this remove contact block assembly, then loosen the armature screws, and pull the armature away from the plate just far enough to permit the reamer to pass between the armature shoe and magneto plate. Clamp the magneto plate in a vise on a drill press when reaming the hole. After the hole is reamed to size, a bushing (No. 63709) should be pressed into the hole with tool (No. 69821-T3-12). See Plate No. 34.

CAUTION. When pressing the bushing (No. 63709) into the plunger hole be careful not to press the plunger bushing into the magneto bearing, as this would cause oil pumping through the plunger hole.

After bushing (No. 63709) is in place, it must be reamed with a reamer (No. 69821-T3-22) to assure a free fit for the contact plunger. Before reassembling magneto plate to motor be sure oil return valve of bearing is clean and in working order.

On the early models bushing (No. 63709) will extend above the boss in cover plate, but on the later models it will be even with top of boss.

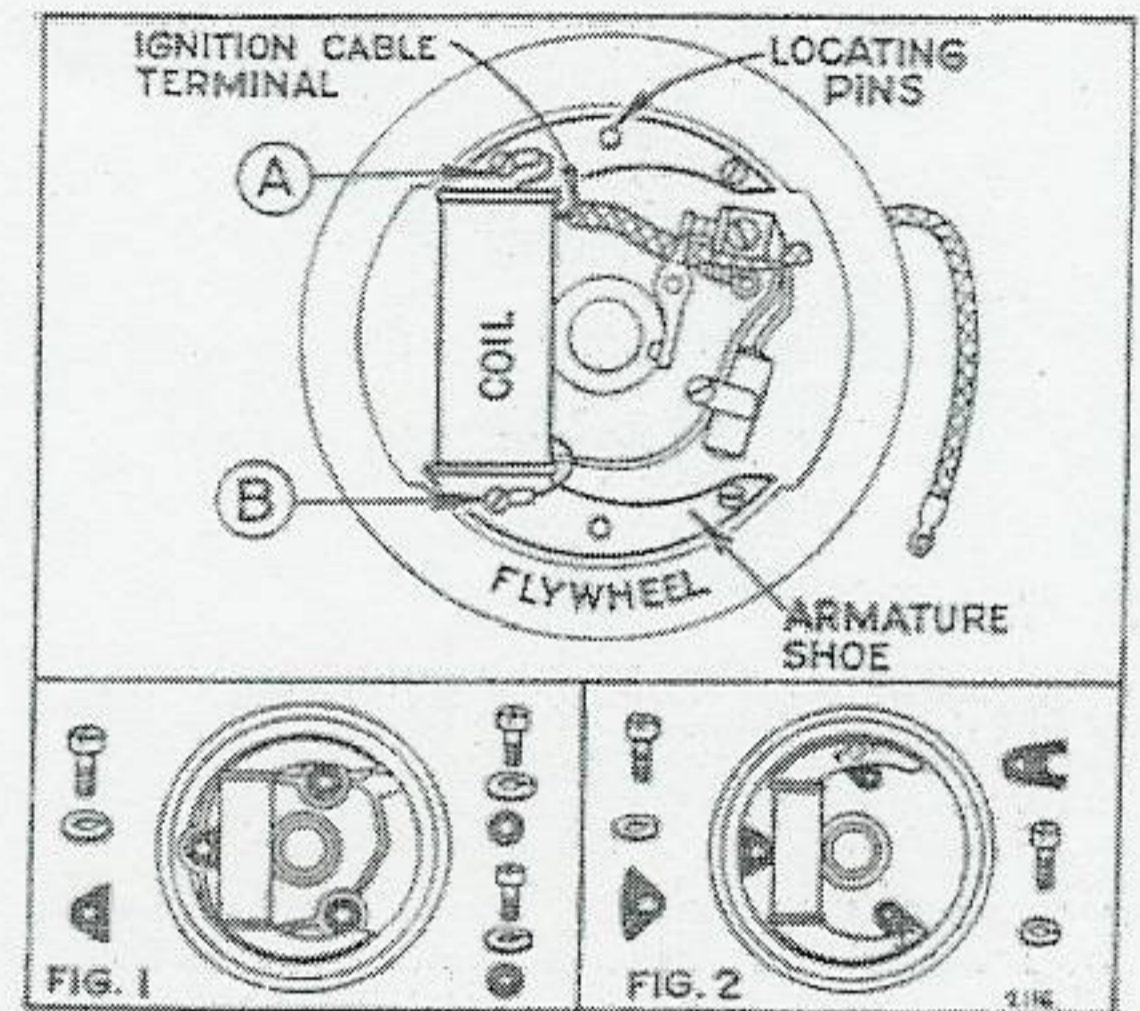
ARMATURES AND MAGNETO PLATES
Model AGR

To replace armature see instructions for model A, except note position of spacers under coil on four locating pins and also on the two mounting screws.

Models FH—FI—FJ1&2—L—M—PB—Q—R—S—T—W

Remove primary armature lead wire from contact bracket. Remove high tension ignition cable from secondary terminal loop in the coil. Unscrew four armature mounting screws. Hold magneto plate and pry armature loose with screw driver. To test coil be sure to fasten both secondary ground wire loops (A and B) to the core. The secondary of this coil is split and the ground wires are not connected inside of coil. Failure to fasten either or both of these ground wires will result in a weak or dead coil. See Plate No. 35.

Plate No. 35



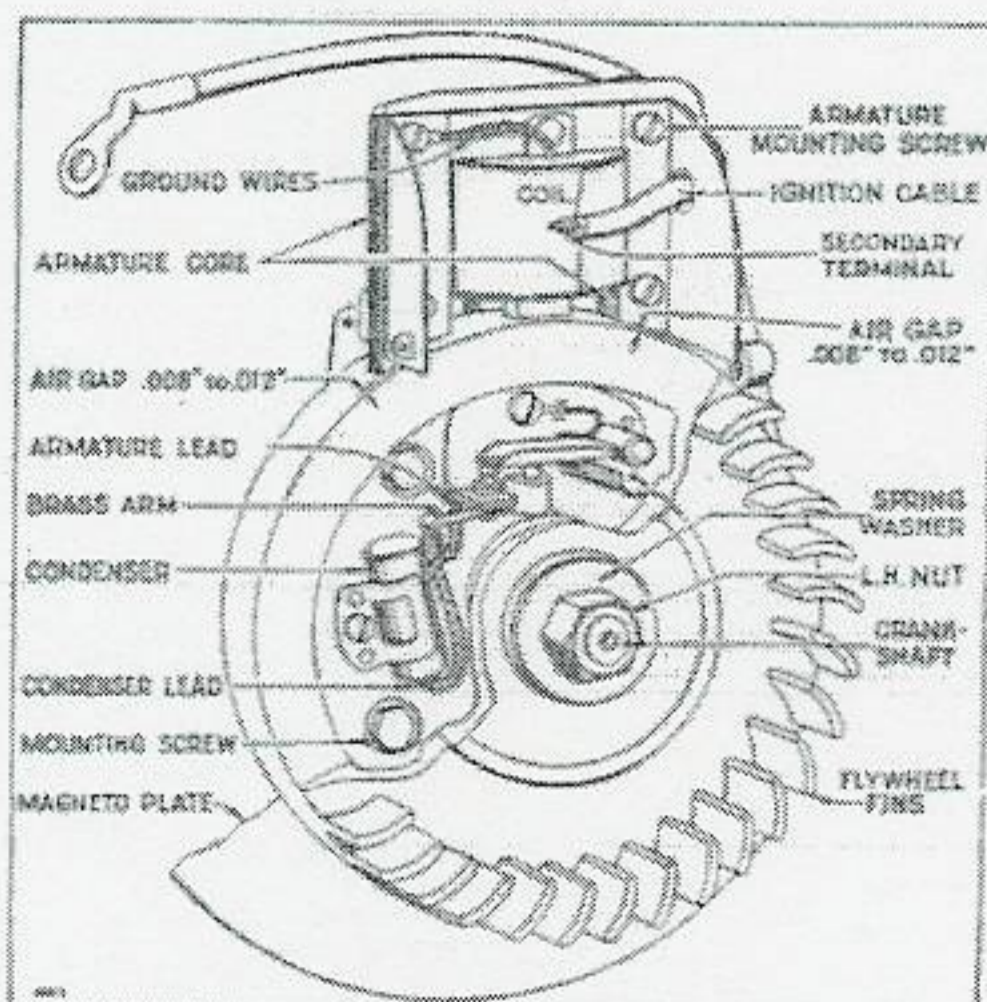
Mount armature on the two locating pins. Fasten armature to plate with four mounting screws - with the two screws next to coil end inserted in loops A and B. Solder ignition cable to terminal of coil.

See Plate No. 35. Dirt under the stop button spring in blower housing, or on air guide in some models, will cause a short. Check and clean.

Early Model FH motors were not equipped with steel locking plates under mounting screws and lockwashers of magneto plates. This caused screws and lockwashers to become loose and damage magneto. On magneto plates with reinforcing rib, Figure 1, Plate No. 35, use locking plate assembly (No. 69711). On magneto plates without reinforcing rib, Figure 2, Plate No. 35, use locking plate assembly (No. 69712).

Models I—N—U—WI—WM—WMB—WMI

Plate No. 36



Remove armature lead wires, ignition cable, four armature mounting screws, lockwashers and plain washers. To replace reverse operations. See Plate No. 36.

On early Model WM motors the coil was not insulated from the magneto plate with coil wrapper part No. 65794. The absence of this wrapper permits leakage from the coil to magneto plate which will cause motor to miss fire. Install this coil wrapper on each Model WM motor that comes to your shop for repair with serial number less than 10,000.

ARMATURES AND MAGNETO PLATES

When a magneto plate assembly is returned for repair, the armature must be set to 2.8785" radius from center of magneto plate bearing to armature core. Maximum diameter of magneto bearing is .877". This setting will give you the proper air gap between flywheel and armature core.

AIR GAP ADJUSTMENTS

Models I - N - U - WI - WM - WMB - WMI

Place feeler gauge under all poles between armature shoes and flywheel. Loosen armature mounting screws and raise or lower armature to obtain an air gap from .002" to .012". See Plate No. 36.

All Other Models

Chalk edges of armature shoes and mount flywheel in place. Remove spark plug to release compression. Turn flywheel several revolutions by hand. Remove flywheel and examine edges of armature shoes. High spot will have the chalk rubbed off. File high spots carefully with a fine file. Repeat until flywheel no longer rubs but do not remove too much metal. If high spots cannot be eliminated use armature turning fixture (No. 69053-T1) and turn armature to 5.990" to 5.986" diameter. Each Central Service Distributor has the equipment to do this work for you. The correct air gap for these models is from .015" to .026".

Note: If the new armature rubs on the flywheel, it should be turned down to the proper diameter as illustrated in Plate No. 38. This is to insure proper air space between armature and magneto, and to insure that outside diameter of armature is concentric with plate bearing.

Each Central Service Distributor has the special tools illustrated. In Plate No. 37 is shown the method of assembling the magneto plate with armature to the armature turning fixture (No. 69053-T1). The plate is properly located on the fixture by locating pin fitting into hole "A". Lock armature plate in place with the cover plate and hexagon nut. Place fixture between lathe centers for turning as illustrated in Plate No. 38. The cutting edge of cutting tool must be on the same plane as the points of the lathe centers.

For most satisfactory results in turning, we recommend the use of Stellite Steel, or its equivalent, for the cutting tool. Tool must be sharpened properly as shown in illustration and kept sharp at all times. The armature must be turned at the rate of approximately 450 to 500 r.p.m. Cutting tool should travel at the approximate rate of 3" per minute. The diameter of the finished armature to be 5.990" maximum and 5.986" minimum.

ARMATURES AND MAGNETO PLATES

Plate No. 37

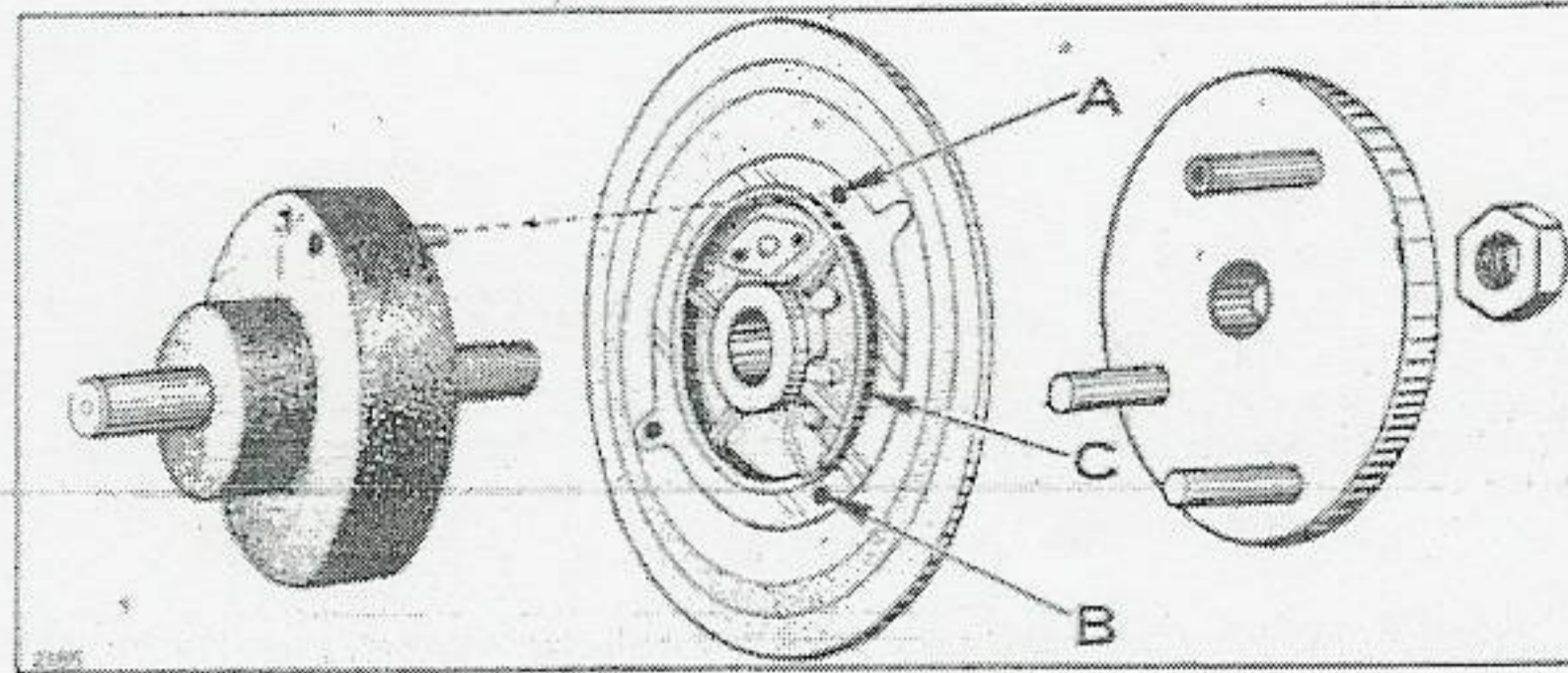
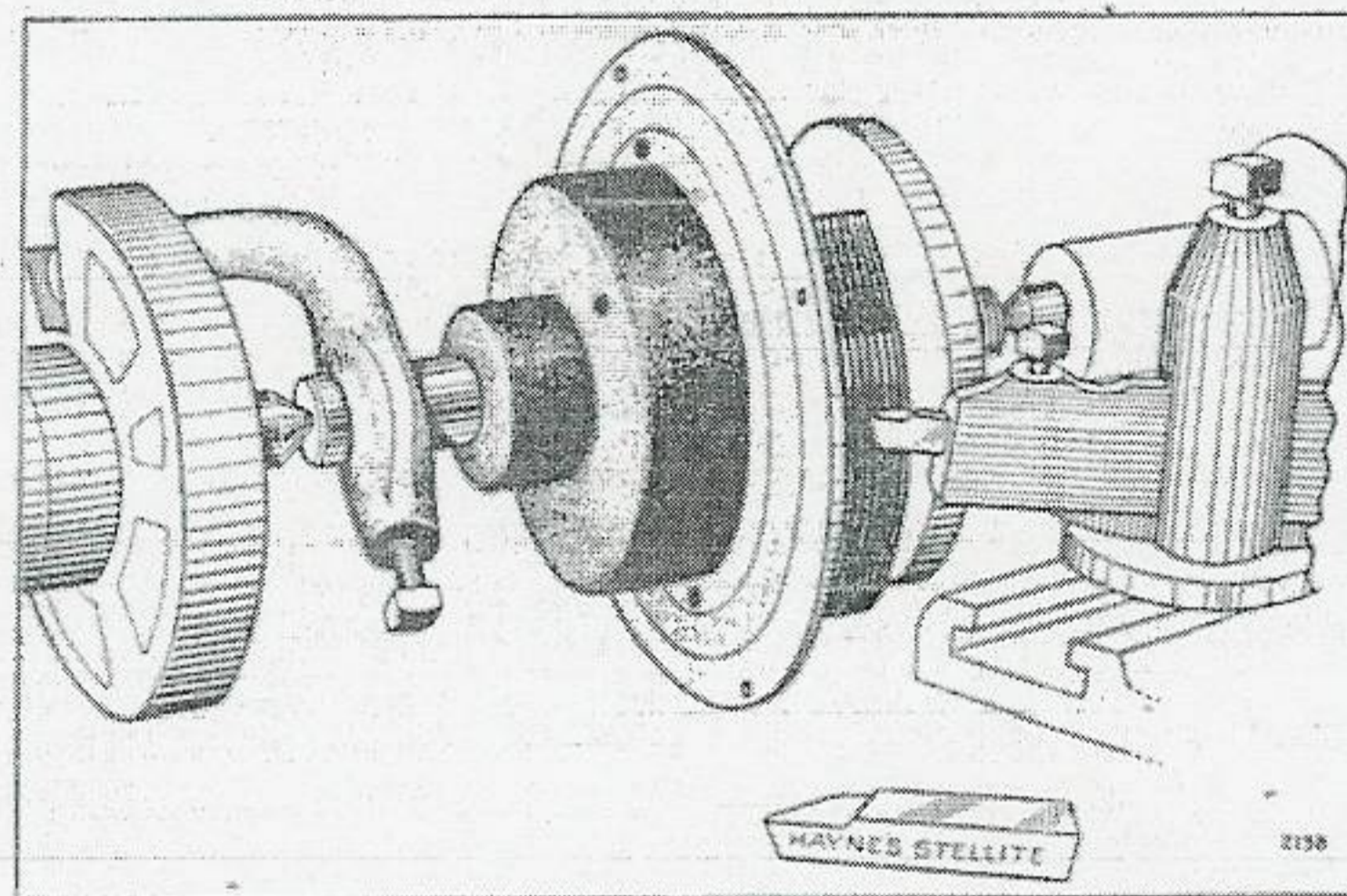


Plate No. 38



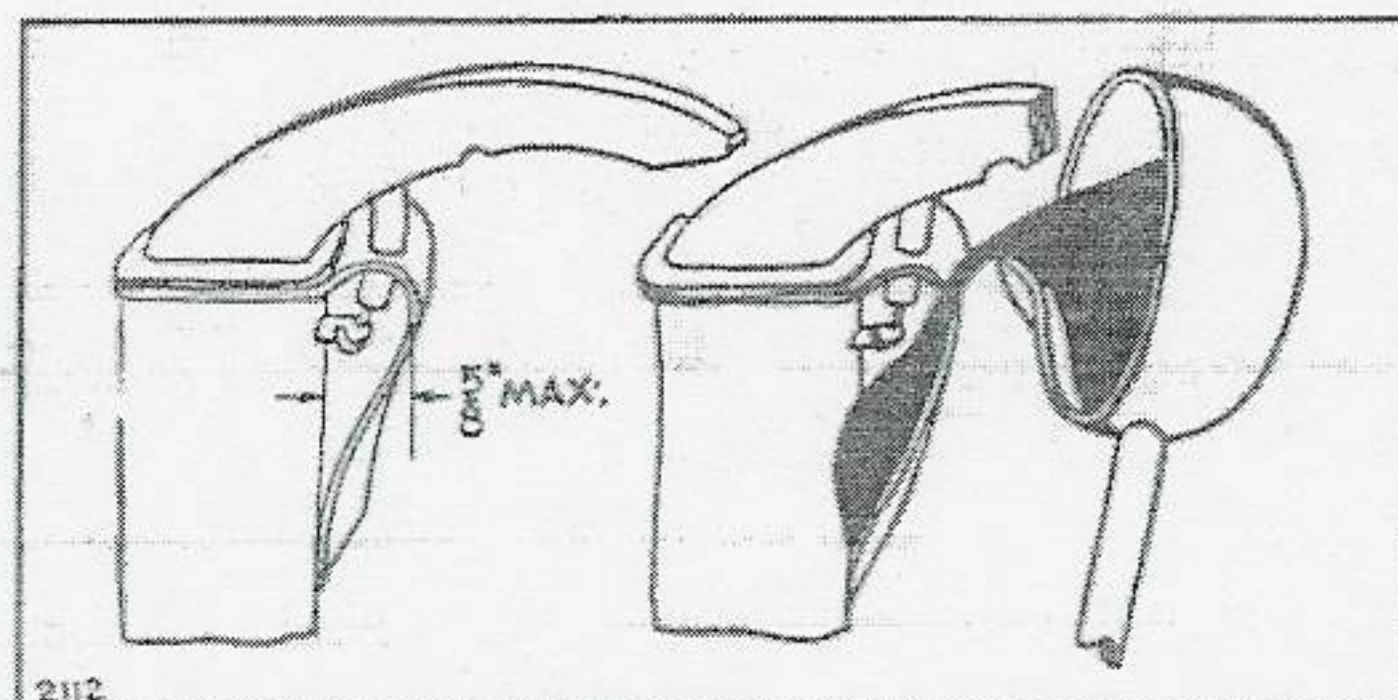
INSULATING SECONDARY TERMINALS

All Except Models I—N—U—WI—WM—WMB—WMI

Form a pocket with flap and fill with hydrolene or korite, as shown in Plate No. 39. This insulates the terminal and prevents arcing in moist weather.

CAUTION: Do not use battery compound as this has a low melting point and will run over contact points. The melting point of hydrolene or korite is 240° F, which is higher than the heat of the motor. (Part No. 99040)

Plate No. 39



VALVES

COMPRESSION

Check Compression. When tuning up a motor, it is always well to check compression. This is done by turning the motor over slowly. If a point of resistance is offered every other revolution, compression should be satisfactory. If motor turns over without compression resistance for a full cycle, it is probable that leaky valves, leaky gaskets or a worn piston or piston rings are present.

Check Gaskets. See that spark plug has a gasket under it and is drawn up securely. Check cylinder head gasket and tighten cylinder head bolts a little at a time so that cylinder head is pulled down evenly.

Check Valve Seats. Valves must seat properly, have correct tappet clearance to close fully, and operate freely. Check all clearances when motor is cold. To check, turn flywheel until valve reaches its topmost open position, then give the flywheel one additional turn and check. This brings the cam followers into a 180° position, opposite the cam lobe.

VALVE CLEARANCE CHART

MODEL ENGINE	INTAKE (COLD)		EXHAUST (COLD)	
	MAX.	MIN.	MAX.	MIN.
A-AGR-AH-AHL-AHLP-AHM-AHMT-AHP-AHR4-AHR6-AL-ALP-ALR4-ALR6-AM-AMT-AP-AR4-AR6.	.007"	.005"	* †	* †
B-BH-BHL-BHLP-BHLR4-BHLR6-BHM-BHP-BHR4-BHR6-BL-BLP-BLR4-BLR6-BM-BMG-BP-BR4-BR6.	.007"	.005"	† #	† #
FH-FH1	1/16"	1/32"	.013"	.011"
FI	.007"	.005"	.007"	.005"
FJ1-FJ2	.011"	.009"	.021"	.019"
H-HM	.011"	.009"	.021"	.019"
I-IB-IBHP-IBLP-IBP-IL-ILR6-IMT-IP-IR6-IS	.007"	.005"	.009"	.007"
K-KL-KLP-KLR4-KLR6-KM-KP-KR4-KR6.	.007"	.005"	.015"	.013"
L-LA	.011"	.009"	.021"	.019"
M-MB-MC-MF-MH	.007"	.005"	.009"	.007"
N-NP-NR2-NR6	.007"	.005"	.012"	.010"
PB	3/32"	1/16"	.021"	.019"
Q-R-RC-S-SC-T-TA-W-WA-WEG-WI-WIBP-WM-WMB-WMG-WMI WMIP-WR6.	.007"	.005"	.009"	.007"
U-UR2-UR6	.007"	.005"	.012"	.010"
Y	.011"	.009"	.021"	.019"
Z-ZH-ZHL-ZHLP-ZHLR4-ZHLR6-ZHM-ZHP-ZHR4-ZHR6-ZL- ZLP-ZLR4-ZLR6-ZM-ZP-ZR4-ZR6.	.007"	.005"	.015"	.013"
ZZ-ZZL-ZZP-ZZR.	.021"	.019"	.021"	.019"

*Motors with six digit type numbers or with exhaust valves marked "Sil XCR" clearance is to be within .013"-.011".

† Motors with five digit type numbers with exhaust valves marked "Silch #1" clearance is to be within .009" - .007".

