

**OPERATING MANUAL**  
**and PARTS LIST**

**A S H C R A F T**

**SUPERHIGH**

**P R O J E C T I O N**  
**L A M P**

*Manufacturers of the finest in arc-light projection equipment*

**C. S. ASHCRAFT MANUFACTURING COMPANY**  
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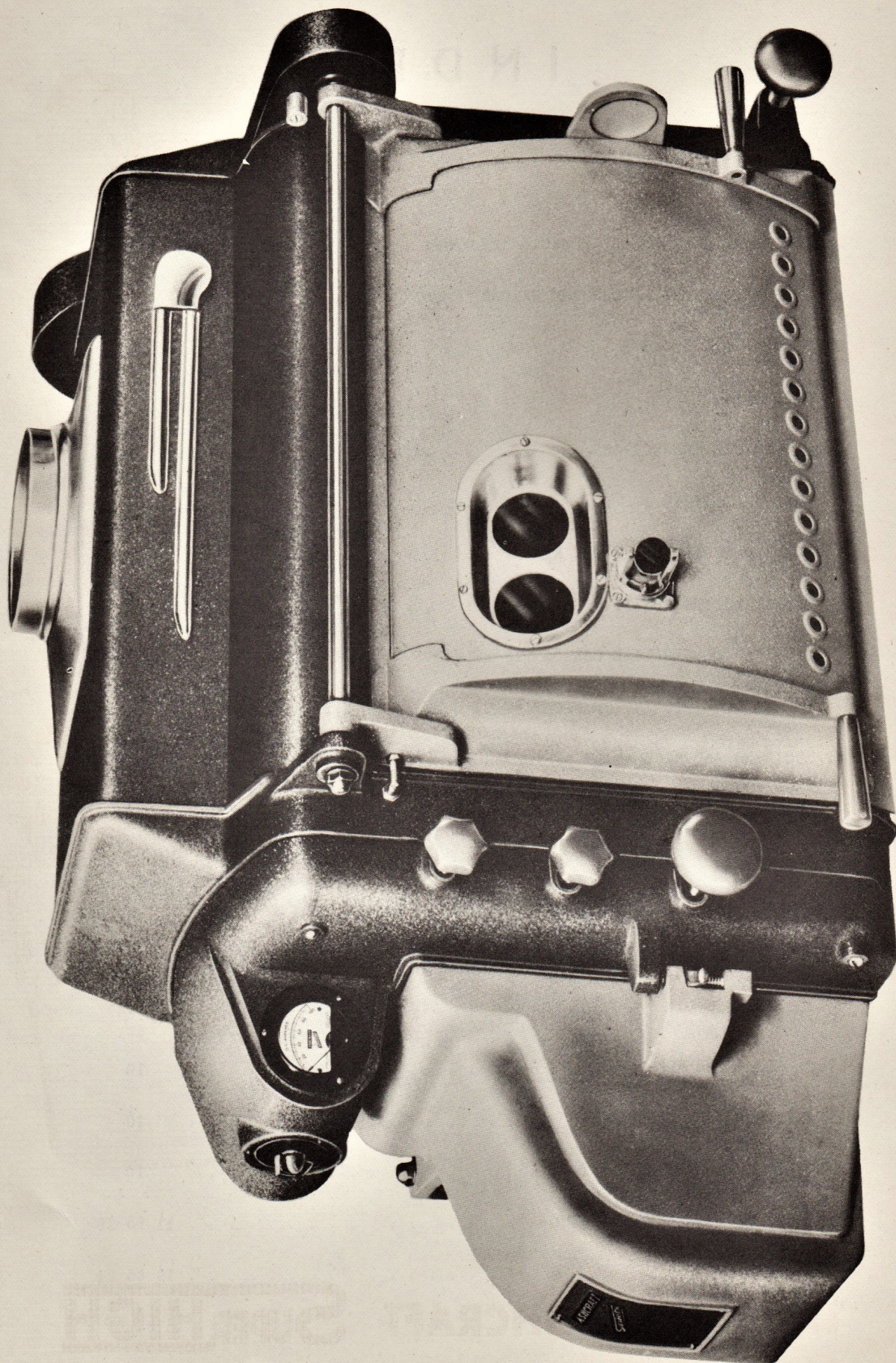