Motors with 6 digit type numbers or with exhaust valves marked "Sil. XCR" clearance is to be within .014" - .012".

VALVE ADJUSTMENTS

Models A—FJ1&2—H—I—L—M—S—T—WI—WM—WMB—WMI—Y

Valve clearance is adjusted by grinding required amount from end of valve stem. End of stem must be square with stem proper.

Model B

Valve clearance on models previous to serial No. 1170 is adjusted by changing position of cam follower screw and locknut. On models after serial No. 1170 adjustment is the same as for Model A.

Models FH

The intake valve is automatic. The exhaust valve clearance is secured by loosening the rocker arm set screw, moving rocker arm fork to desired position, and locking in place with set screw. If rocker arm fork is removed, make sure that slug (No. 65232) is placed ahead of set screw when reassembling.

Models FI

Valve clearance for both intake and exhaust valves is secured by following instructions for Model FH exhaust valve.

Models K—Q—R—W—Z—ZZ

Valve clearance is adjusted by loosening cam follower locknut and turning cam follower screw to desired position. Securely tighten the cam follower locknut after adjusting valve clearance.

Model PB

The intake valve is automatic. Exhaust valve clearance is adjusted by loosening cam follower locknut and turning cam follower screw to desired position. Securely tighten cam follower locknut after adjusting valve clearance.

(To Remove and Assemble)

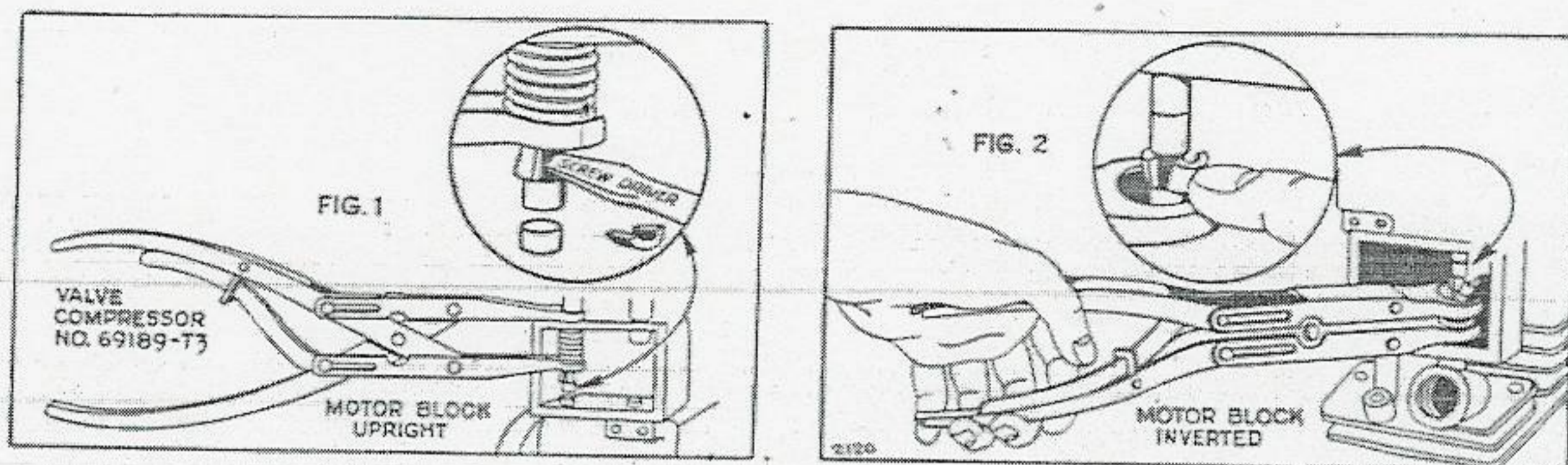
Models A—B—FJ1&2—H—K—L—M—R—S—T—W—Y—Z—ZZ

With cylinder in upright position place valve spring compressor (No. 69189-T3) on the top of valve chamber and below valve spring retainer as shown in Figure 1, Plate No. 40. Then compress the spring and pry out retainer collar with a screw driver.

To assemble invert cylinder after the oil has been removed. Place valve spring and retainer into compressor tool and compress as much as possible. Place tool into valve chamber and slip valve in place. Slip one half of retainer collar into groove in valve stem and move it toward the rear of valve chamber, then insert the other half. See Fig. 2, Plate No. 40. Release spring compressor.

(To Remove and Assemble)

Plate No. 40



Model FH

Intake Valve--file or grind off the peened head of the valve stem. Exhaust Valve--place part (A) of tool (No. 65292-2-T1) under the valve head as shown in Fig. 1 of Plate No. 41. Be sure that this round tool stays under the valve head. Place slotted hole in tool (C) over the retaining collar as shown in Fig. 1. Press down on tool (C) and release the split locking sleeves that hold the collar in place. Remove collar and spring to take out valve.

To assemble intake valve, insert tool (A) under valve head. Replace the spring and press the collar on part way with tool (B) as shown in Fig. 1, Plate No. 41. Insert tool (C) between the end of valve stem guide and collar above the spring, see Fig. 2. This allows for the correct valve lift and clearance. The thickness of tool (C) is about .036" which regulates proper valve opening.

Press the collar down as far as possible, and peen over the end of valve stem carefully, to hold collar in place.

To assemble exhaust valve, insert valve and place tool (A) under valve head. Assemble spring and collar. Compress spring with tool (C) and insert split locking collar.

Model FI

To remove and assemble intake or exhaust valve, see instructions for Model FH exhaust valve.

Models I-N-U-WI-WM-WMB-WMI

Compress valve spring with screw driver, and pull out retainer pin with long nose pliers. To replace, reverse operation.

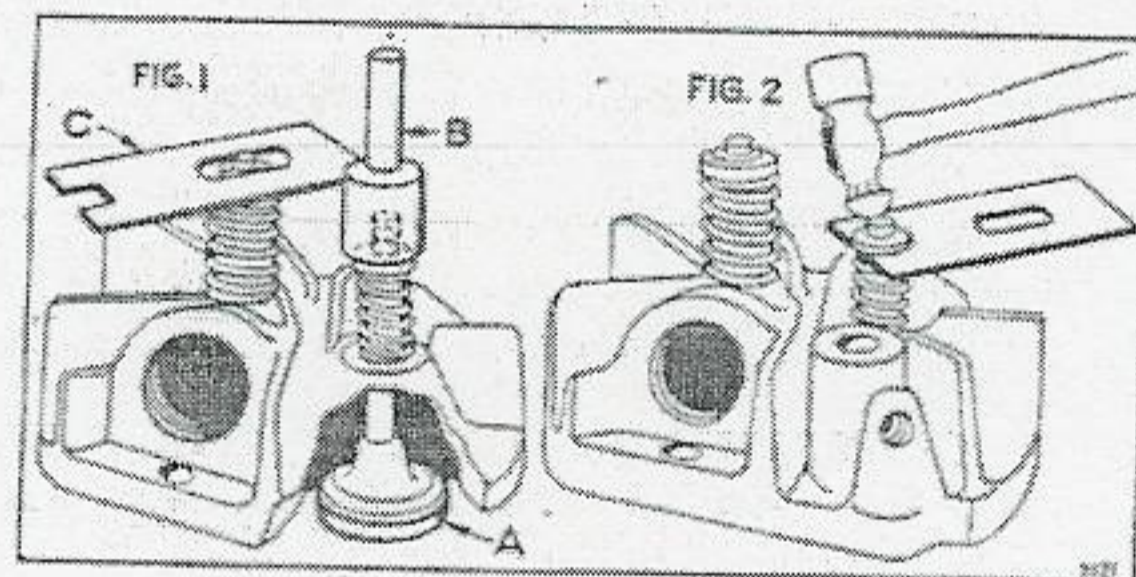


Plate No. 41

To Remove and Assemble

Model PB

Loosen compression release set screw, and carburetor elbow clamp. Remove intake valve. If valve is tight use kerosene or penetrating oil to loosen. To remove exhaust valve, lift valve spring and collar with end of screw driver and with long nose pliers remove the pin through the valve stem. Pry spring out with end of screw driver. To replace valves reverse operation.

Model Q

To remove and assemble valves, follow instructions for Model A with this exception: Use a long nosed plier to remove and replace valve spring collar retainer pin.

TO CORRECT STICKY EXHAUST VALVE

On the model motors in the following chart bearing serial numbers lower than those listed, remove cylinder head, valve chamber cover plate and exhaust valve.

Check distance from the top of the cylinder to exhaust valve guide. This distance must be $\frac{1}{4}$ " greater than that of the intake. If it is not, face top of exhaust valve guide, using bushing and special drill listed in chart. See Plate No. 42 Run special drill at 300 to 500 R.P.M. Remove chips, clean guide and valve stem, and assemble. On Model WM be sure to install oil spray shield, Part No. 62703). See Plate No. 43.

Model	Before Serial No.	Drill Bushing No.	Special Drill No.
A	35636	60144-T100	60144-T101
B	22868	60144-T100	60144-T101
K	13777	60144-T100	60144-T101
WM	167412	29746-T1-1	29746-T1
WMI	167412	29746-T1-1	29746-T1
Z	14610	60144-T100	60144-T101

Plate No. 42

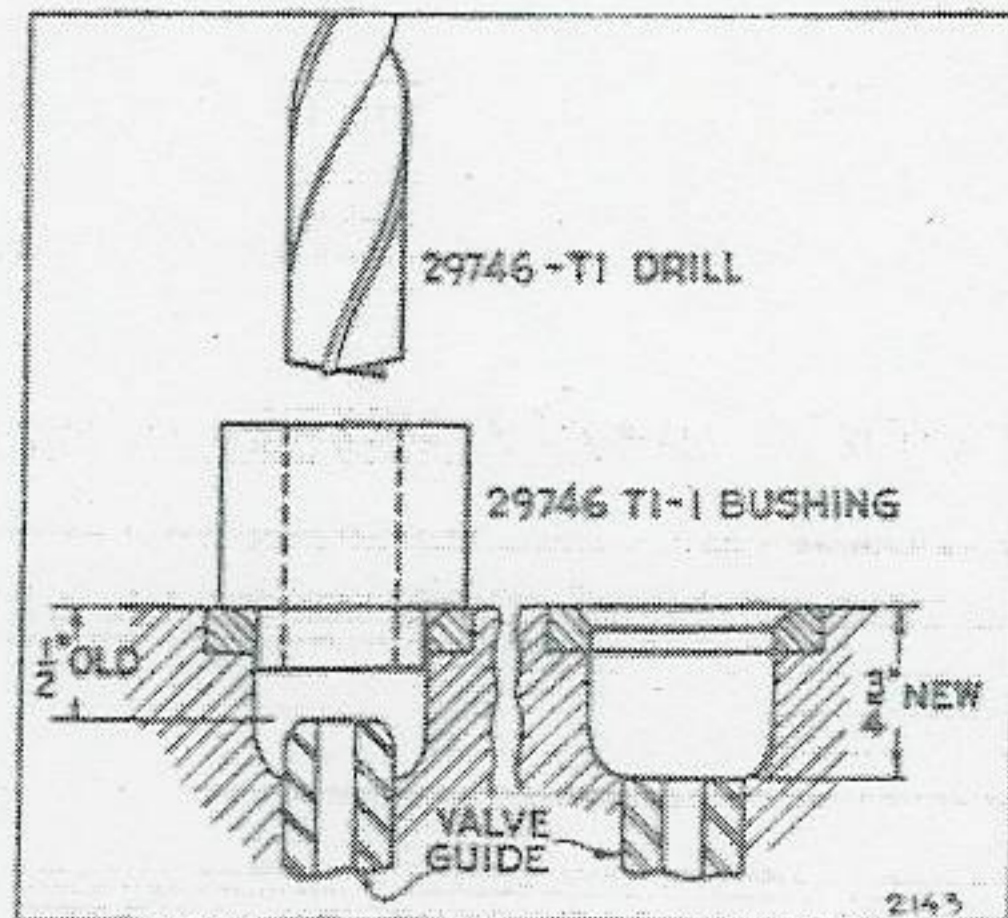
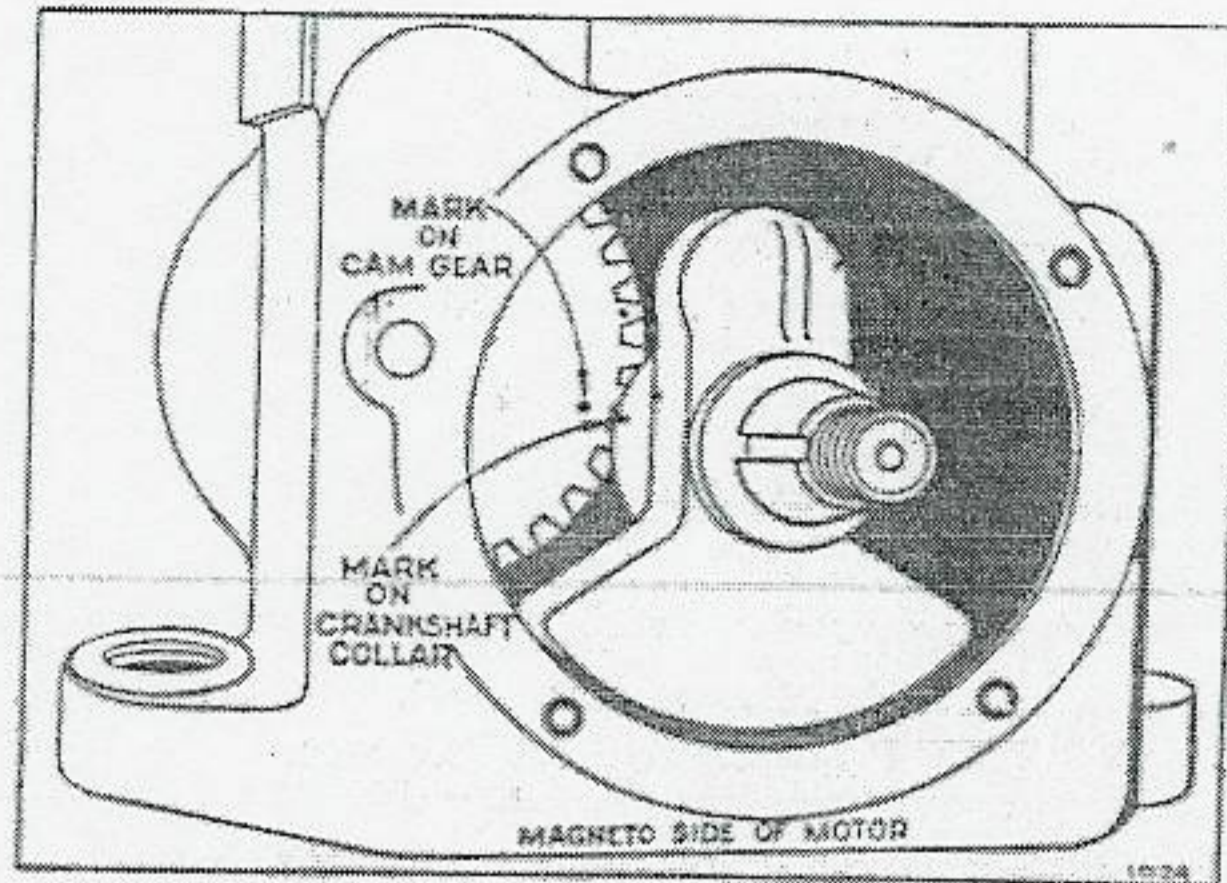


Plate No. 43



TIMING

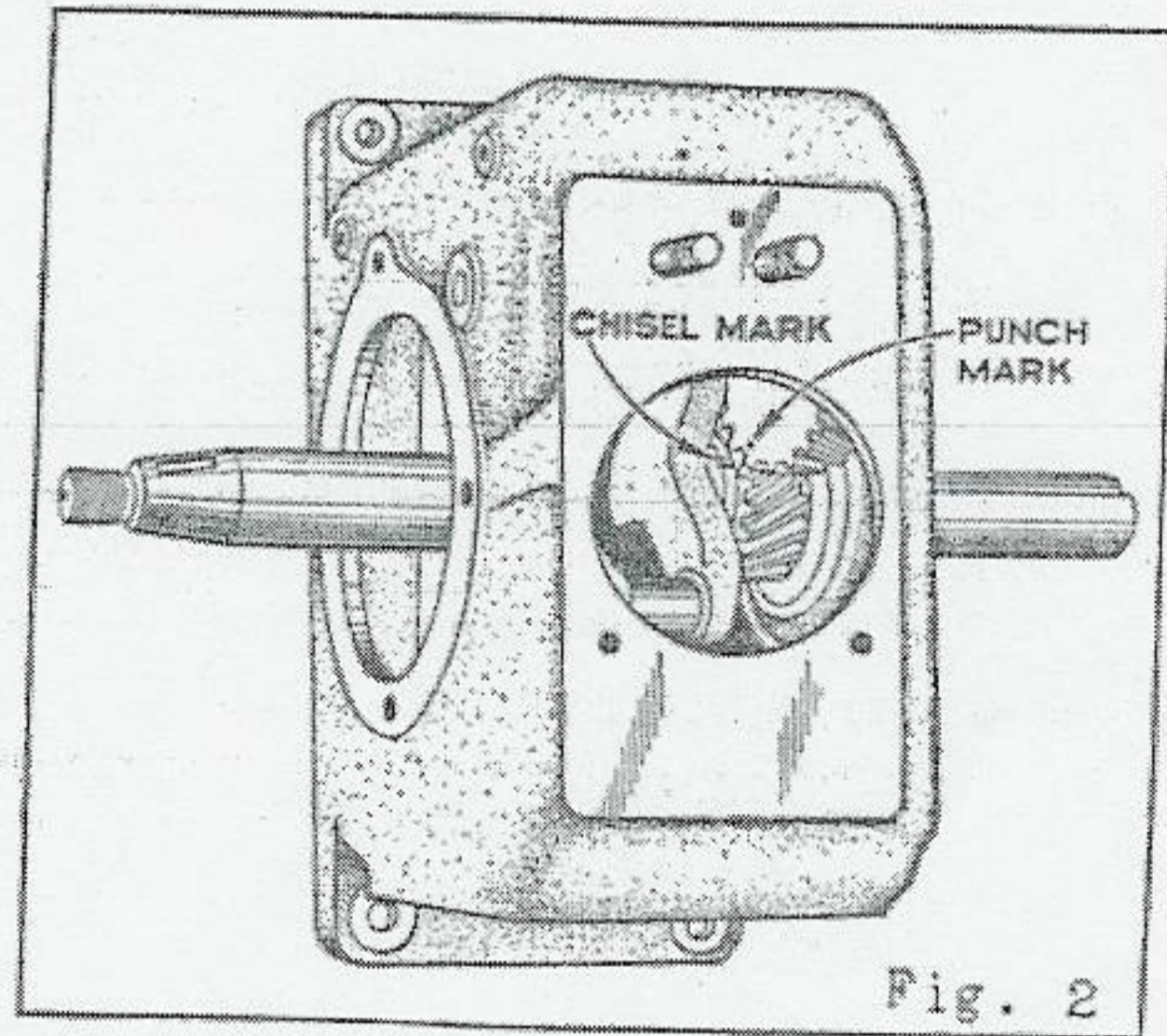
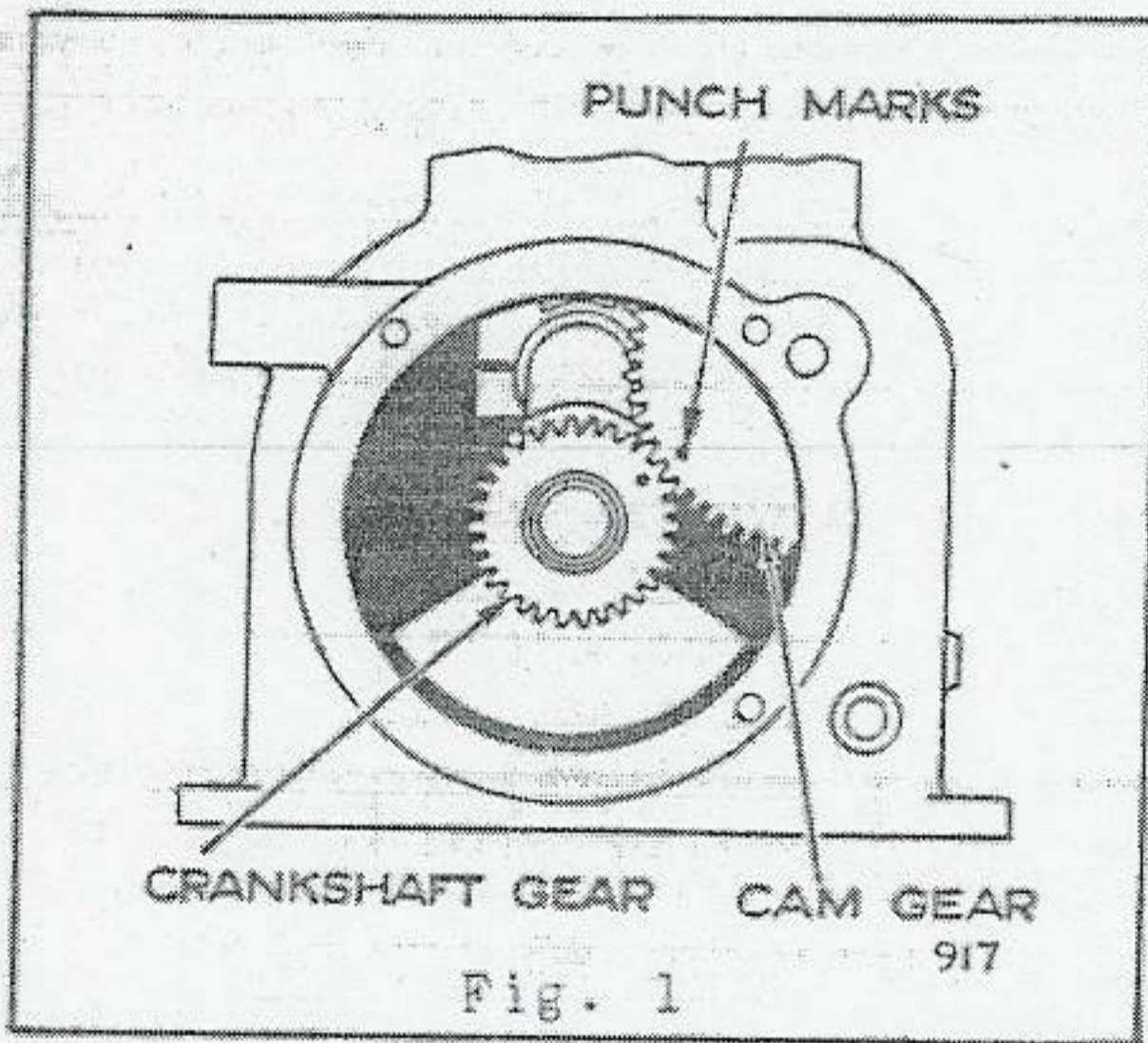
Plate No. 43A



Models A—FJ1—FJ2—H—I—L—M—N—U—S—T—WI—WM—WMB—WMI—Y

To properly time the valves, assemble the crankshaft so that the timing mark on the collar of the crankshaft is in line with that on the cam gear. See Plate No. 43A.

Plate No. 43B



Models B—K—Q—R—W—Z—ZZ

To properly time the valves, assembly the crankshaft from the power takeoff side.

On some of the early models the gears are marked as shown in Fig. 1 of Plate No. 43B. These gears are properly meshed when the mark on the cam gear is in line with the mark on the crankshaft gear.

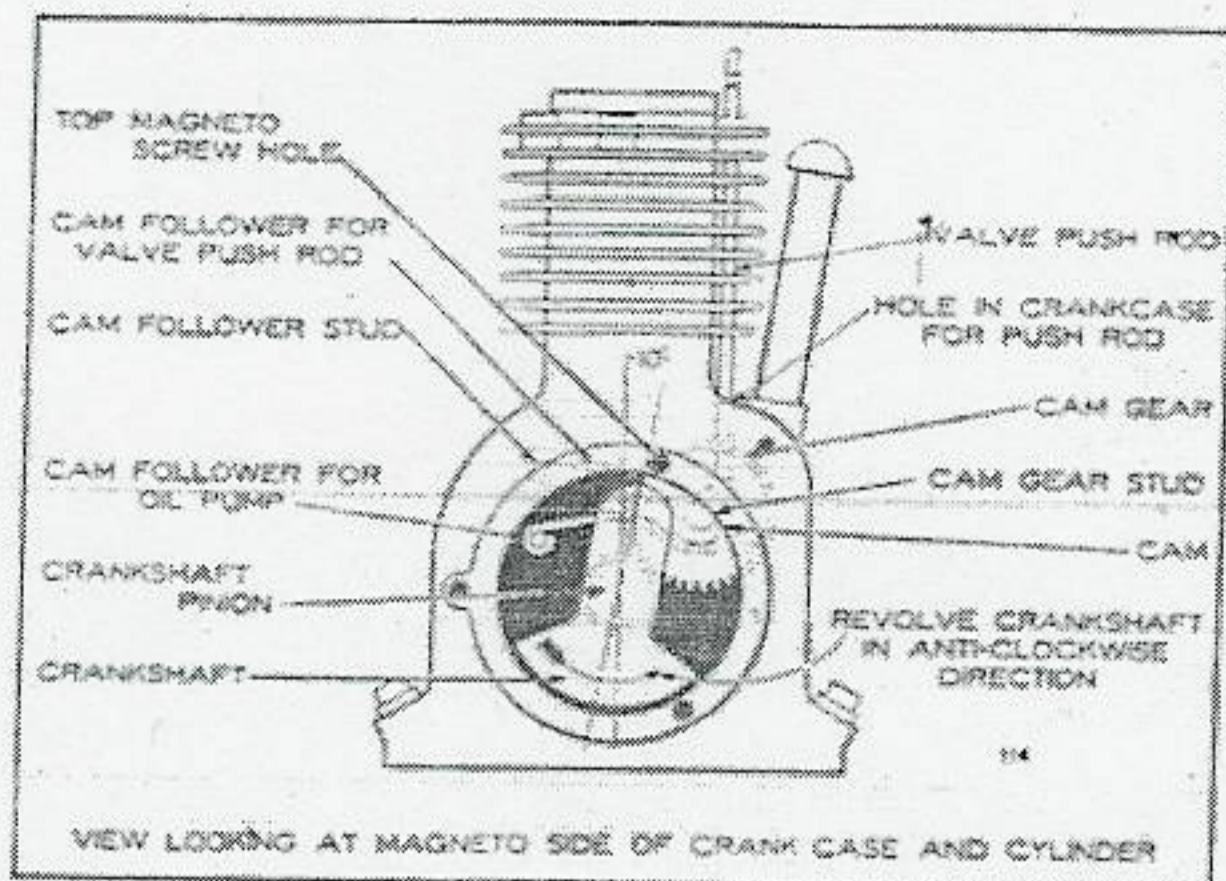
On later models the mark is on the web of the crankshaft at the end of the timing tooth, as shown in Fig. 2, Plate No. 43B. To assemble these crankshafts mark the top of the timing tooth with chalk and assemble.

If the timing mark on any of the gears is on the wrong side, mark the top or opposite end of the timing tooth with chalk.

TIMING CONT'D.

Models FH—FI

Plate No. 43C



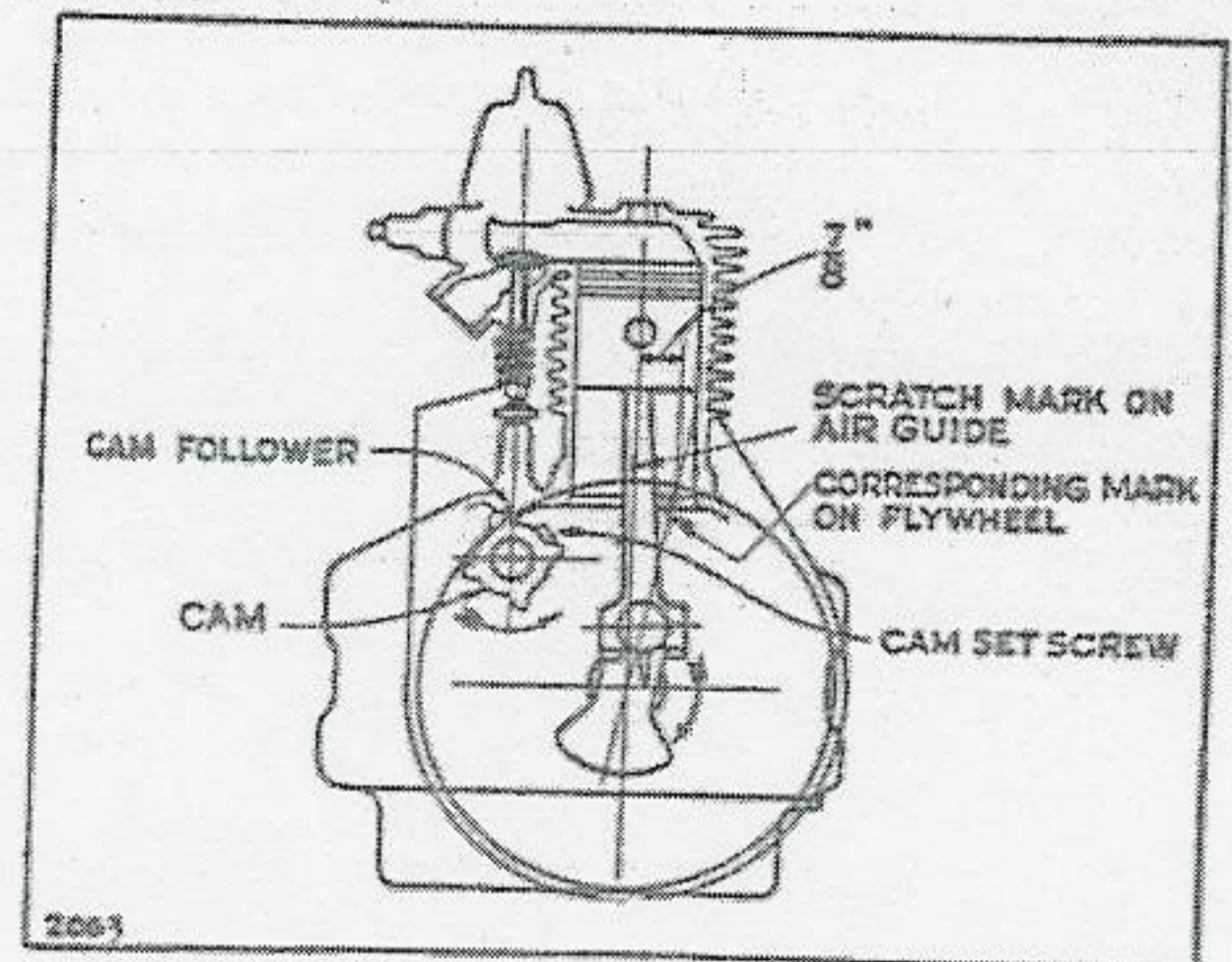
To properly time the valves on these models, assemble cam followers in place, insert the exhaust valve push rod through the small hole in top of the crankcase so that the flat end of rod rests on the upper cam follower. Then place the cam gear on its stud so that the cam lobe is toward the crankcase wall and between the two cam followers. Place finger on top of push rod and press lightly (being careful not to bend rod and bind against the side of the small hole in crankcase) while rotating the cam gear to the right or clockwise several times until you become familiar with the point where push rod begins to rise.

With the cam gear set in this position, insert crankshaft, gear end first and with crankpin 10° to the right of center line, almost in line with top magneto screw hole. Motor will then be in correct time. See Plate No. 43C.

Model PB

Plate No. 43D

To properly time the gears on this motor proceed as follows: With the cam loose on the cam gear shaft and the cylinder in place temporarily, turn the crankshaft so that the piston is at its highest point. This can easily be found by putting a scale in the cylinder plug hole on top of the piston. It will rise as the piston rises and the highest point can easily be noted. Scratch a mark on the flywheel and a corresponding mark on the air guide. Remove the cylinder, turn the cam proper, which is still loose on the gear shaft, until the cam, which allows the set screw to be tightened through the piston hole, just strikes the cam follower on the left or forward side. Then turn it slightly to the right to take up the play between the valve stem and valve tappet.



See that the mark on the flywheel lies opposite the mark on the air guide, then turn the flywheel to the right $7/8$ of an inch and tighten the set screw on the cam. The motor is then timed correctly. See Plate No. 43D.

STARTERS

To Adjust and Assemble

Models A—B—L—M—S—T

On hand lever models the starter return spring must have sufficient tension to return lever against its stop on blower case. To increase tension of spring move small hook at end of spring back to next peg. See Plate No. 44.

On hand crank models tighten pinion gear on crankshaft securely. Oil crank gear shaft through the oil cup and grease the pinion and crank gear teeth to reduce wear. See Plate No. 45

Plate No. 44

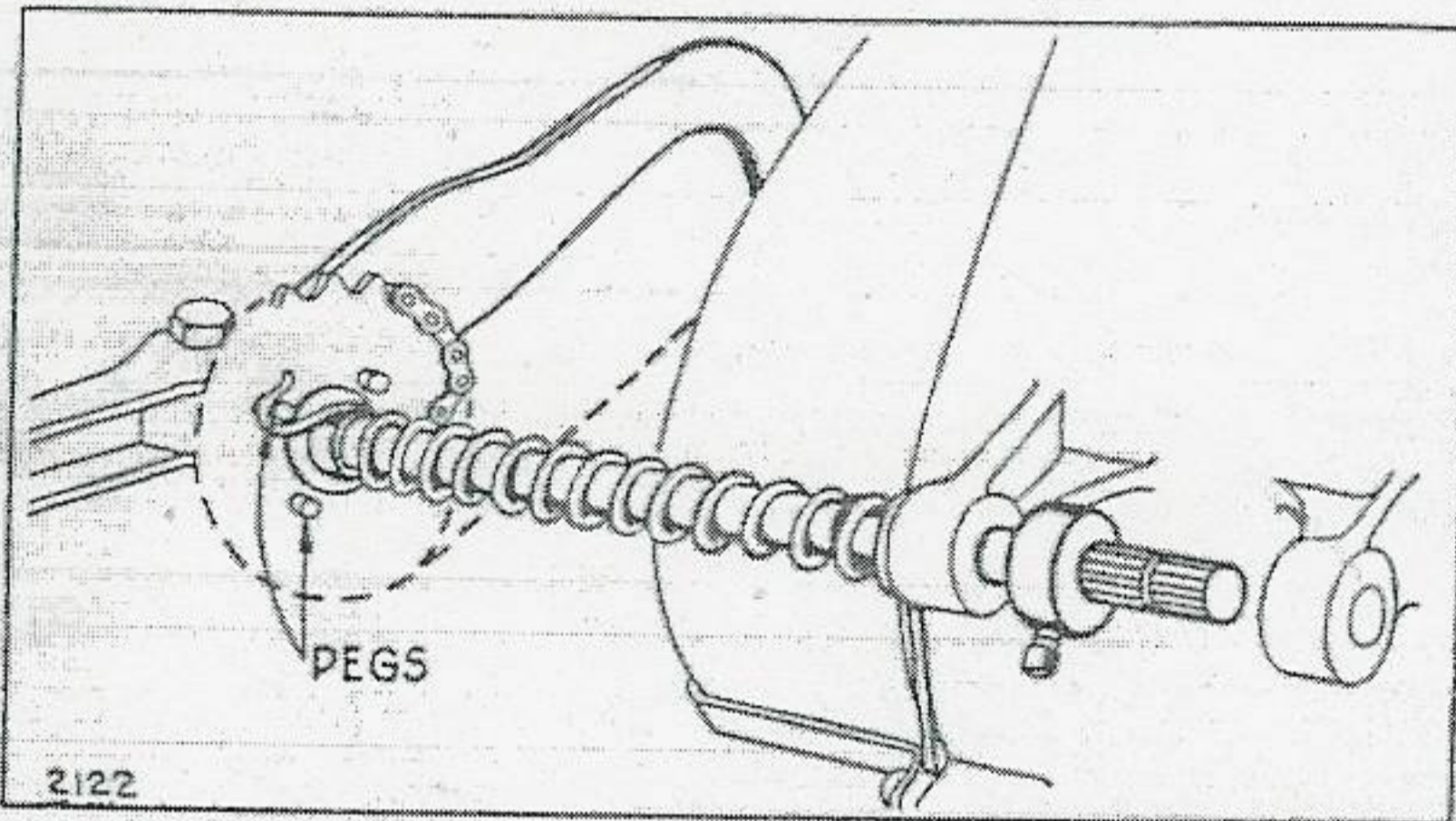
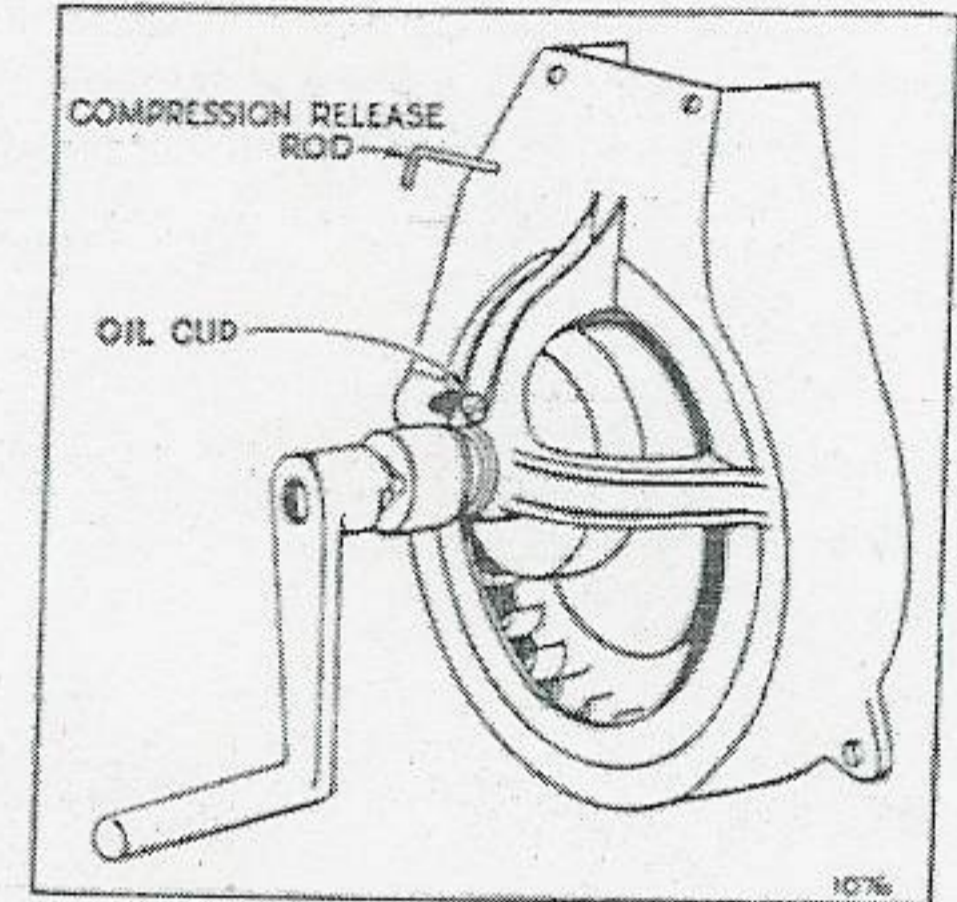


Plate No. 45



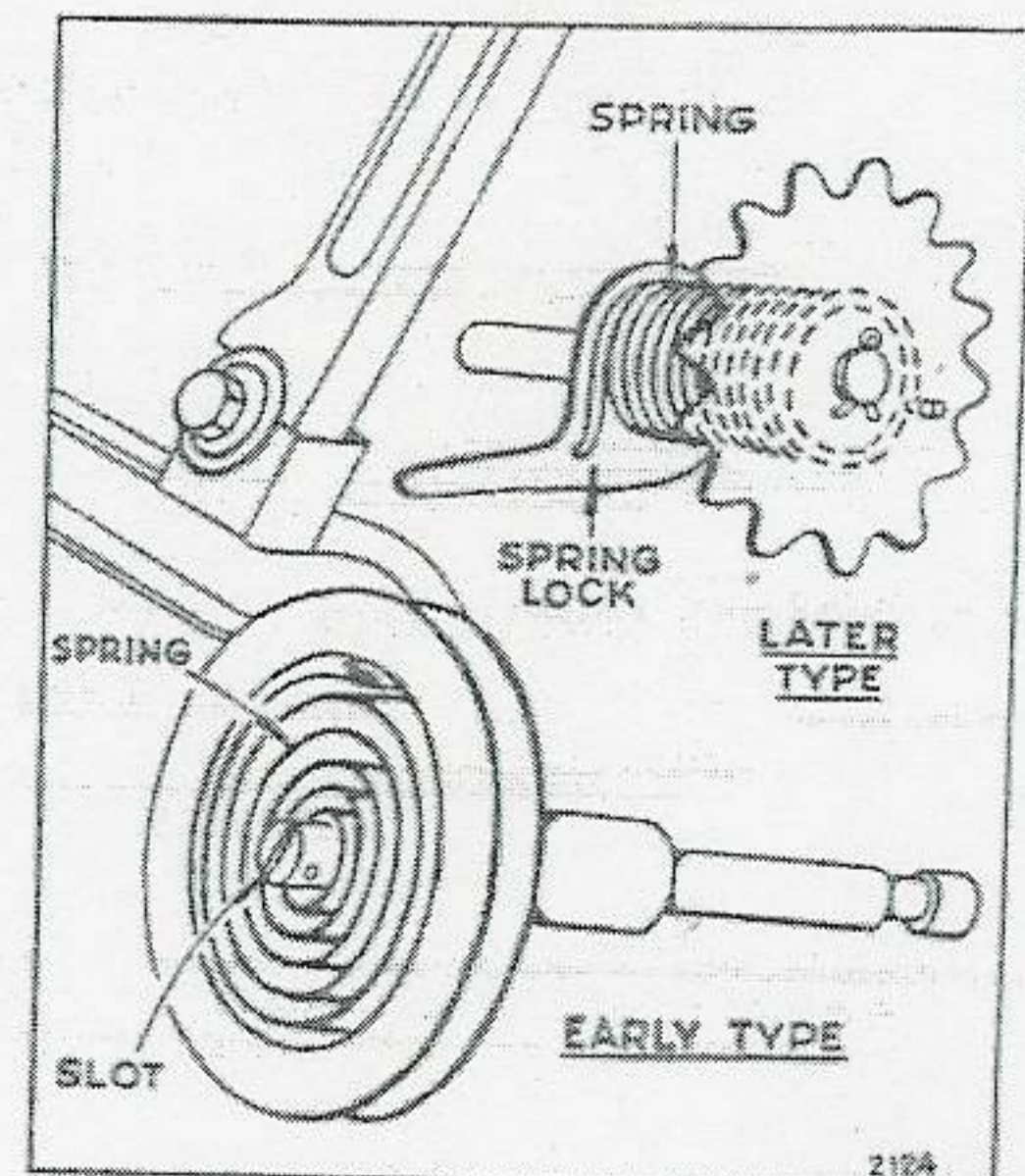
Models FH—FI

On the early Model FH motors (before Serial No. 57100) a clock spring type return spring was used. Correct assembly of spring to case is shown in left view of Plate No. 46. To increase tension on the spring, loosen set screw on starter shaft and turn shaft to the left with a screw driver at the slot, then lock shaft in place.

The later type spring used on Model FH (after Serial No. 57100) is shown in the right view of Plate No. 46. One end is hooked through hole in sprocket and the other end in the spring lock. To change tension on this spring, loosen set screw and move starter assembly out far enough to permit turning of spring lock, then turn lock forward to increase tension and backwards to decrease tension. Slide starter assembly in place with spring lock up against blower case and lock shaft in place.

Chain must align properly with sprockets on later models and with sprocket and sheave on earlier models. If out of alignment use pipe wrench to straighten lever.

Plate No. 46



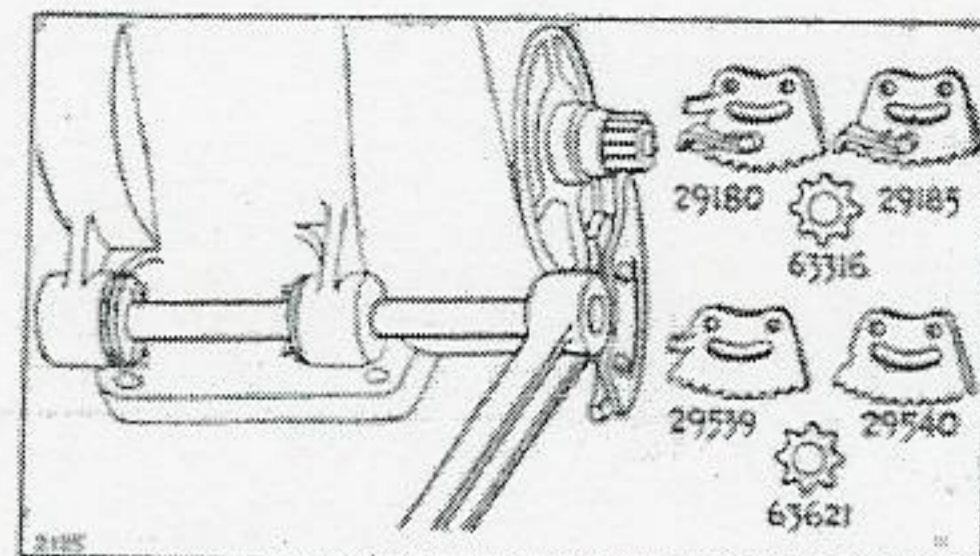
2124

To Adjust and Assemble

Models H—Y

Plate No. 47

The gear sector on the starter pedal of this type of motor should align squarely with the pinion on the crankshaft. Use washers on pedal shaft to adjust gear sector in the middle of the pinion gear. Be sure that the sector does not bind at any place. To replace this sector, it is necessary to remove only two rivets and rivet new ones in place.



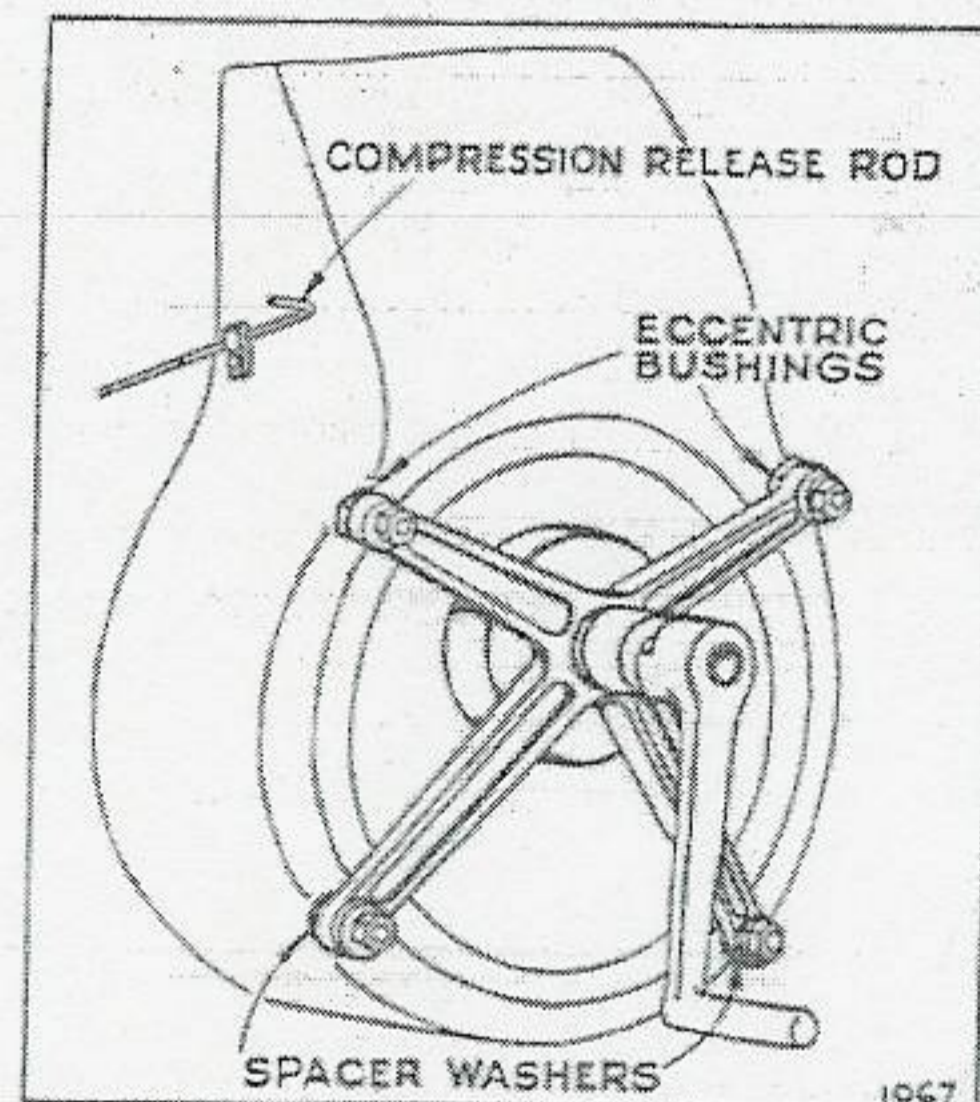
The starter clutch pinion (No. 63316) on the first Models H and Y motors had blunt gear teeth. This starter pinion was used with sector assemblies Nos. 29180 and 29185, which are equipped with a spring tooth assembly as shown in Plate No. 47. Do not use this pinion with sector assemblies Nos. 29539 and 29540.

The new starter clutch pinion (No. 63621) has pointed gear teeth. This pinion can be used with all of the sector assemblies shown in Plate No. 47.

Plate No. 48

Models K—Z

To assemble starter, place two eccentric bushings on upper studs, and two plain washers on lower studs. Then place starter bracket gear and shaft assembly and four plain washers, and nuts on studs. Press starter shaft toward motor and turn the two eccentric bushings until gears mesh with as little backlash as possible and without binding. Tighten nuts securely. Oil the crankgear shaft through the oil cup, and grease the pinion gear teeth occasionally to reduce wear. See Plate No. 48.



Models Q—R—W

The early Model Q motors were equipped with a starter as shown in Plate No. 50. If gears of this type starter bind, place shims under starter bracket.

The later Model Q and all Model R and W hand crank motors were equipped with a starter as shown in Plate No. 49. If gears of this type starter bind, place shims between starter bracket and crankcase.

To Adjust and Assemble

Plate No. 49

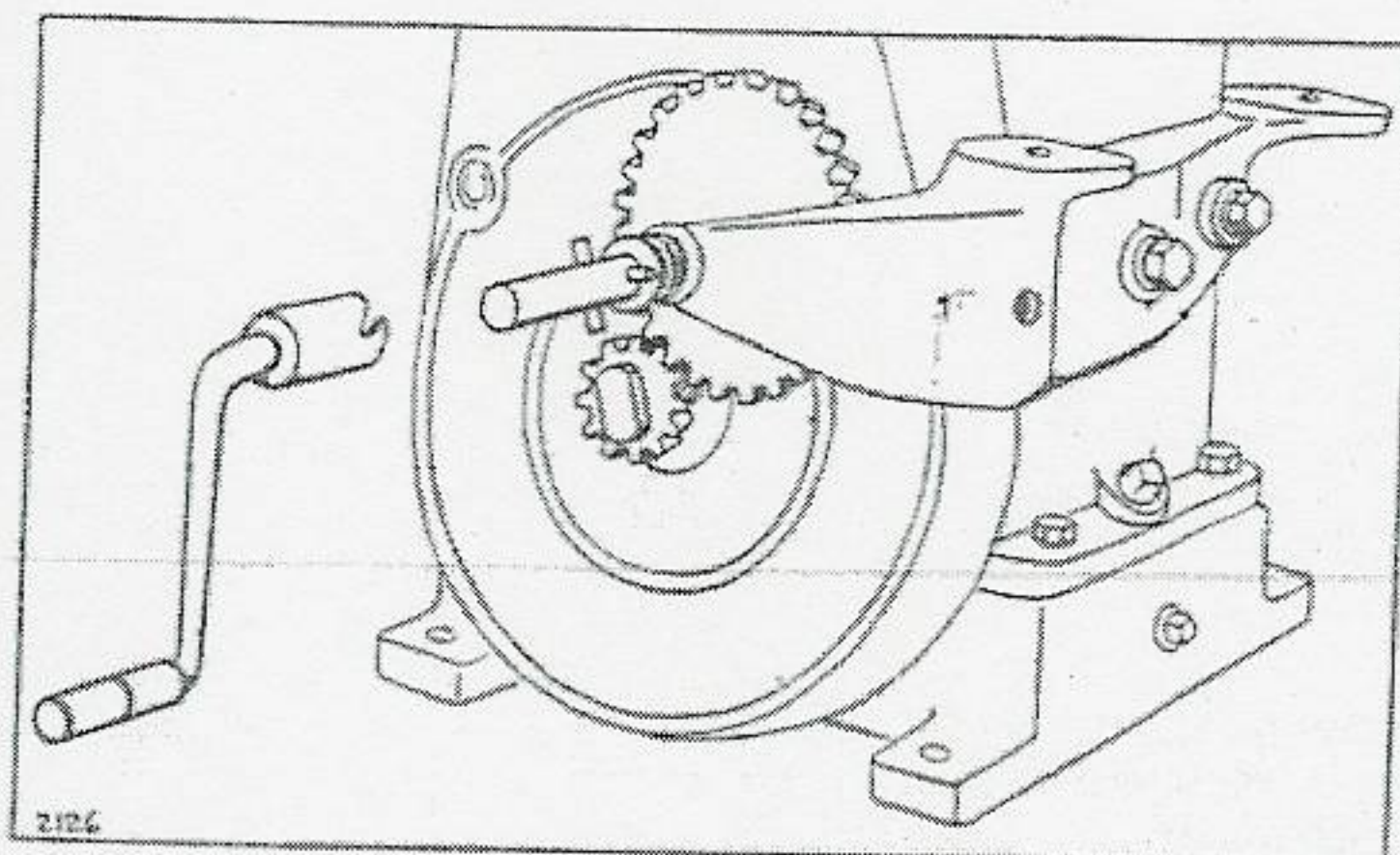
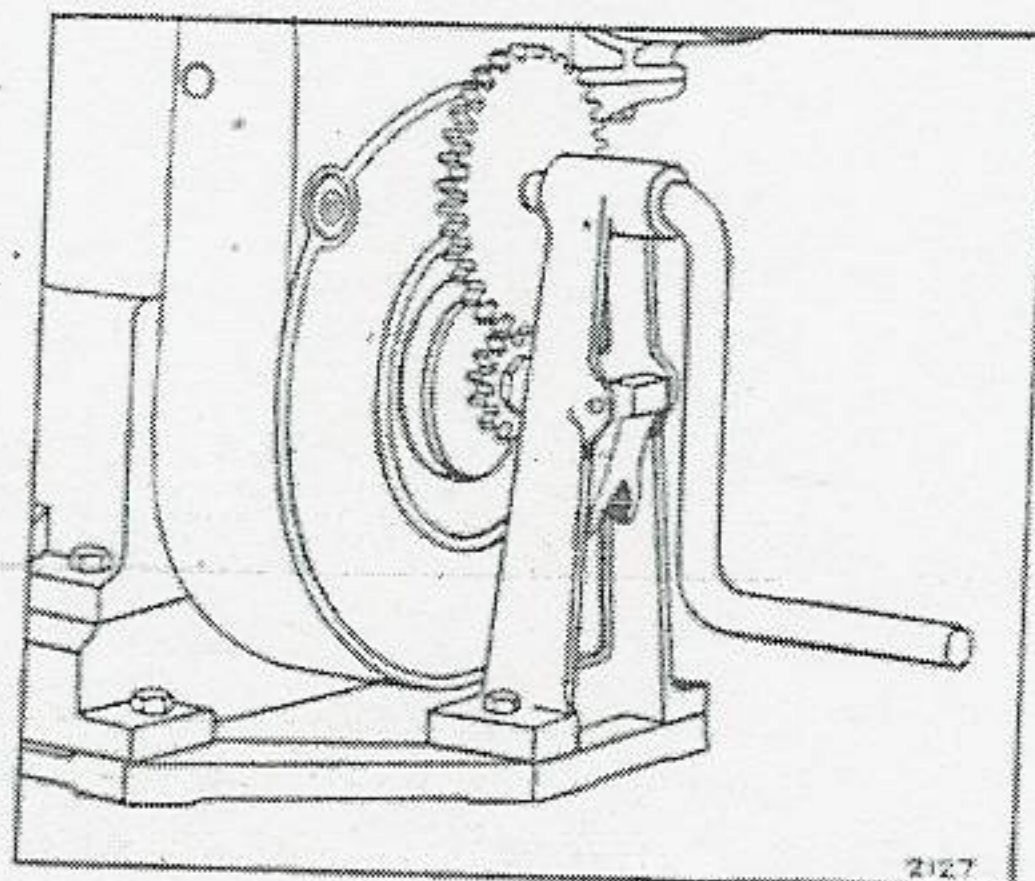


Plate No. 50



Models WI—WM—WMB—WMI

The starter pedal is made in two parts - the pedal proper and pedal stop, held together with the adjusting bolt. To adjust, loosen the bolt and set pedal to desired position. Adjust the pedal to get the longest possible stroke without striking any part of the machine. The first tooth on the starter sector must clear the teeth of the starter pinion. Should the starter pedal return spring loosen or lose its tension, loosen the bolt which holds the return spring cup.

Turn the cup to the left until there is enough tension to return the starter pedal back to the normal position after depressing it, and tighten the bolt. Too much tension may cause spring to break. Be sure the spring is in the proper position with the long end below the pedal adjusting bolt and the hooked end in the slot of the cup. See Plate No. 51.

If starter pedal return spring and cup have been removed and washed, refill cup with 1/4 teaspoonful of "Marfak" No. 3 grease or any other fibre grease used to pack the front wheels of an automobile.

Plate No. 51

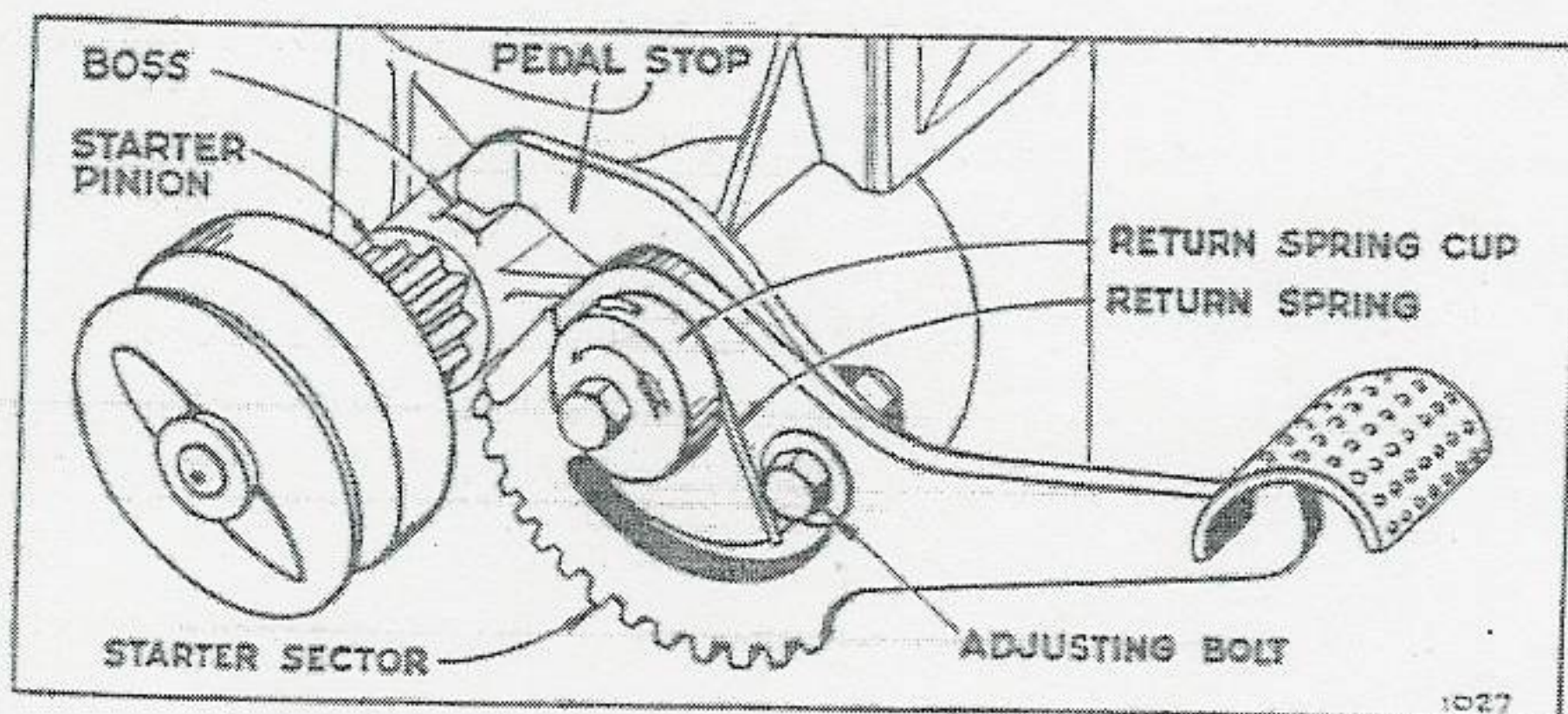
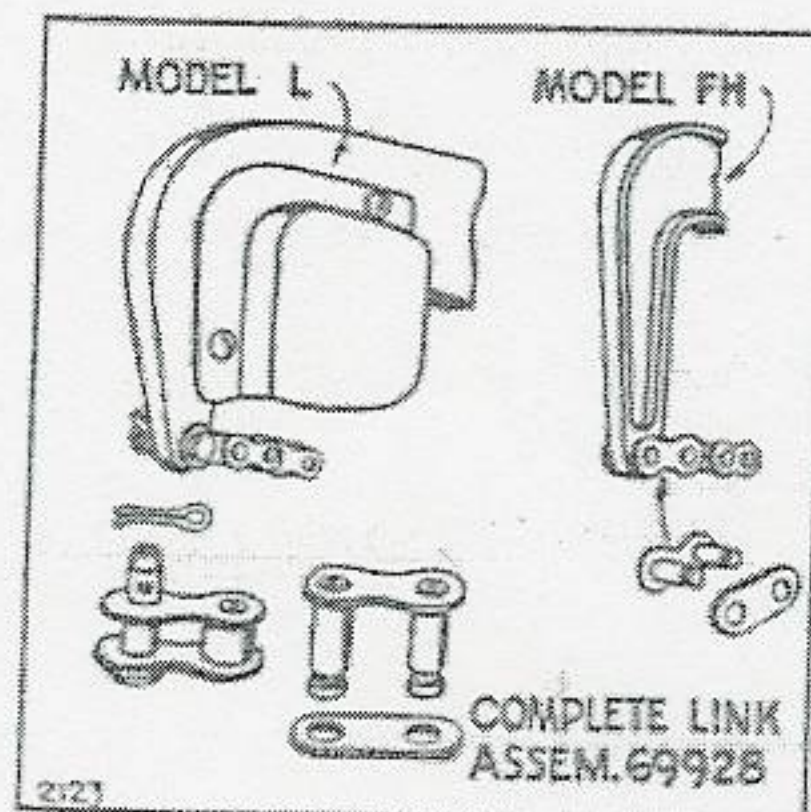


Plate No. 52



To Repair

Models A—L—M—S—T

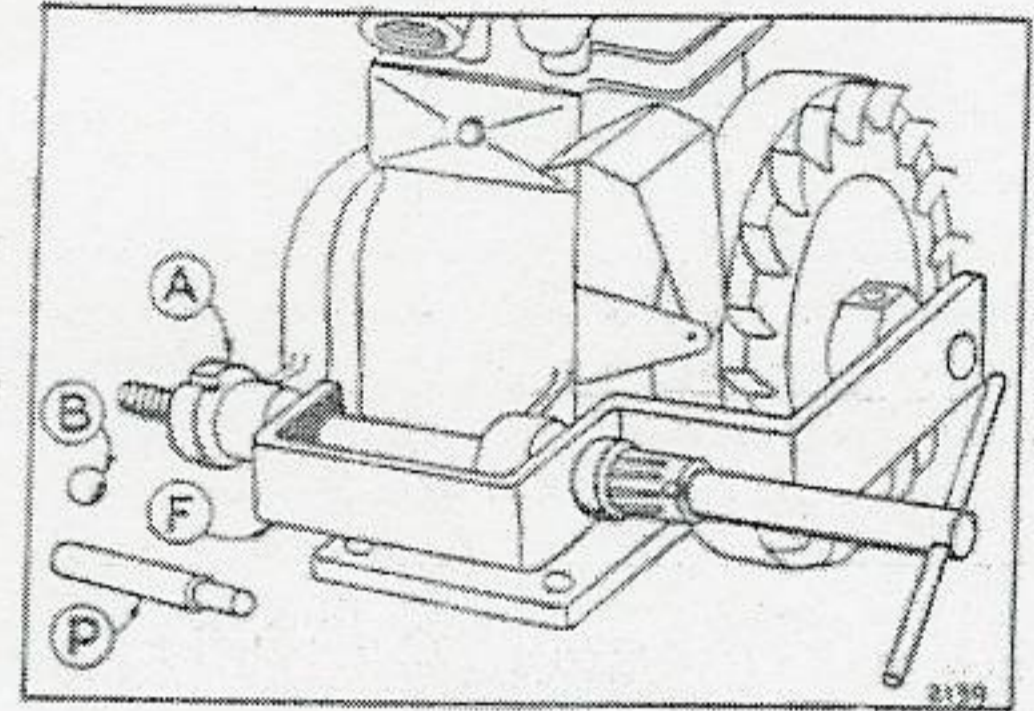
Broken chains can easily be repaired with standard repair link assembly (No. 69928). See Plate No. 52.

Models H—Y

Plate No. 53

If starter sector slips over pinion teeth or sector and pinion teeth have too much clearance, it is usually caused by a worn starter shaft hole. To repair, use reaming fixture (No. 60079-T3)

Remove starter pedal, blower case and clutch. Slip the frame (F) over end of crankshaft and into left starter lug hole. See Plate No. 53. Ream with the smaller (13/16") dia. shell reamer. Use nut (A) on end of arbor to draw reamer in uniformly. If nut (A) turns, lock it with suitable pin at slot. Run reamer in far enough to chamfer end of hole to take bushing easier. NOTE: If 13/16" dia. of reamer does not clean up worn hole, run the next 7/8" dia. thru. In most cases the smaller diameter is sufficient.



After reaming, press in the right size bushing. The 13/16" dia. bushing is Part No. 63673. The 7/8" dia. bushing is Part No. 63706. With bushing in place, burnish hole by pushing steel ball (B) thru twice with plunger (P). Try starter shaft in hole. If shaft is tight in hole, push steel ball thru third time. Shaft should have good slide fit in hole.

All Briggs & Stratton Authorized Service Distributors and Stations are manned by factory-trained men, equipped with special factory tools, ready to take care of any emergency. They will be glad to supply you promptly with any repair parts you may need, or handle the complete job for you. You will save time and money by using their facilities.

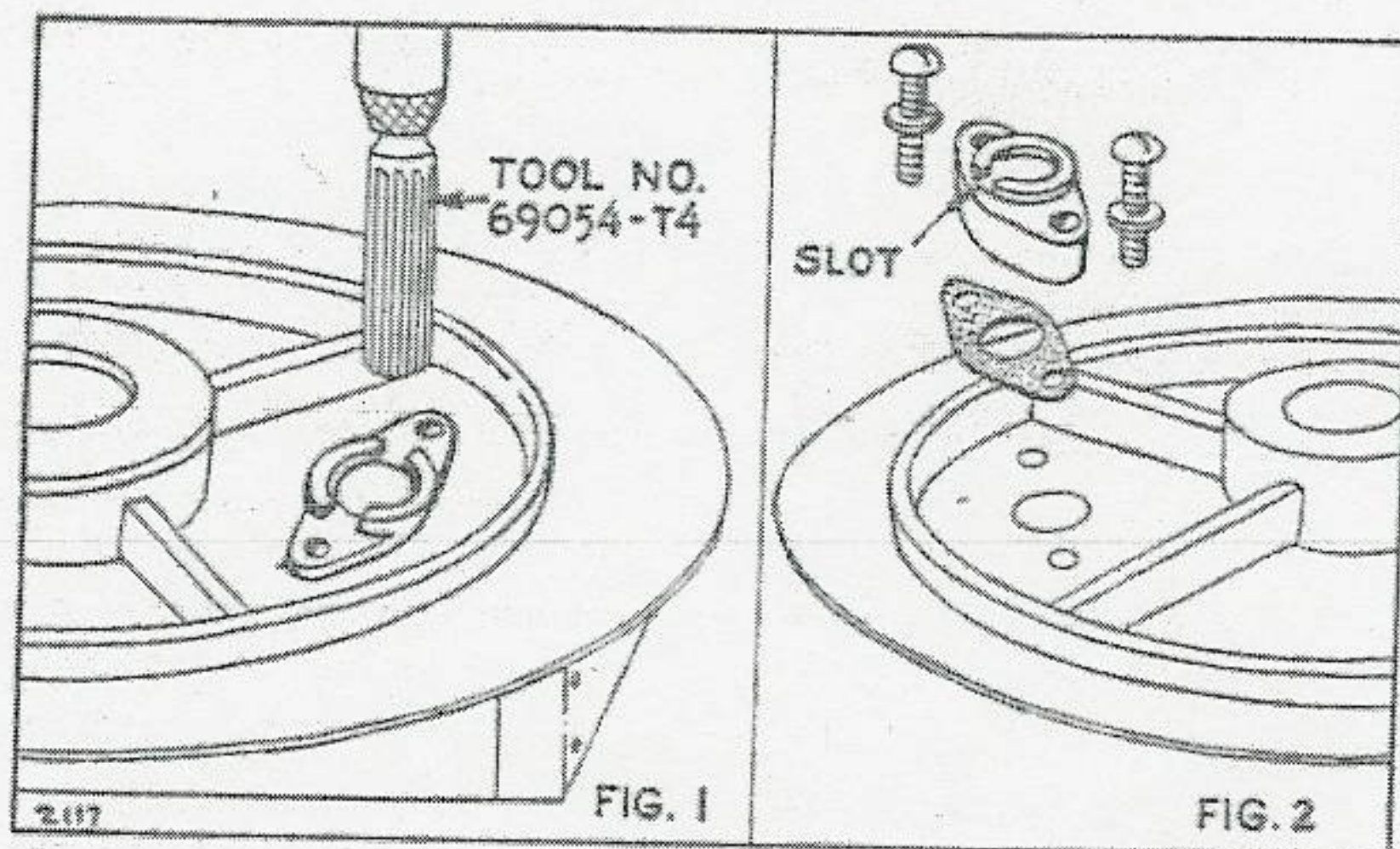
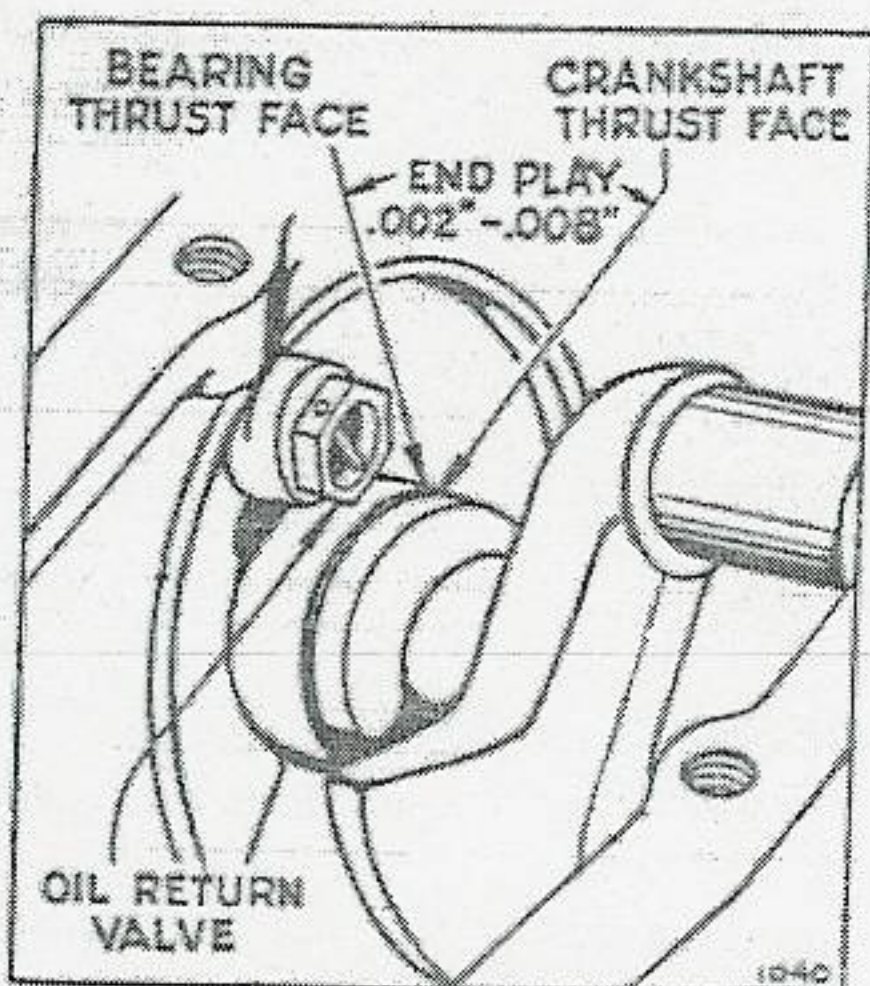
OIL RETURN VALVES

An oil leak at the main bearings can usually be corrected by cleaning or replacing oil return valve. The oil return valve is under the bearing in the cylinder and magneto plate. On late model motors the valve is threaded and screws in place. See Plate No. 54. Earlier models were equipped with cast-in type valves as shown in Fig. 1 of Plate No. 55 and should be replaced with new type (Part No. 69992) shown in Fig. 2.

To remove old style oil return valve, place magneto plate with armature down, on a box to support the outer edges. Place end mill tool (Part No. 69054-T4) in drill press and feed press table up, moving magneto plate back and forth, until you have removed entire old oil return valve. In assembling oil return valve (Part No. 69992), be sure the slot of the disc is placed toward bottom of motor. See Plate No. 55.

Plate No. 54

Plate No. 55



CRANKSHAFT END PLAY

End play is measured with thickness gauge between the bearing thrust face and crankshaft thrust face. End play should not be less than .002" or more than .008". See Plate No. 54. Proper end play can be secured by facing magneto plate in a lathe or if these tools are not available, you can sometimes correct the trouble by the use of gaskets furnished with each magneto assembly measuring .005", .009" and .015" thick.

To correct end play less than .002", place magneto plate arbor in a lathe and take required cut from bearing thrust face, or add one or both of the thinner gaskets as required. To correct end play greater than .008", place magneto plate in lathe and take cut off mounting face, or remove the .015" gasket and replace with either a .005" or .009" gasket.

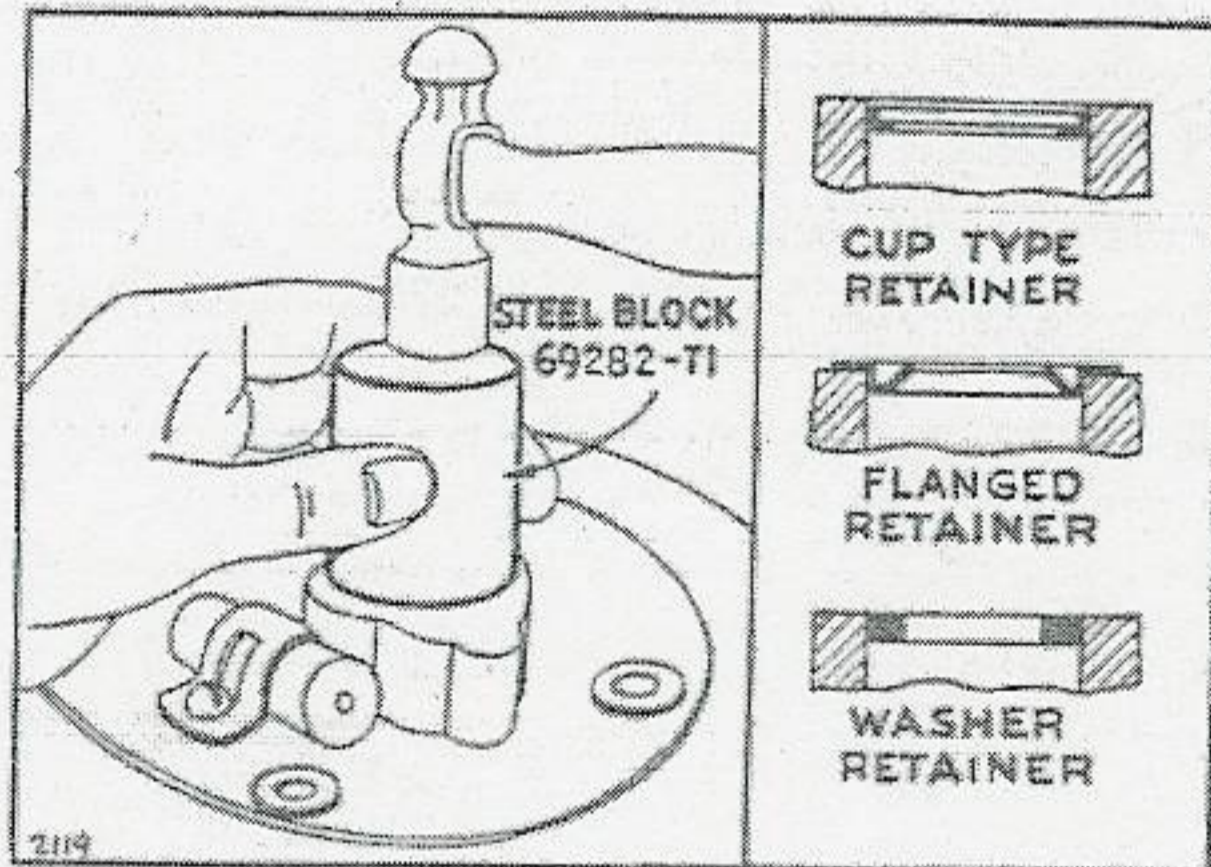
OIL RETAINER RINGS
(To Remove and Assemble)

The bearing oil retainer rings of Briggs & Stratton motors consist of three types - the flange type, the cup type, and the washer type.

To remove, pry out old rings with a screw driver. The flange type oil retainer ring can be assembled to the bearing boss, only with the flange at the top. The cup type oil retainer ring must be assembled with the sides of the cup up, and the washer type retainer can be assembled with either side up.

Place new oil retainer ring or washer in the counterbore, then use tool (Part No. 69282-T1) to drive ring into proper position. See Plate No. 56. There must be an air gap of about .010" between cup type and flanged type oil retainer ring and crankshaft journal. If the air gap is not .010" the oil retainer ring should be filed. The air gap of the washer type retainer is less and should be left as received from factory. Do not file washer type retainer.

Plate No. 56



BREATHERS

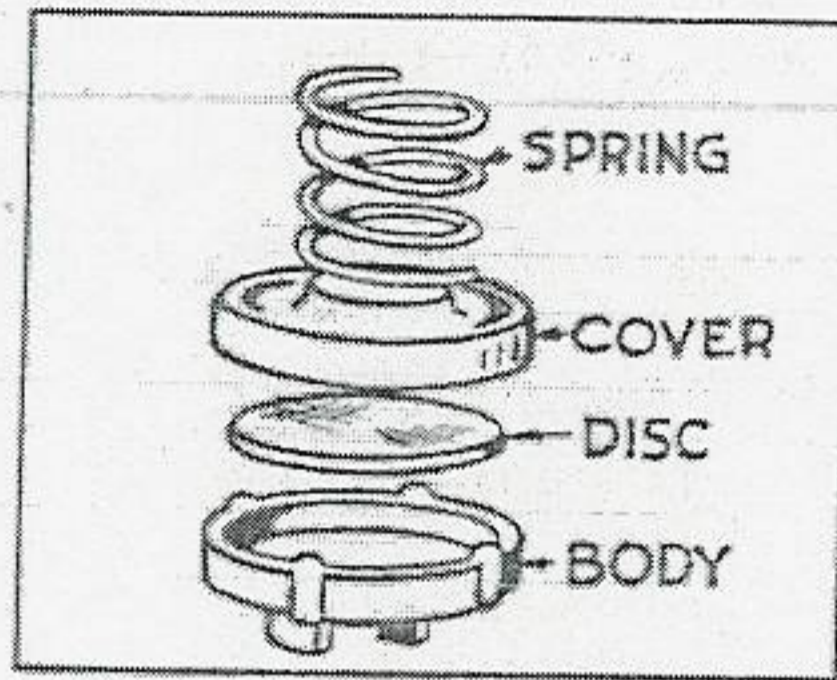
Models A—B—H—WM—WMB—Y

These models are equipped with a breather that is pressed into the cylinder. See Plate No. 57.

Models N—U

These models are equipped with a breather valve in the valve chamber. To disassemble or assemble See Plate No. 56A.

Plate No. 56A



All Other Models

The breather screws into the cylinder or crankcase on all other models.

(To Remove and Assemble)
Models A—B—H—Y

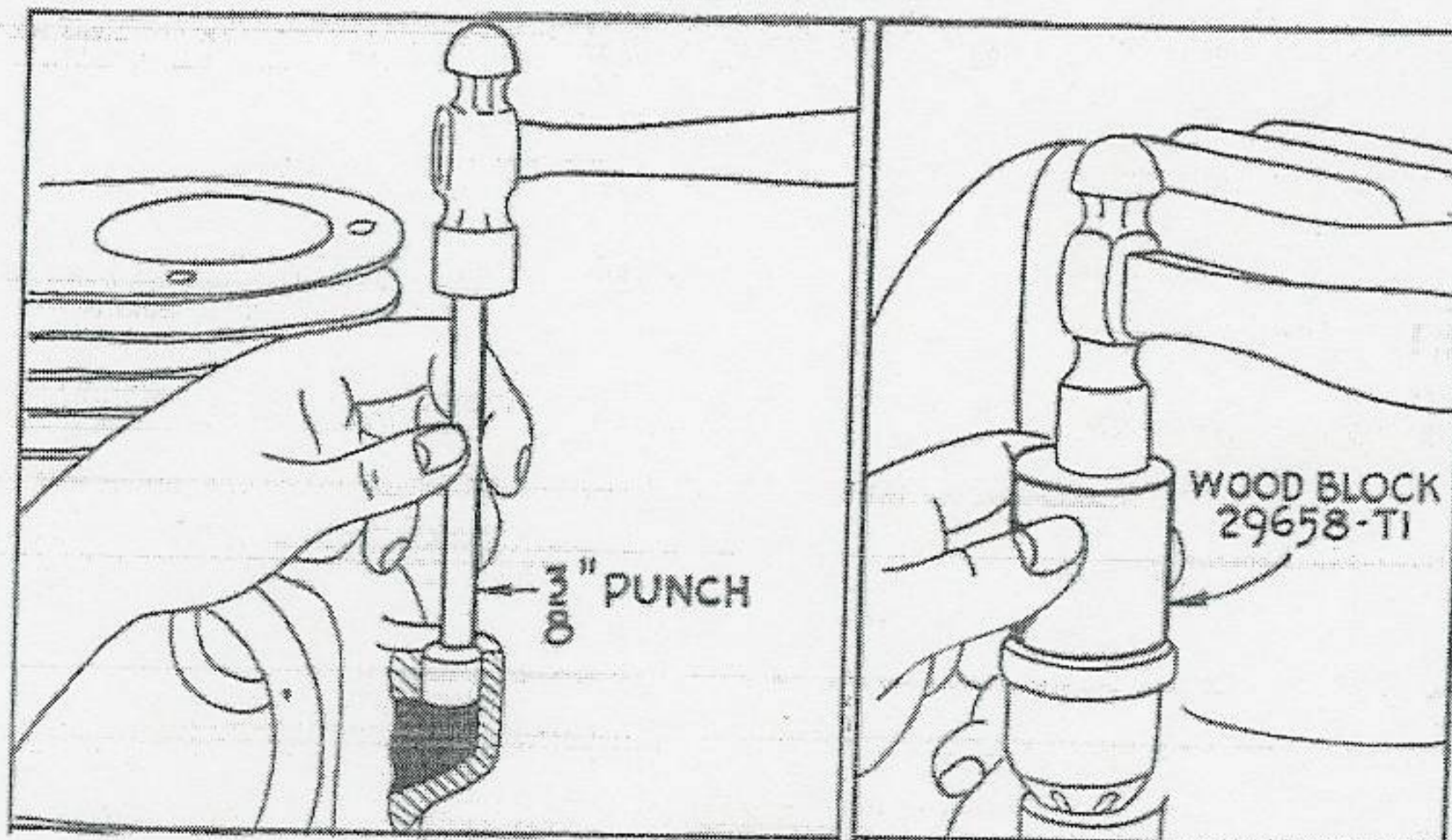
Remove base of motor and drive breather sleeve out with a long punch or rod from below.

When assembling new breather apply shellac to the breather hole in the cylinder. Insert new breather and drive in place using Driving Block (Part No. 69751-T1) as shown in Plate No. 57.

Models WM—WMB

To remove breather see instructions for Model A, except to remove breather, drive it down into the crankcase. Using Driving Block (Part No. 29658-T1) to assemble new breather.

Plate No. 57



BREATHERS CONT'D
(To Replace Moss)

Plate No. 58

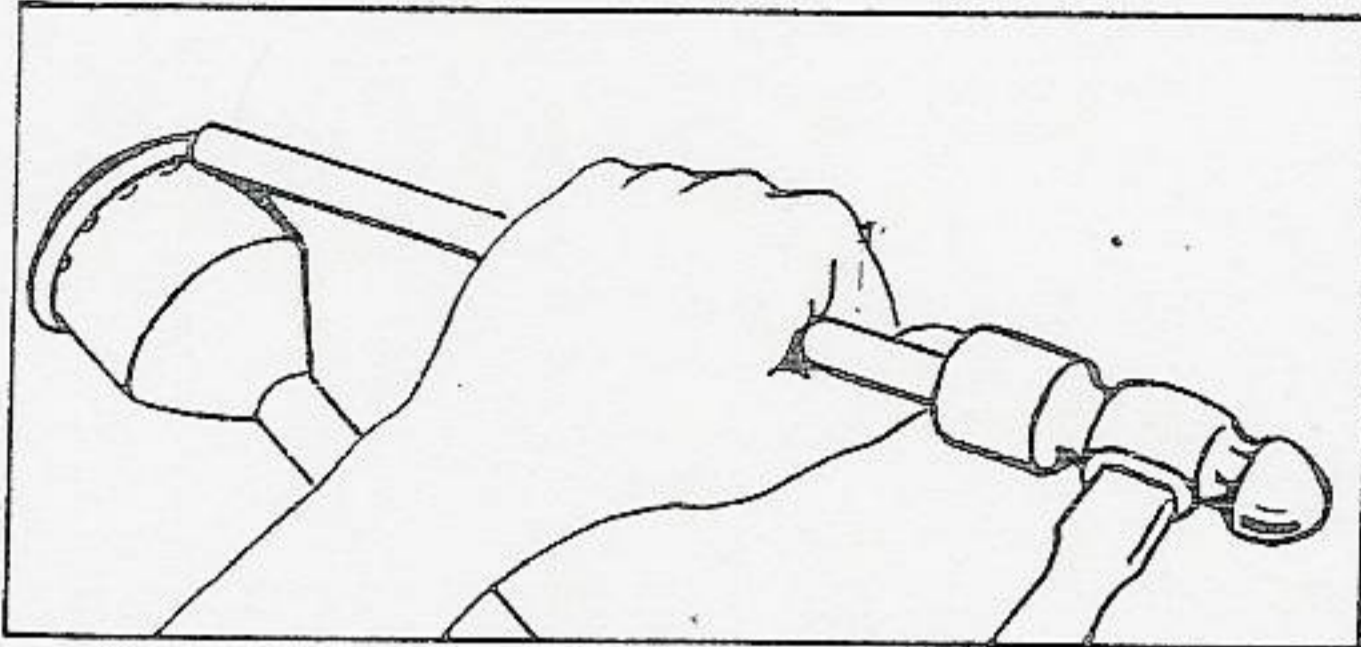


Plate No. 59

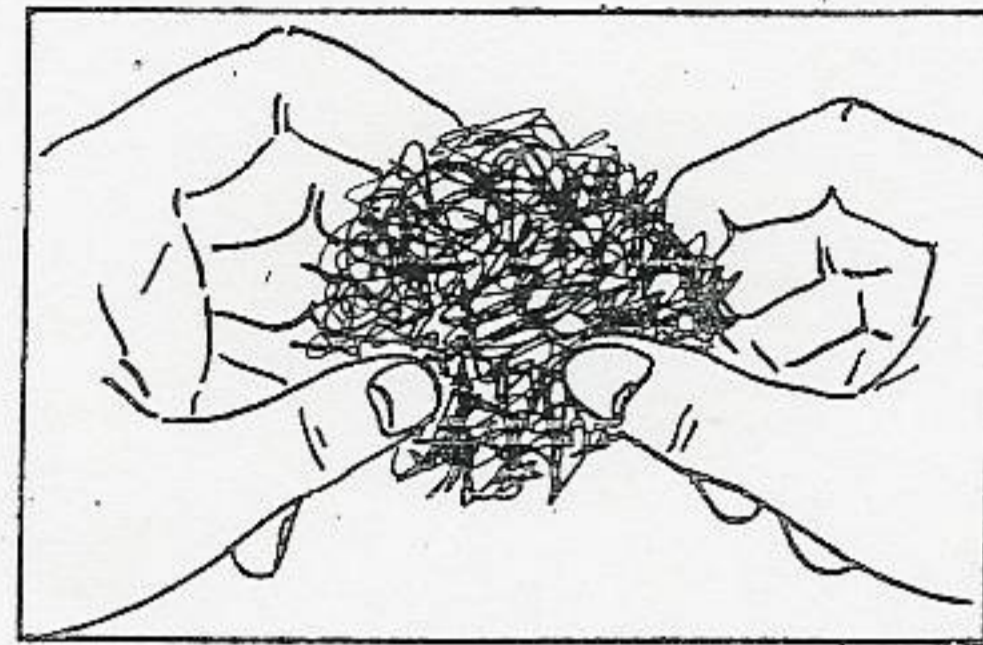
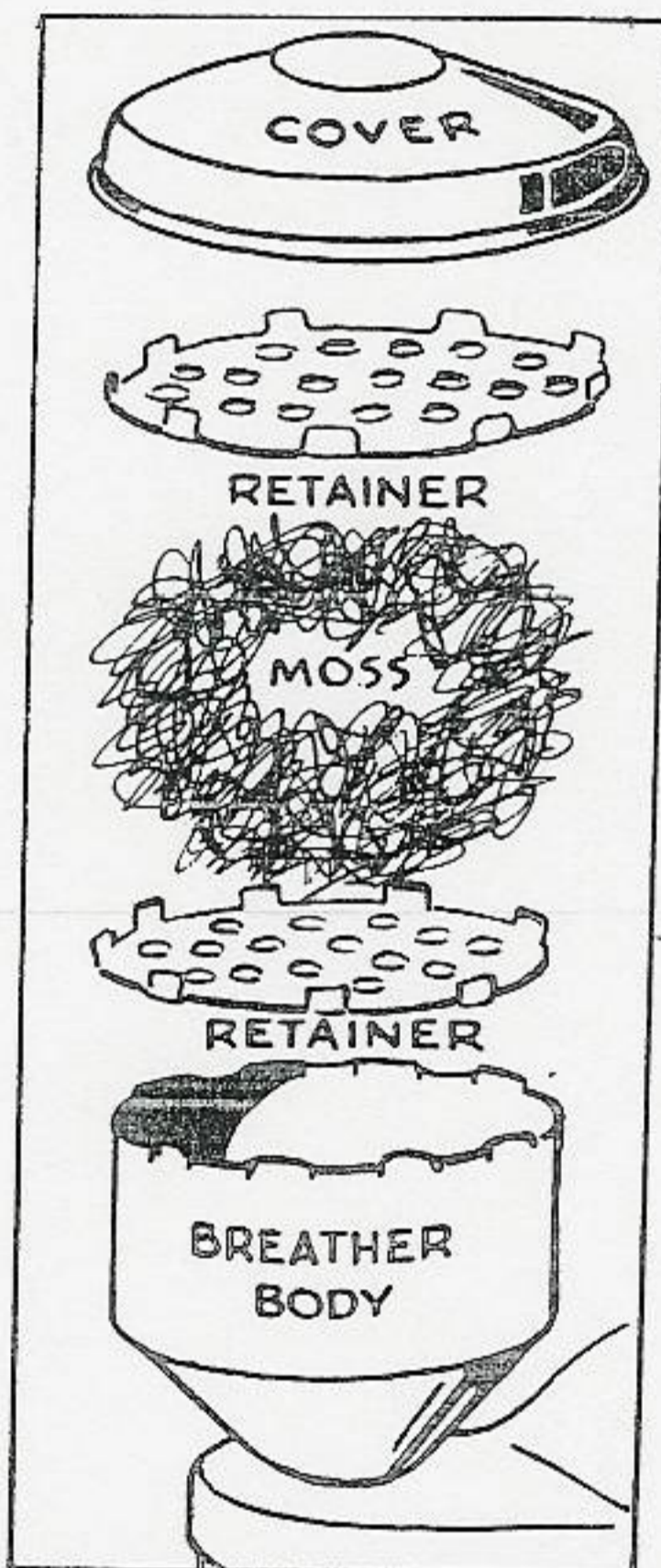


Plate No. 60



Remove breather cover by tapping lightly with a blunt tool as shown in Plate No. 58.

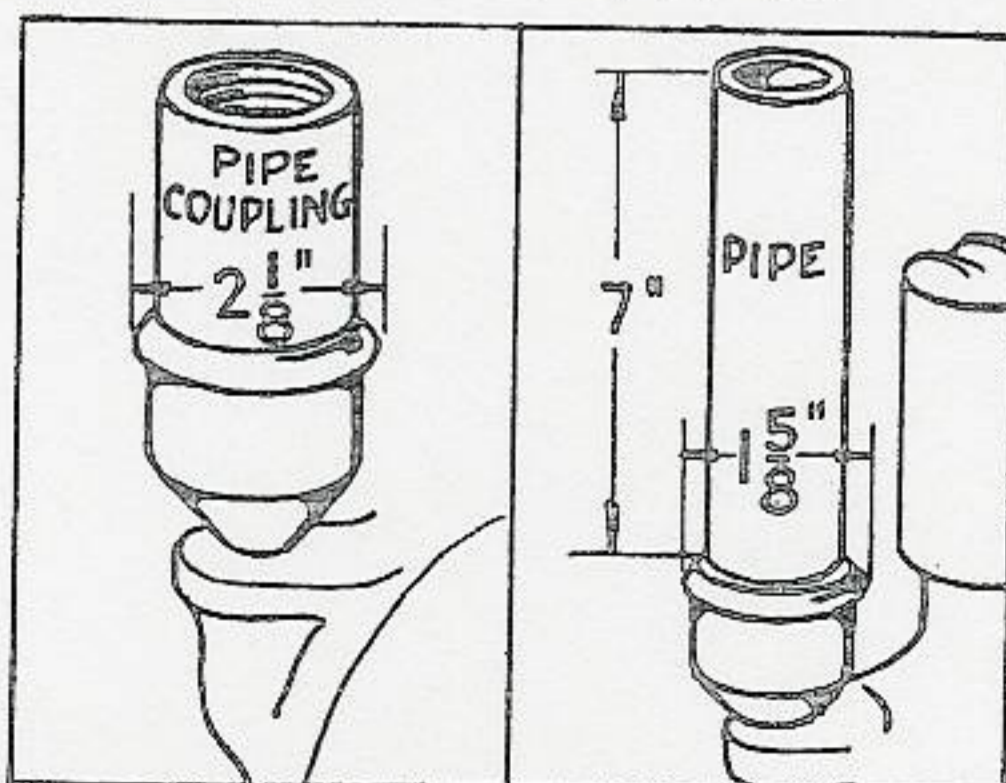
Discard old moss and clean parts thoroughly. Remove lumps from new moss by pulling it apart to prevent packing too tightly. See Plate No. 59. Reassemble moss and retainers as shown in Plate No. 60.

Before driving cover into place, place a heavy piece of cloth over it and proceed as follows:

On covers measuring 2-1/8" place a 1-1/4" or 1-1/2" pipe coupling over cloth and cover. See Plate No. 61.

On covers measuring 1-5/8" use a piece of 1-1/4" pipe about 7" long.

Plate No. 61



Tap the end of pipe or coupling until cover is properly seated on breather body. Do not drive cover with a hammer or other flat surfaced tool as this is liable to dent it and prevent proper fit.

AIR CLEANERS

An Air Cleaner properly serviced protects the motor from dust and dirt.

If the Air Cleaner instructions are not carefully followed, the dirt and dust collected in the cleaner is drawn into the motor and becomes part of the oil film resulting in an abrasive mixture which wears the moving parts which the oil is intended to protect. No motor can stand up under the grinding action which takes place when this occurs.

(To Clean)

Felt Type

Rinse in gasoline and blow all dirt out of filter element. If filter element is gummy and greasy so that it cannot be cleaned, it should be replaced.

Oil Bath Type

To clean, remove cup and clean out old oil. Caution customer to refill with clean, light engine oil to indicated oil level.

Moss Type

To clean, rinse in gasoline to remove dirt. Fill with oil through holes, drain and replace. If moss is gummy and gasoline will not remove gum and dirt, air cleaner should be replaced.

HOW TO ORDER REPAIR PARTS

In ordering parts by mail from any Briggs & Stratton Service Distributor or Station which serves the territory in which you are located, always be sure to include the following information:

1. MOTOR MODEL LETTER
2. MOTOR SERIAL NUMBER
3. MOTOR TYPE NUMBER

This information is stamped on a metal plate attached to the blower housing of the motor.

When sending a complete motor for service, always include all parts such as gas tank, gas lines, starting equipment, etc., so that the complete unit can be given a careful check.



CHANGE OF OILING SYSTEM

Each and every Briggs & Stratton Model WM-WMG and PC-WM motor sent to you for repair or adjustment must be changed from the pump type to splash type oiling system as outlined in the following procedure.

Model WM - Drain oil; remove motor base plate. Use 7/16" socket.

Model WMG - Drain oil; remove generator assembly from motor base. Use 1/2" open end wrench to take off generator mounting screws. Remove base plate from motor (use same tools as for Model WM). DO NOT loosen base plate dowel nut which keeps motor and generator in alignment. See Plate No. 58.

Model PC-WM - Drain oil; remove motor from gas tank. Use 1/2" and 5/8" open-end wrenches. Remove base from motor, same as Model WM.

Inspect lower bearing of connecting rod, and if in good shape reassemble rod. DISCARD FILLISTER HEAD CONNECTING ROD SCREW LOCATED NEAREST CARBURETOR SIDE OF MOTOR and install in its place Special Dipper Screw (Part No. 91942) and draw up both screws tight. See Plate No. 59.

If lower rod bearing is scored, discard rod and install new style connecting rod, Part No. 29733, with assembly marks on rod and X on piston boss toward magneto side of motor, and with dipper screw Part No. 92080 toward carburetor side of motor. See that tangs of the connecting rod screw locking plates are in slots. Bend locking plates against hexagon heads with a pair of pliers. See Plate No. 59A.

Install new base plate Part No. 62904 on models "WM" or "PC-WM" and Part No. 62974 on models "WMG". (See page 47 for aligning "WMG" generator.

Plate No. 58

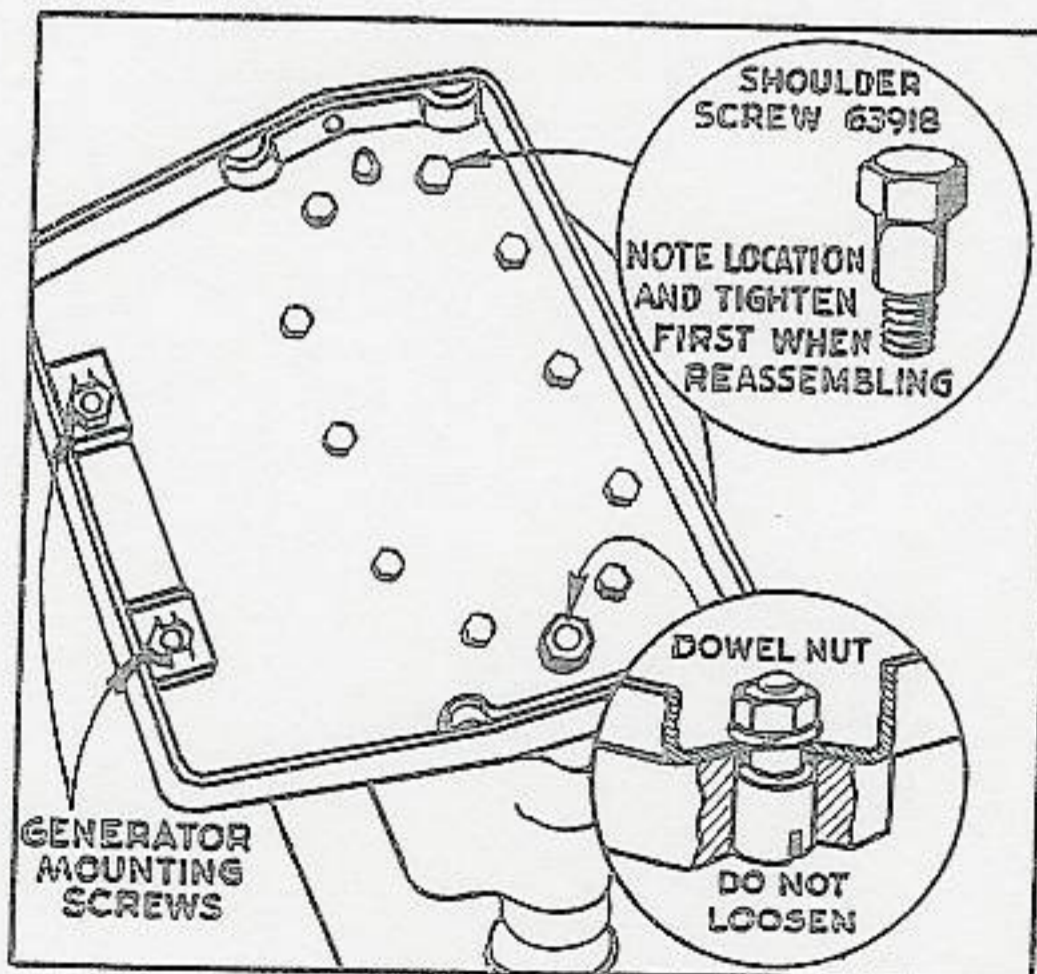


Plate No. 59

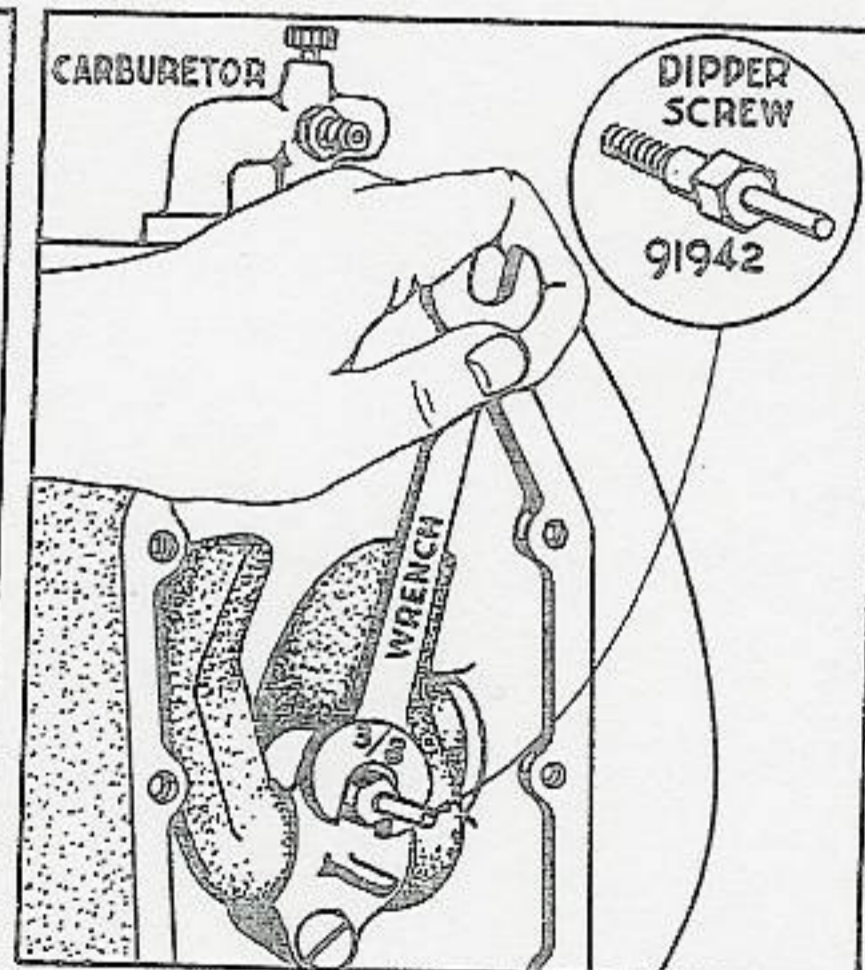
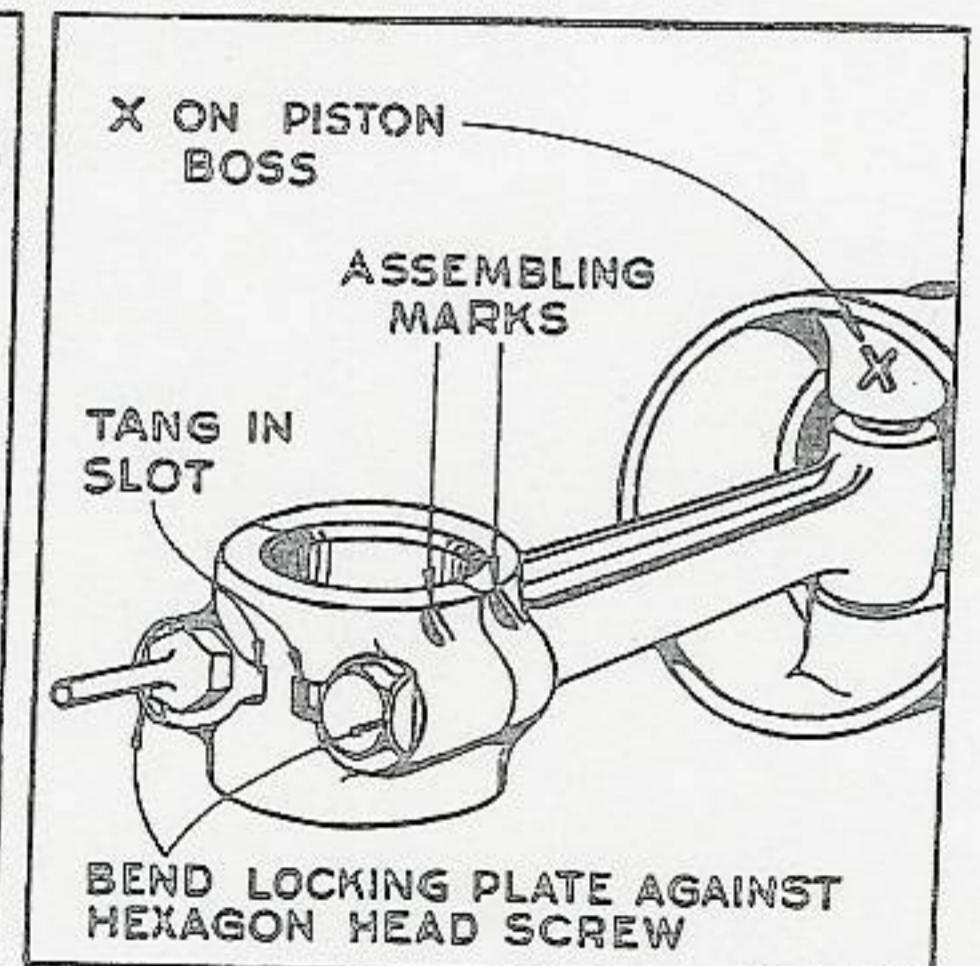


Plate No. 59A



CHANGE OF OILING SYSTEM

Models I— IBP—WI—WMI

OIL PUMP CHANGE

The oil pump of each and every Briggs & Stratton Motor Models listed above sent to you for repair or adjustment, must be examined and all old style pumps replaced by the Part Number 99955 as outlined in the following procedure;

Drain oil: Remove motor base. Remove oil pump from base. Use 7/16" socket wrench.

To check whether oil pump is old or new style, blow oil out of screen, but do not remove screen.

The old style oil pump had a staked-in seat as indicated in Plate No. 59-B and must be replaced by the new style pump which can be identified by the cast-in seat as shown in Plate 59-C

When assembling new pump to base be sure to install pump plunger and spring from the old pump.

This replacement is to be made on a warranty basis, regardless of the condition of the old pump.

Plate No. 59-B

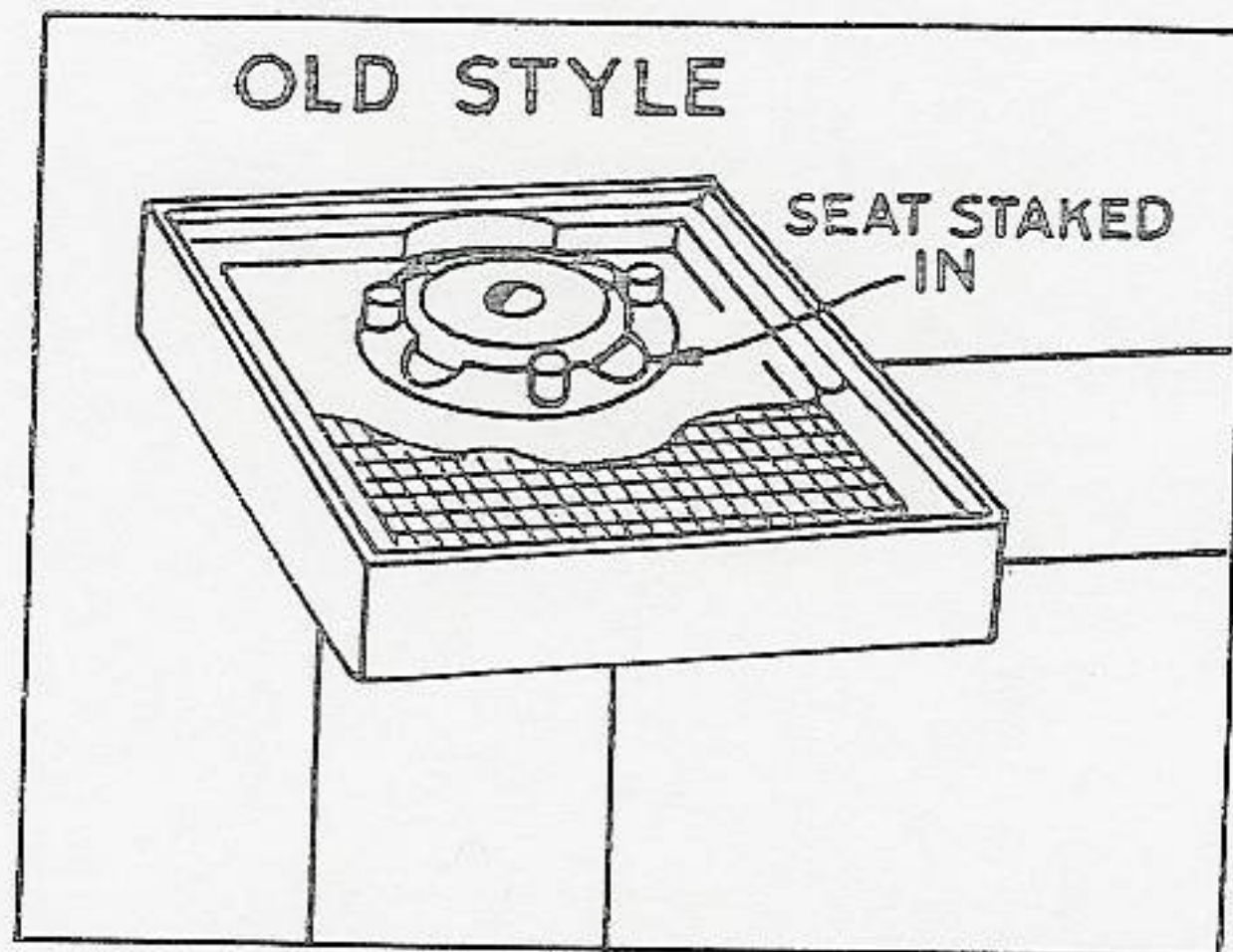


Plate No. 59-C

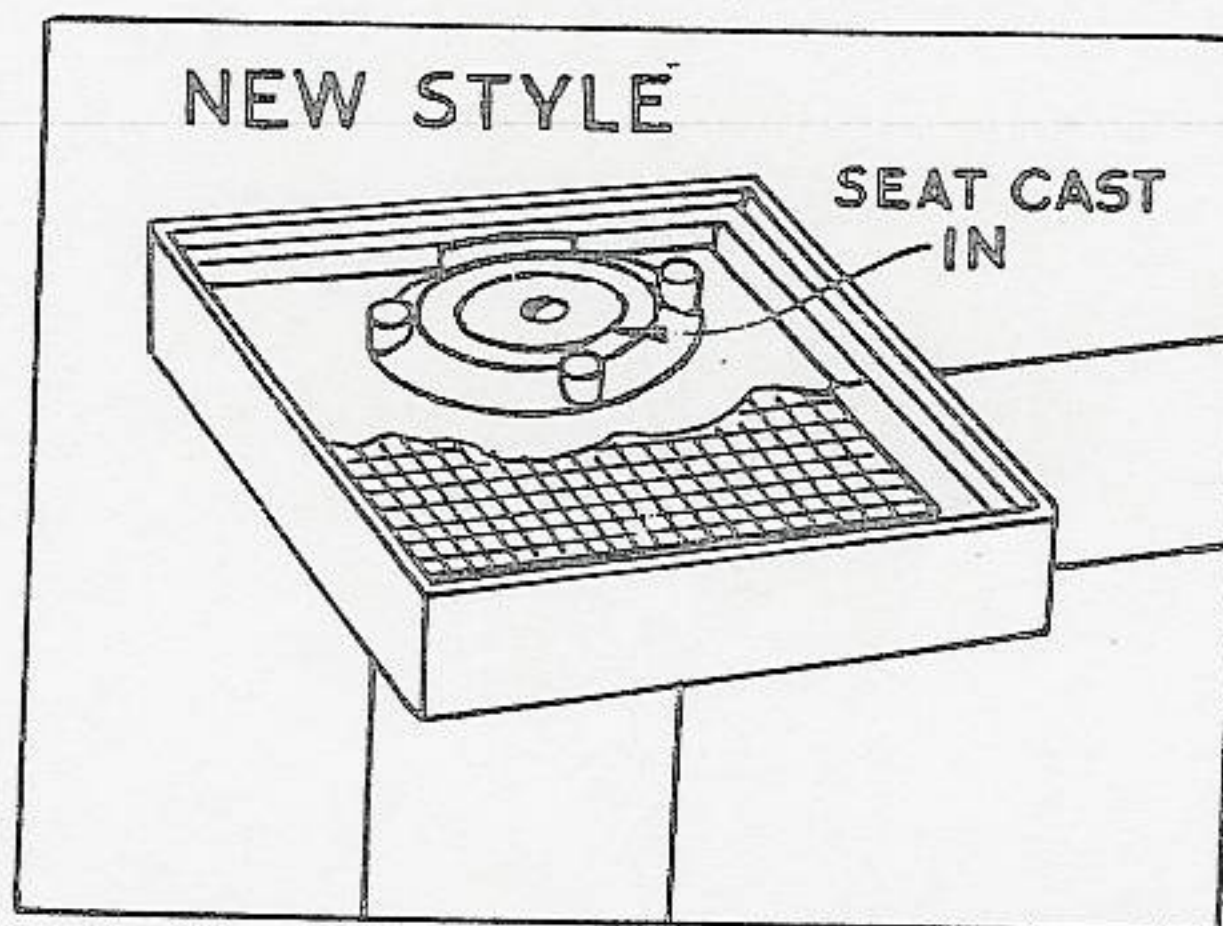
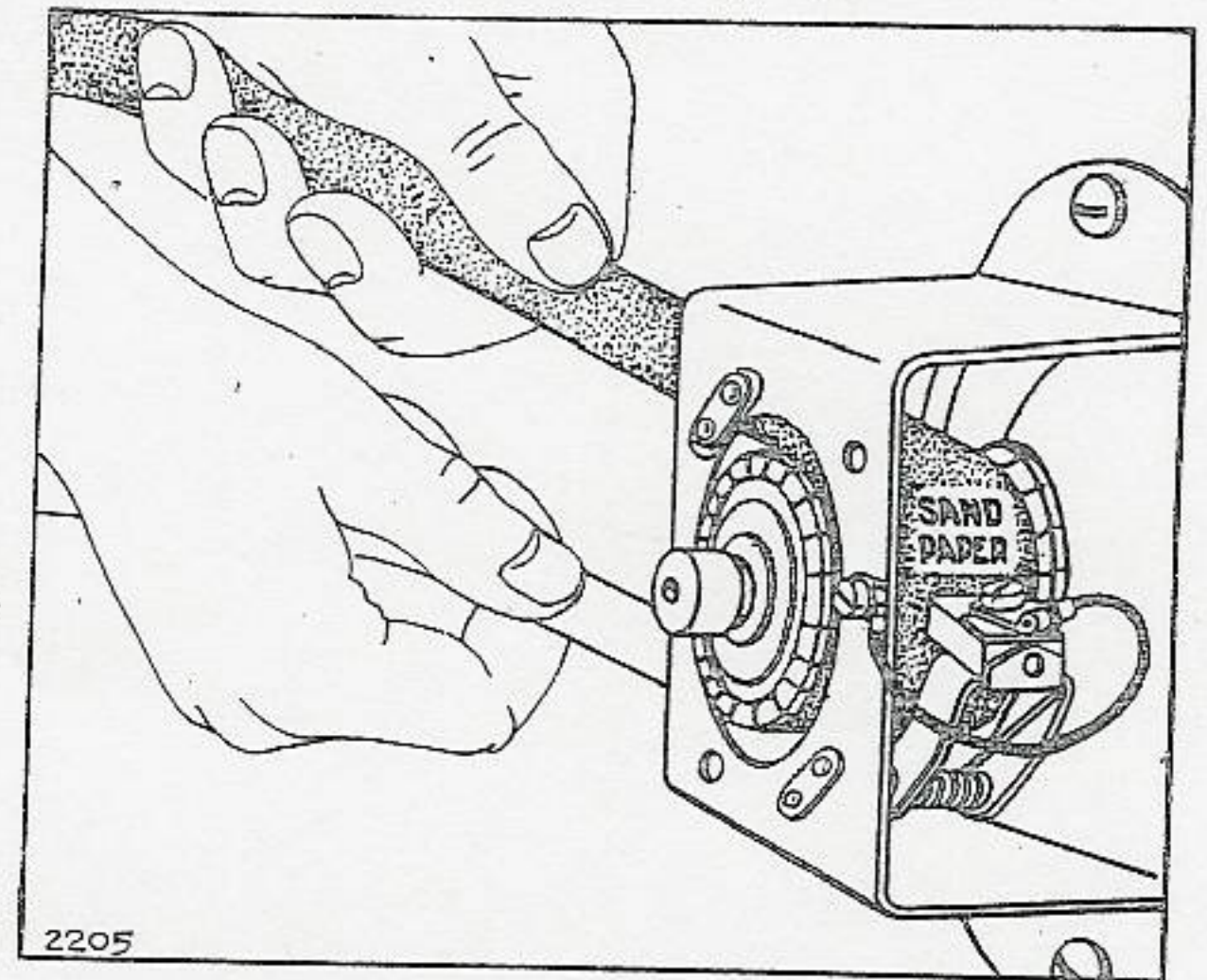


Plate No. 60

To seat new brushes or reseal old brushes, wrap a strip of No. 00 sandpaper around the commutator with the rough side next to the brushes. A few strokes with the sandpaper will form the brush seat correctly. Be sure brushes do not stick in the holder. Remove sandpaper and blow out all sand and dust. Never use emery cloth to seat brushes.



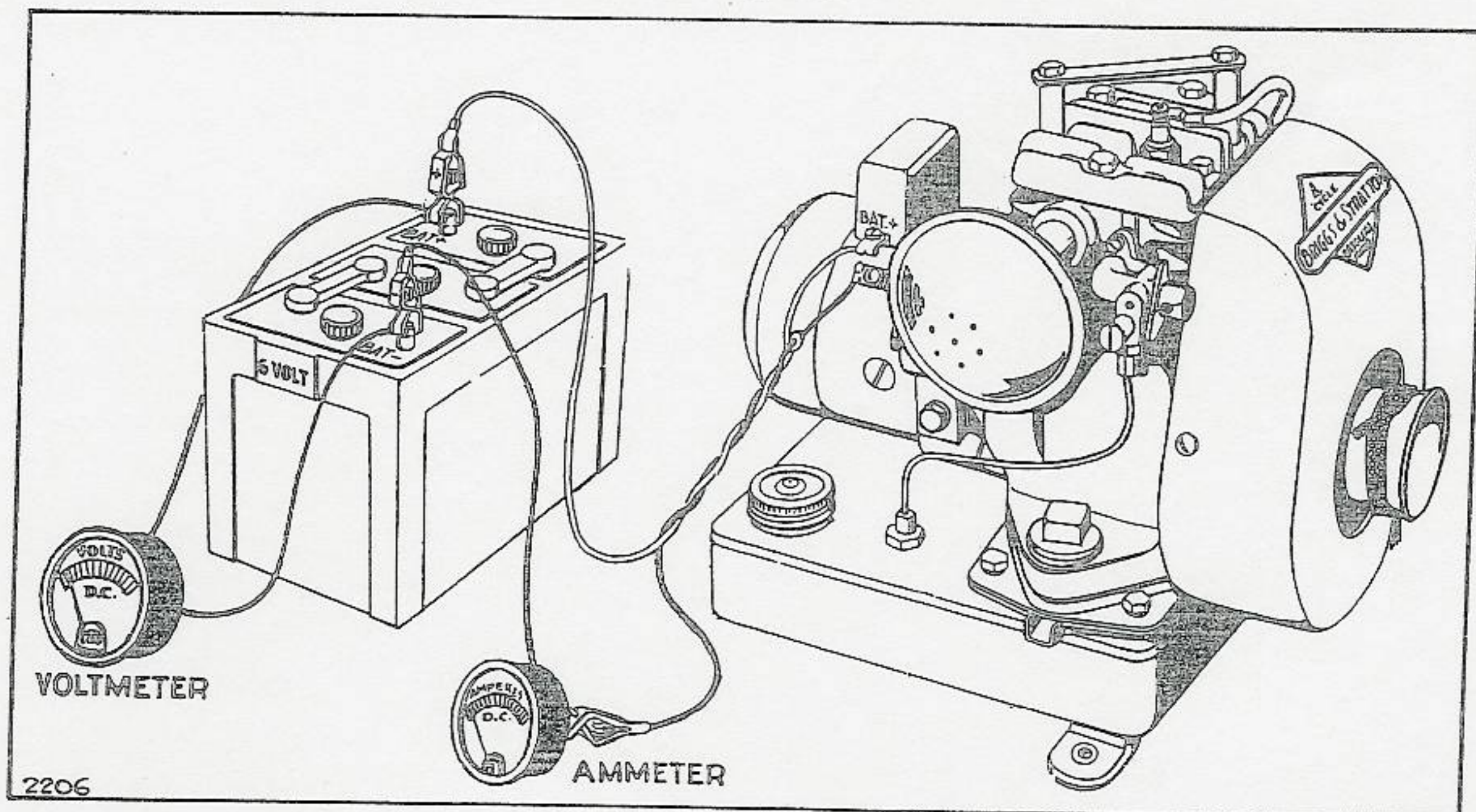
To inspect and clean commutator remove generator cover and place a piece of No. 00 sandpaper over a stick with the end cut square, then hold against commutator so as to clean it evenly. If copper bars are worn even with Mica insulators, the armature should be removed, the commutator turned in a lathe, and the Mica undercut.

Model 100 Power-Charger

The Model 100 Power Charger has one charging rate which is controlled by the speed of the motor.

The generator is a special high efficiency bi-pole, two brush, shunt wound type. To test generator output connect a 6-volt battery, volt meter, and ammeter as shown in Plate No. 61.

Plate No. 61



Generator brushes are special size and are mounted in swivel type brush holders which pivot on brush hinge pins riveted to brush plate assembly. If brushes are worn to within $1/16''$ of the holder they should be replaced. To replace brushes remove brush holder screw and brush, then assemble new brush. See Plate No. 62.

Plate No. 62

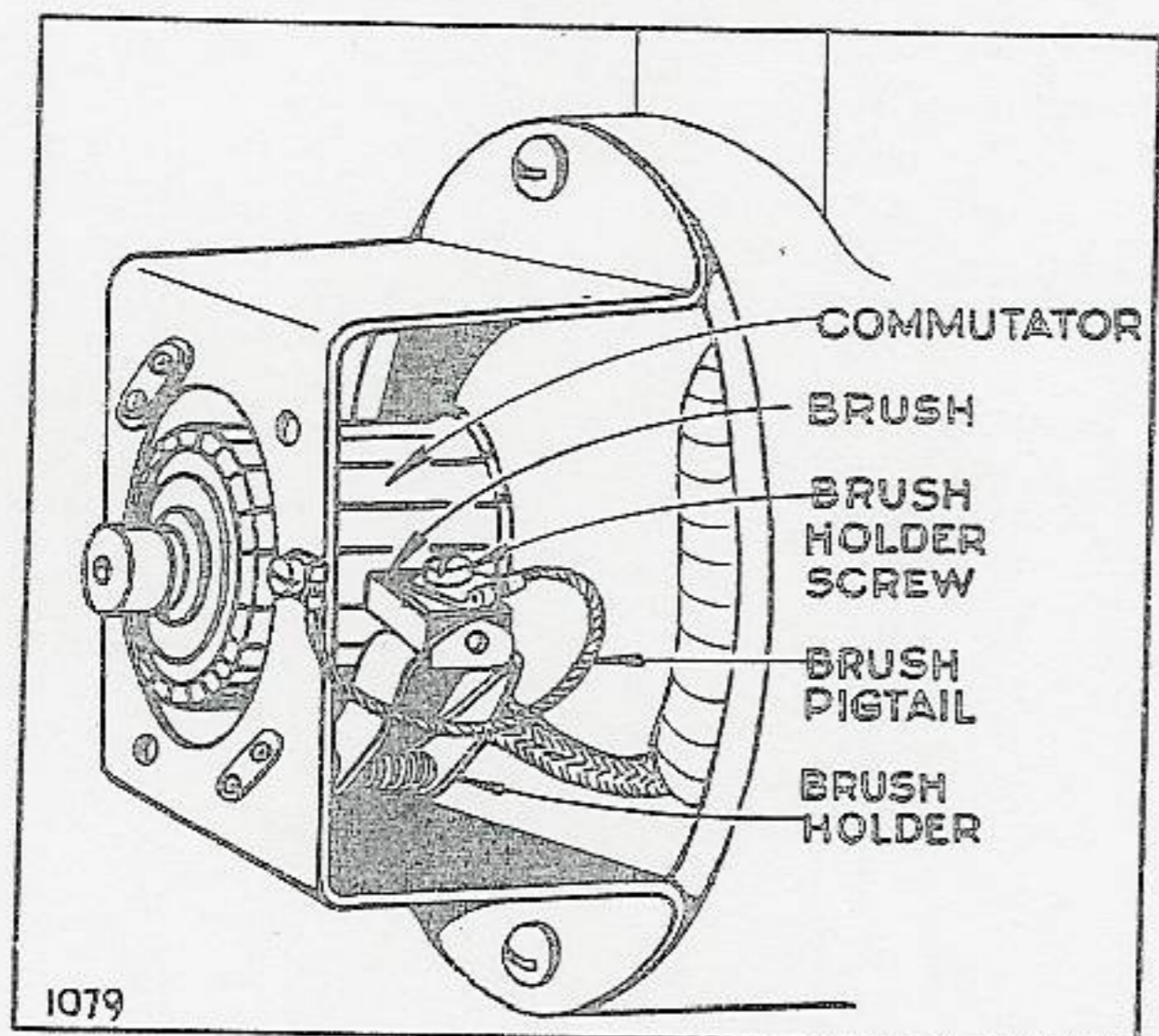
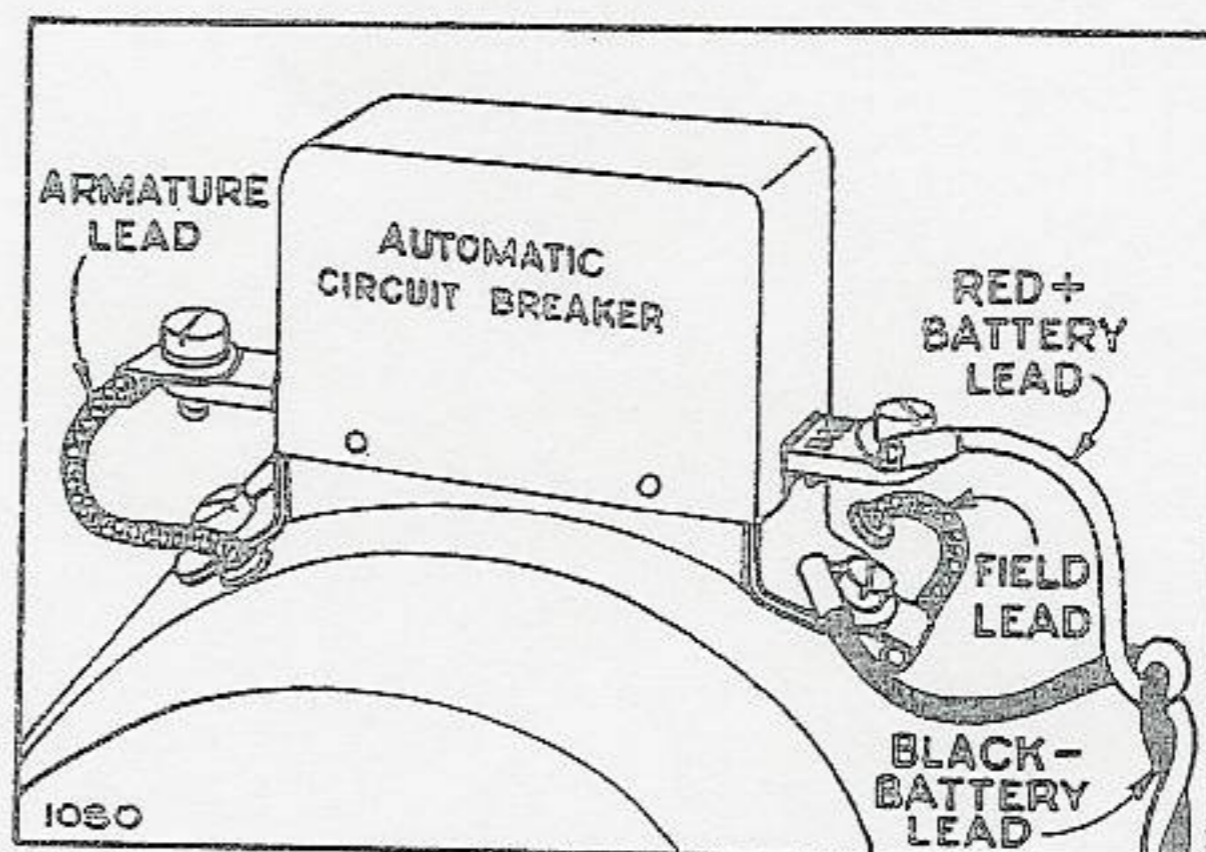


Plate No. 63



The brush spring tension should be from 8 to 10 ounces at brush, the measurement to be taken with a spring balance hooked at brush screw head.

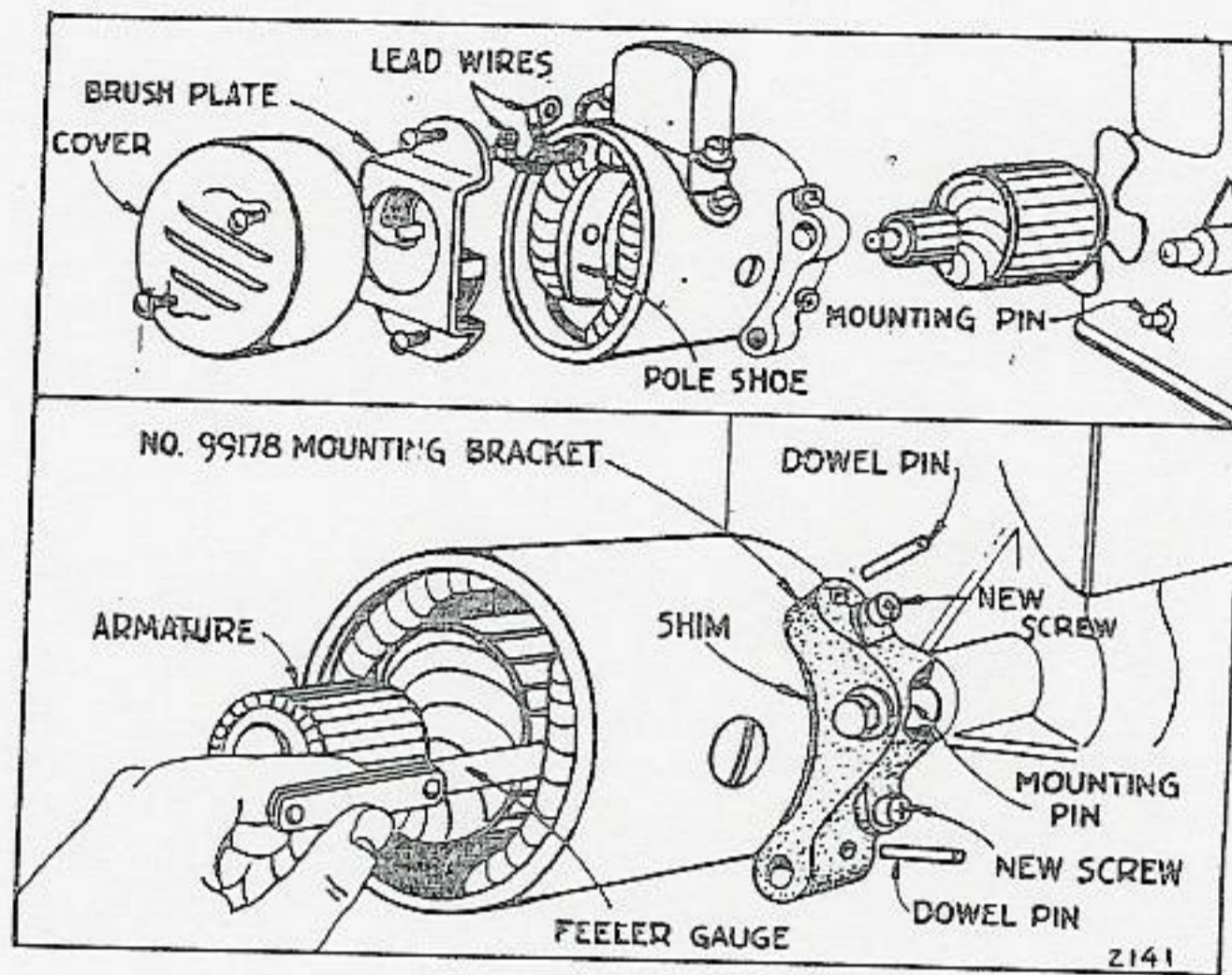
If wires become disconnected assemble as shown in Plate No. 63.

If Armature is Rubbing on Field Poles. Remove generator cover and disconnect two lead wires from generator brush. Remove brush plate assembly and generator frame and bracket assembly from mounting pin. Remove mounting bracket from generator frame and assemble new mounting bracket (No. 99178), using long screws furnished. Assemble generator frame and bracket to mounting pin and check air-gap between armature and pole shoes with a feeler gauge. The air gap at one pole shoe must not differ from the other by more than $.003''$

If the air-gap differs more than $.003''$ check the difference and correct by using necessary shims between generator frame and bracket. It is sometimes necessary to cut a shim in half to raise one end of the bracket more than the other. (Included with each bracket are two $.010''$ and one $.005''$ shims.)

Again remove generator frame and bracket assembly from mounting pin and drill two $3/16''$ holes in generator frame. Use the two dowel pin holes in the bracket as guides and drive dowel pins (furnished) into these holes. Re-assemble generator frame and bracket to mounting pin, recheck air-gap, and re-assemble all other parts. See plate No. 64.

Plate No. 64

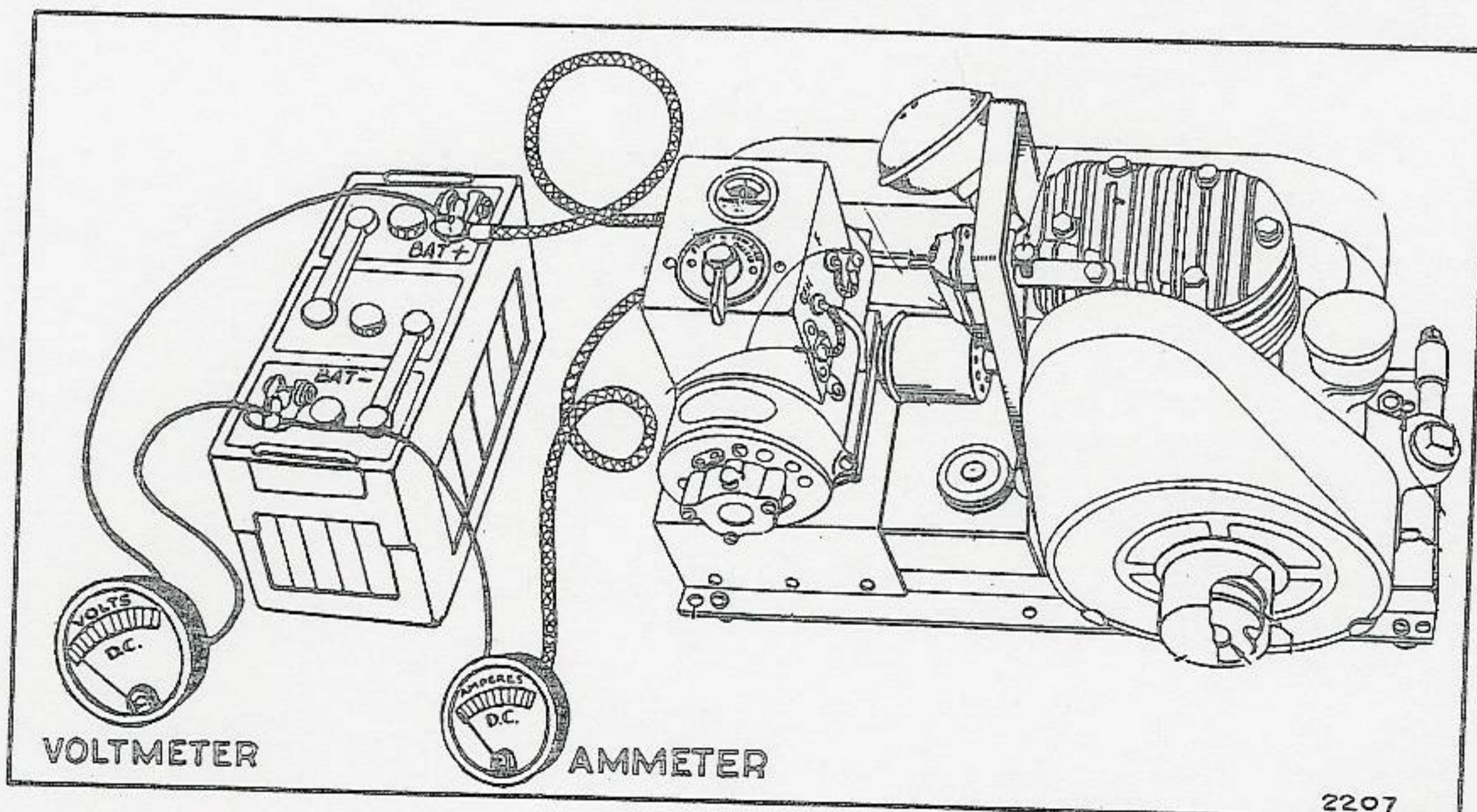


Model 200 Power-Charger

The Model 200 Power Charger has two charging rates. This is controlled by the switch and speed of the motor. For high or full capacity charge turn switch to high, for low or finish charge turn switch to low.

To check output connect a 6-volt battery, volt meter, and ammeter to the generator. Then connect a bank of lights or a resistor to the battery terminals so that the voltage can be held at exactly 7 volts. See Plate No. 65. With motor speed set at 1850 to 1900 R.P.M. and voltage to 7 volts the ammeter should register from 28-1/2 to 35-1/2 amperes. The low charging rate should show approximately 15 amperes on the switch box ammeter.

Plate No. 65



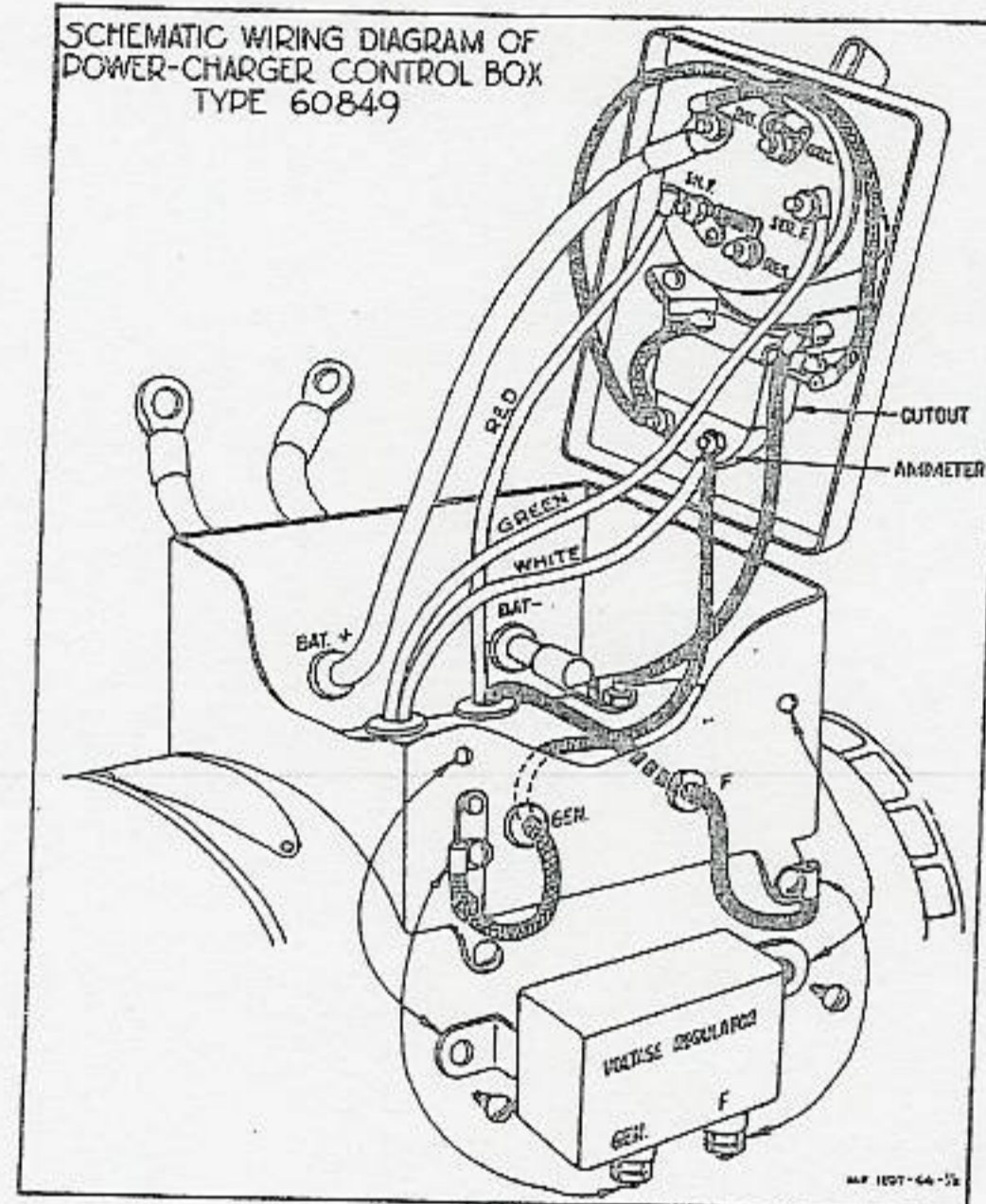
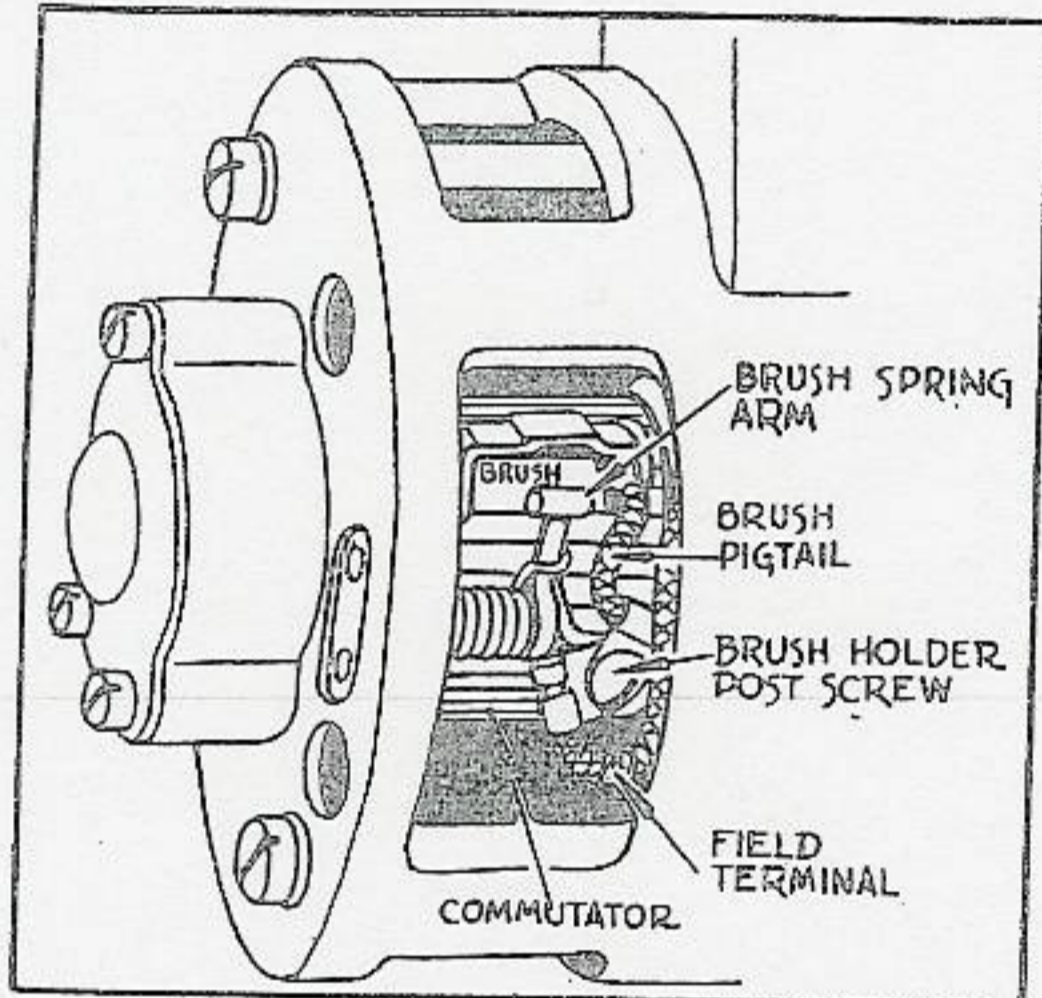
If generator does not deliver its full capacity at high charging rate check to see if belt is slipping. Generator speed should be from 4000 to 4200 R.P.M.

Generator brushes are mounted in box type brush holders which are riveted to the brush plate assembly. To inspect brushes remove inspection band. Brushes that are worn so that spring arm almost touches its "stop" should be replaced. To replace brushes remove pigtail from brush holder post screw, pull back brush spring arm and pull out brush. The brush spring tension should be from 50 to 55 ounces when measured with a spring balance hooked under the brush spring arm. See Plate No. 66

If wires in switch box become disconnected they can be assembled as shown in Plate No. 67.

Plate No. 67

Plate No. 66



Model 300 Power-Charger

The Model 300 Power Charger has two charging rates for either 12 volt, 6 volt, or 2 volt batteries. These charging rates are controlled by the switch. They are a high charging rate for full capacity of the power plant and a low or finish rate.

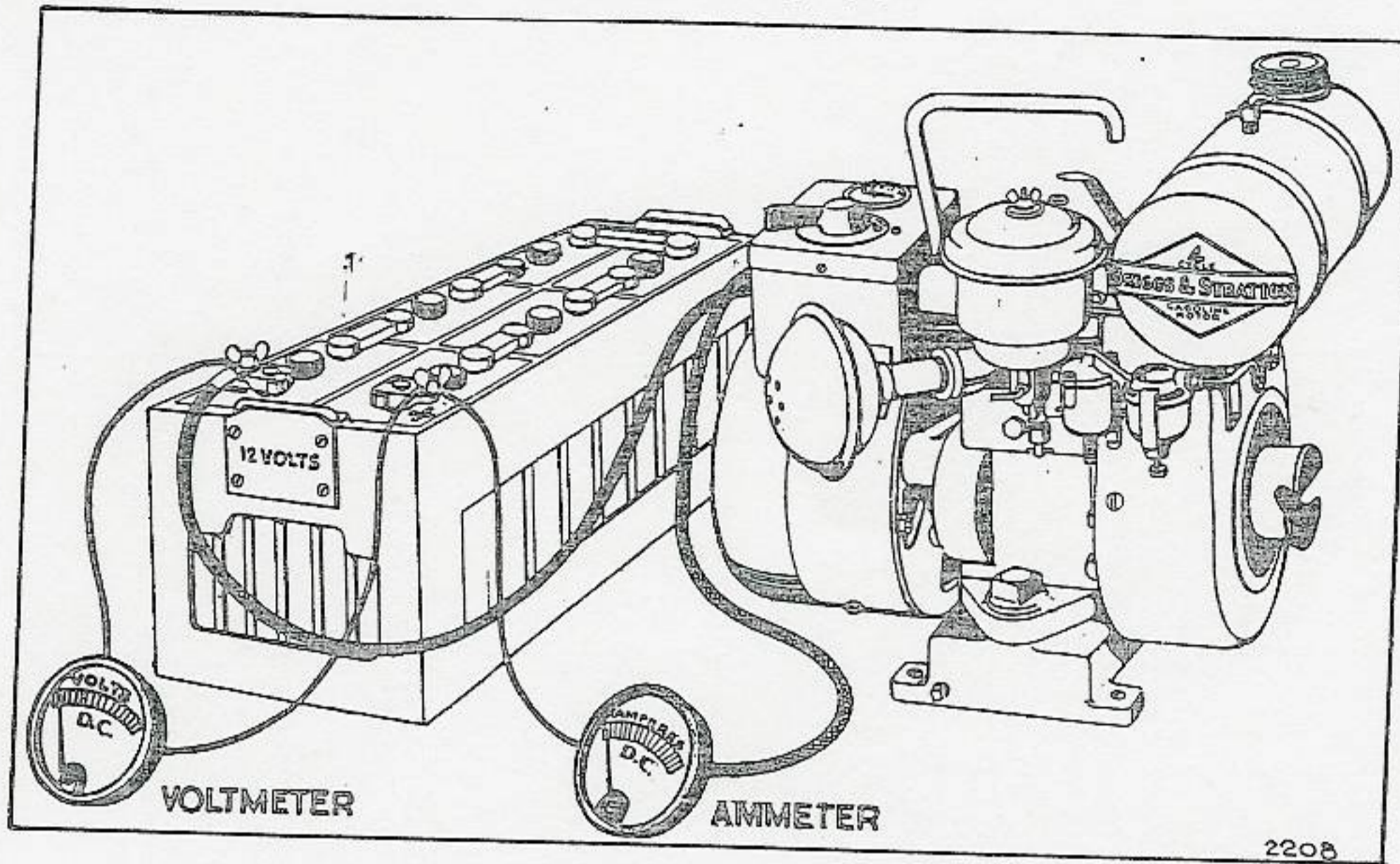
Charging Rate Chart

Battery Voltage	Charging Rate in Amperes	
	Switch	Setting
	"High"	"Low"
12 volts	20 to 25	9 to 11
6 volts	15 to 17	7 to 7.5
2 volts	6 to 7	3 to 4

See Plate No. 68 for Hook-up.



Plate No. 68



The generator is a 4 pole--4 brush, shunt wound type which acts as a powerful cranking motor through a special series winding. It is designed to deliver its rated output at 2750 R.P.M. Higher generator output than that listed in chart above should not be attempted by increasing generator output above 300 watts or motor speed above 2900 R.P.M.

Generator brushes are special size and mounted in box type holders. Remove brushes by pulling out "U" shaped staples. Replace if worn to within 1/4" of holder. See Plate No. 69

If wires in switch box become disconnected, they can be assembled as shown in Plate No. 70.

Plate No. 69

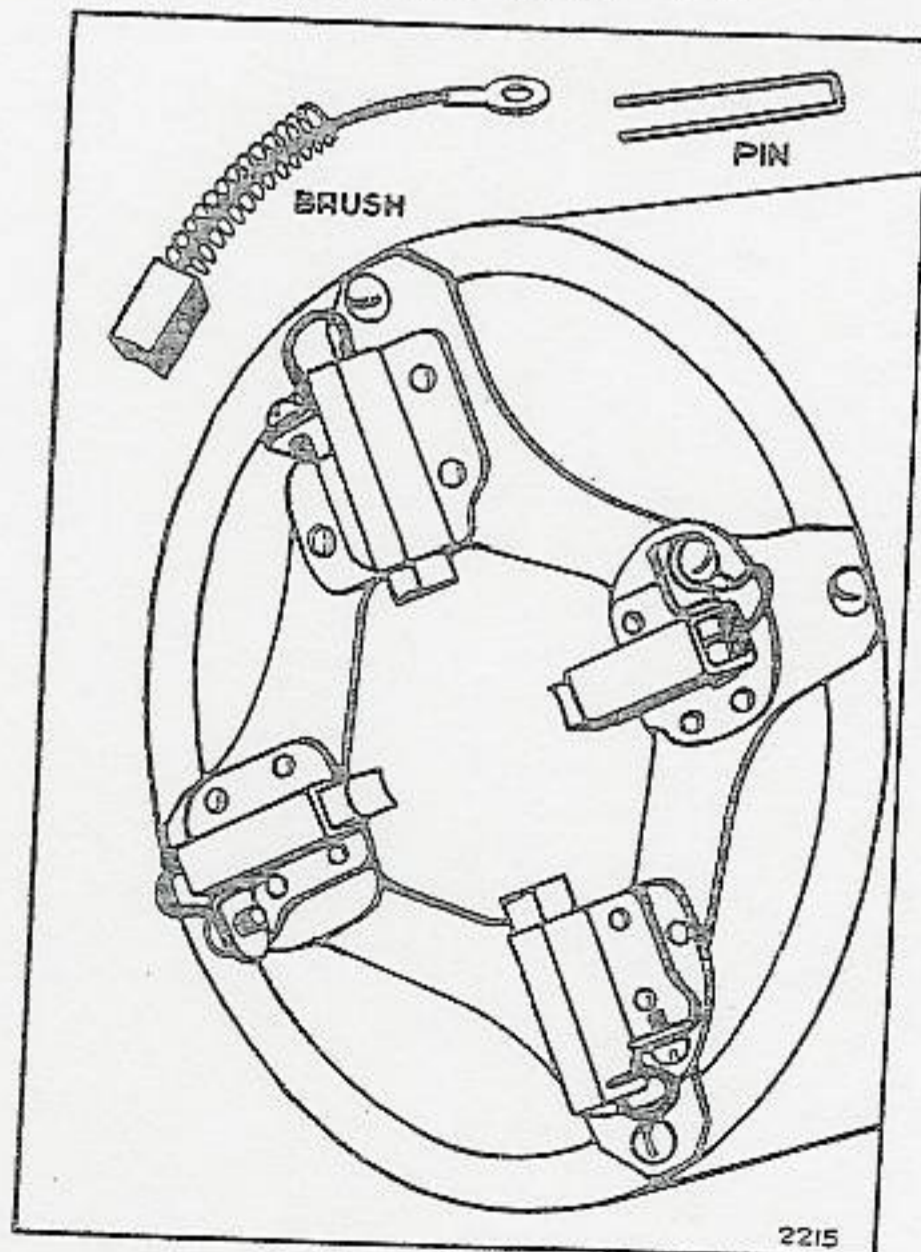
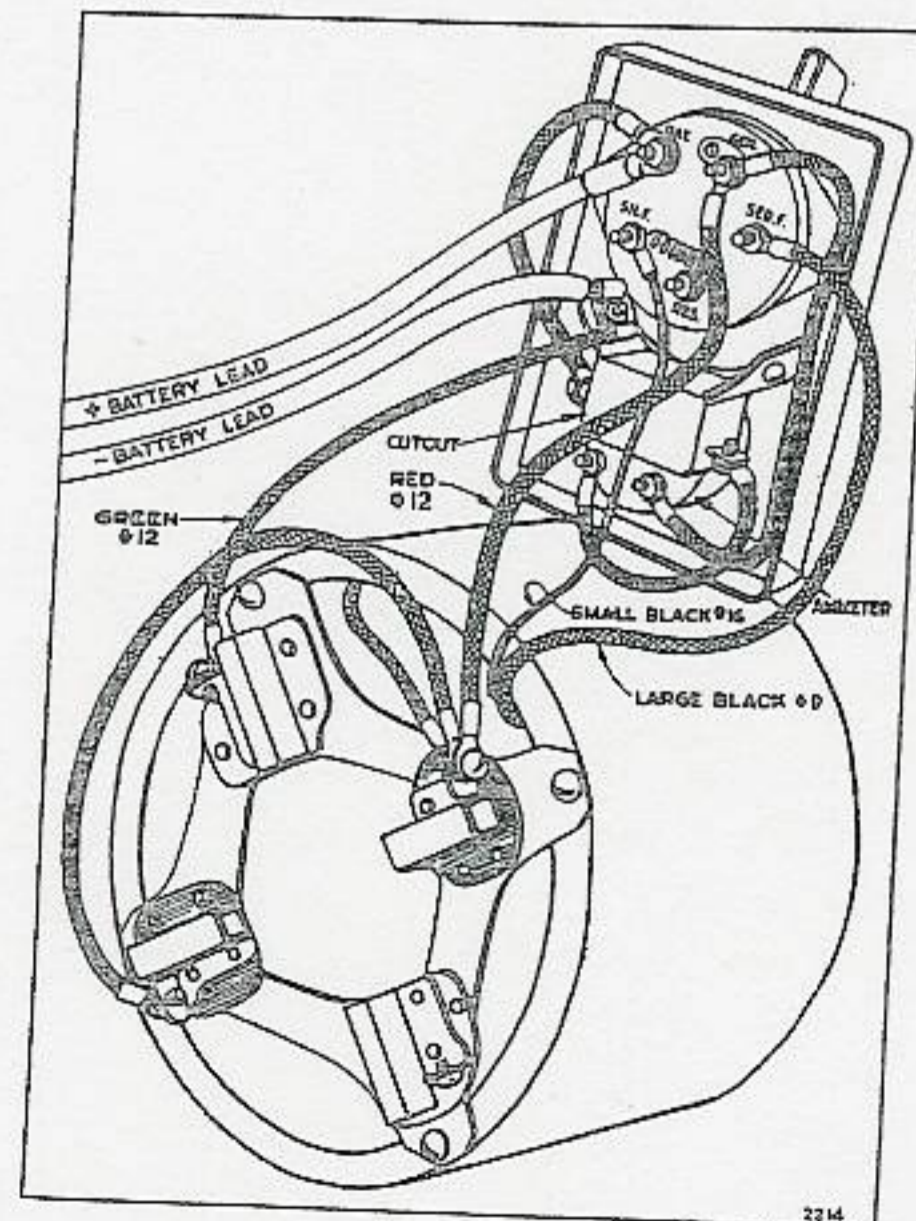


Plate No. 70

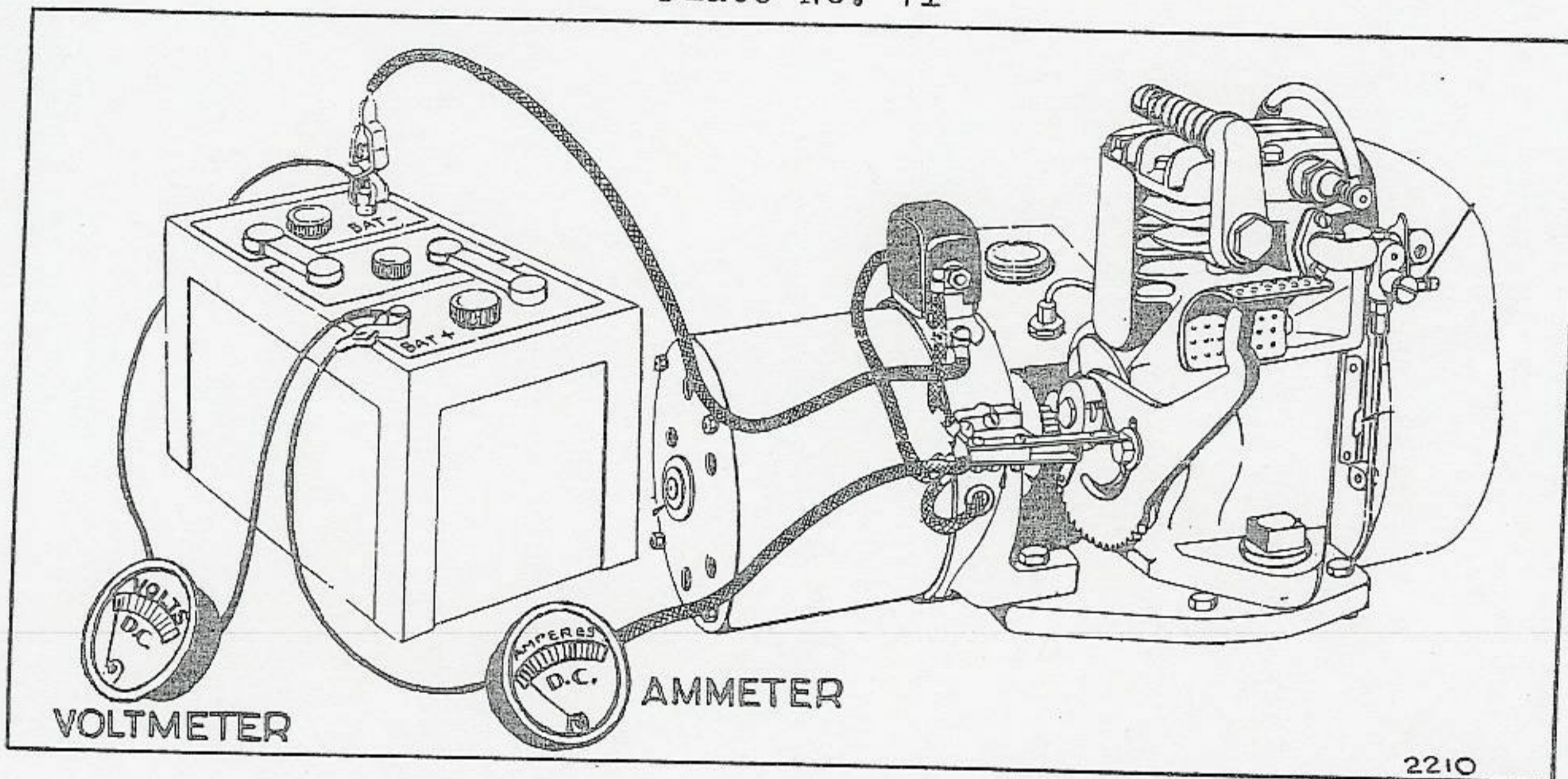


Models WMG—WBG Start-Charger

The Start Charger has one charging rate which is controlled by the speed of the motor.

The generator is a special high efficiency bi-pole, two brush type. Its maximum rated output when hot is 7 volts and from 10 to 20 amperes at a motor speed of 2200 to 2300 R.P.M. To test generator output connect a 6 volt battery, volt meter, and ammeter as shown in Plate No. 71.

Plate No. 71

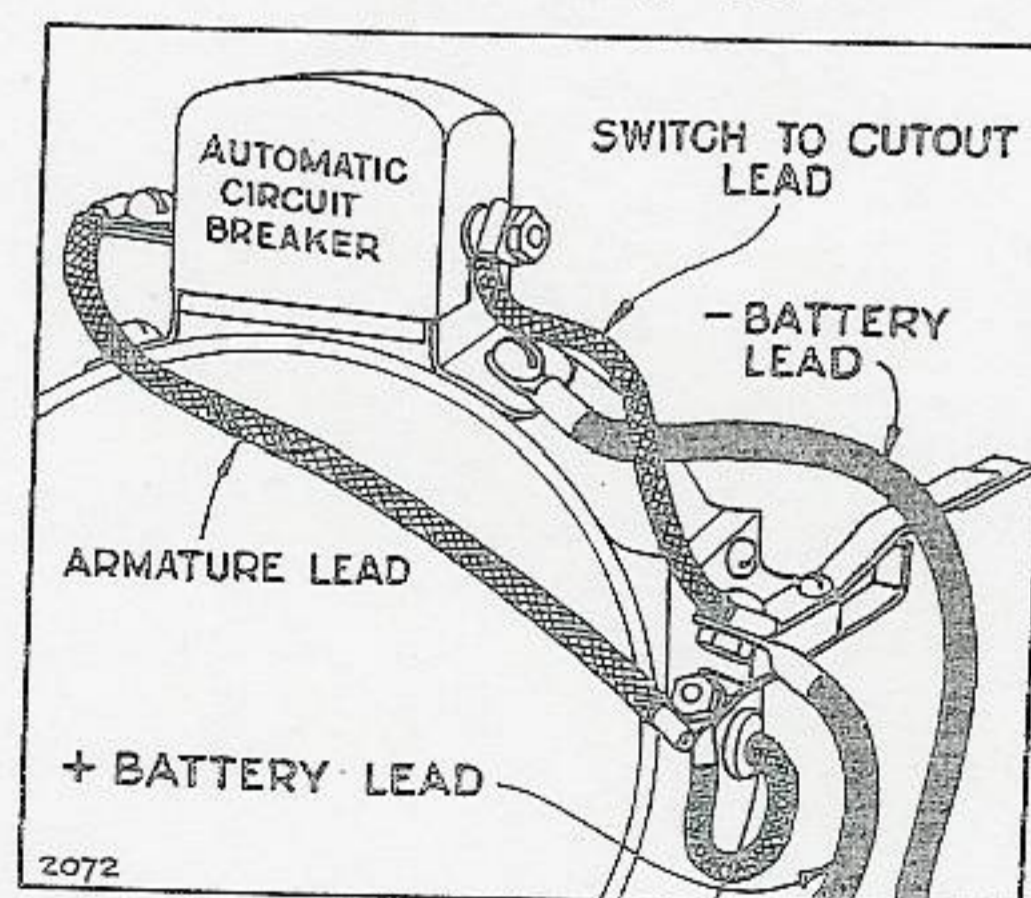


2210

If start charger will not turn motor when starter pedal is depressed, battery charge is too low, connections are loose, or starter switch is bent and not making a good electrical contact.

Generator brushes are special size and are mounted in box type brush holders riveted to the brush plate assembly. Brushes that are worn to within 1/4" of the holder should be replaced. To replace brushes loosen screw which holds brush pigtail and remove "U" shaped wire staple.

Plate No. 72



2072

If wires become disconnected, assemble as shown in Plate No. 72.

TO ALIGN GENERATOR

Model WMG

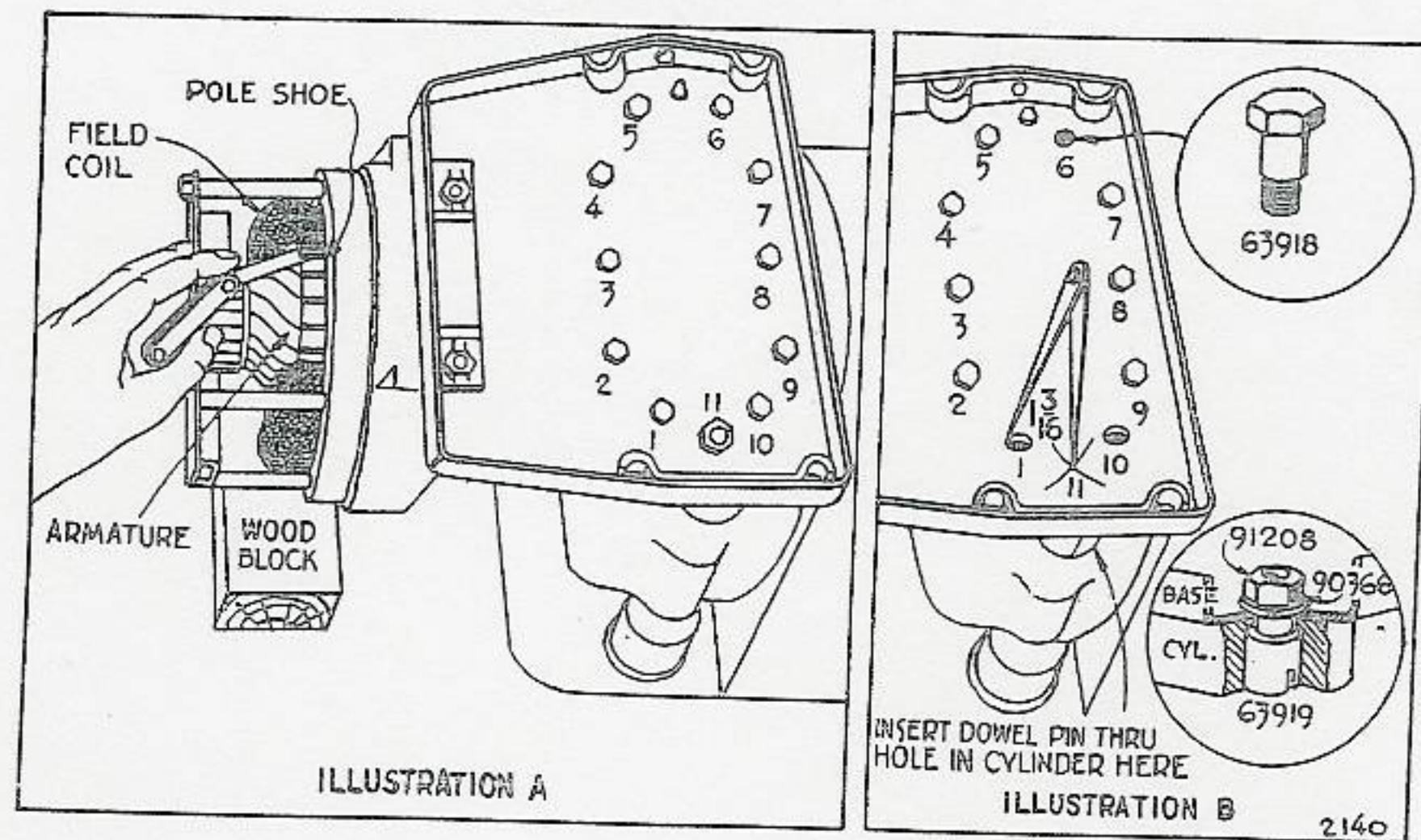
If armature is rubbing on field poles align the motor base plate as follows: Drain oil from motor. Turn complete unit upside down and support generator end with block, as shown in Plate No. 73. Loosen cap screws 1 to 11. Tighten No. 6 (shoulder screw) just enough to hold the base in the adjustment you are about to make. Shift base till armature is centered in the field coil without touching at any point. Use a feeler gauge to get uniform clearance at pole shoes. Now tighten carefully, first at No. 6, then at No. 11 (dowel pin nut). Recheck to be sure you have armature and field coil separated by uniform clearance. If clearance is O.K. tighten all bolts from 1 to 11. Refill motor with oil and test.

TO ALIGN AND DOWEL

Model WMG

If motor is an early model (without dowel pin) place the unit as explained above, loosen cap screws 1 to 10 and remove screws 1, 6 and 10. Replace No. 6 cap screw with new shoulder screw (No. 63918) then install new dowel pin (No. 63919) at No. 11 after doing the following: Spread a divider to 1-3/16". With divider point at the farther side first of No. 1 hole, then No. 10 hole, scratch two arcs to intersect as shown in illustration B at No. 11. Prick punch at intersection of arcs (No. 11) and drill a 11/32" hole through the base. Now insert dowel pin (No. 63919) into cylinder casting hole with threaded end of pin through bottom of base, and tighten lightly with lockwasher (No. 90366) and nut (No. 91208). Proceed with aligning as explained in preceding paragraph. See Plate No. 73.

Plate No. 73



TOOL SET FOR MOTOR TUNE-UP

Individual Tool List

Set No. 29899 Consists of One Each:



Here is a complete assortment of tools designed especially for Tune-up of Briggs & Stratton Motors. This set, No. 29899, consists of 36 Tools with which you can perform all adjustments and repairs involved in a complete Tune-up.

Set is packed in an attractive metal box with plenty of extra space for hammer, pliers, etc.

Tool Set No. 29899 complete in metal box.

Price Available Upon Request.

B. & S. NO.	BLACKHAWK NUMBER	DESCRIPTION
26071	1721	5/16" x 3/8" Open end wrench
26074	1725	7/16" x 1/2" Open end wrench
26072	1727	9/16" x 5/8" Open end wrench
26075	1731	3/4" x 13/16" Open end wrench
26073	1033-C	15/16" x 1" Open end wrench
63894	7812-S	3/8" Socket wrench
63892	7814-S	7/16" Socket wrench
63895	7816-S	1/2" Socket wrench
63893	7818-S	9/16" Socket wrench
63896	7824-S	3/4" Socket wrench
63898	15206-B	Screw driver attachment
63897	15207-B	Screw driver attachment
19006	15593	Extension bar for socket
19007	9209-S	Handle for extension bar
62744	E2	Ignition wrench
62745	E7	Ignition wrench
29654		Feeler gauge
63821		5/32" Allen wrench
69751-T1		Breather driver
29658-T1		Breather driver
69282-T1		Oil retainer driver
MPJ-T4		Breaker timer
MPJ-T7		Spark tester
29593		Wheel puller
65299-2-T1		Valve peener
61741-T9		Flywheel holder
61260-T7		Flywheel bolt hole reamer
69821-T3-2		Oil plunger reamer
69821-T3-22		Oil plunger bushing reamer
69821-T3-12		Oil plunger bushing driver
69054-T4		End mill
69189-T3		Valve spring compressor
29746-T1		Drill
29746-T1-1		Drill bushing
60144-T100		Drill bushing
60144-T101		Drill bushing
19008		Metal case