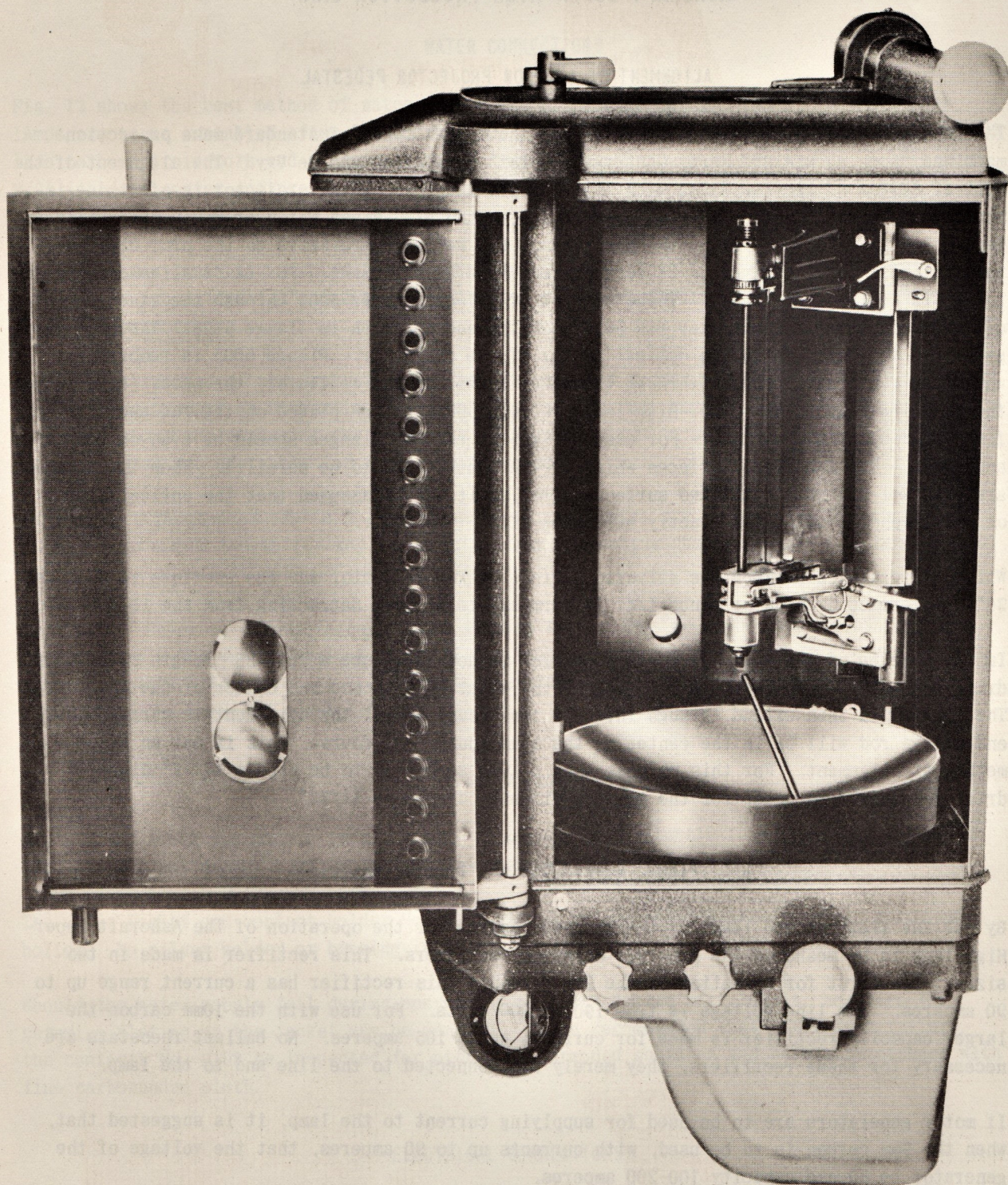
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## THE "NEW" ASHCRAFT **SUPERHIGH**



# INSTRUCTIONS FOR THE INSTALLATION AND OPERATION OF THE ASHCRAFT SUPER-HIGH PROJECTION LAMP

## ALIGNMENT OF LAMP ON PROJECTOR PEDESTAL

The Ashcraft Super-High Lamp will fit any of the modern types of standard make projection machines, such as RCA-Brenkert, Century, Simplex, Motiograph and De Vry. The alignment of the optical system of the lamphouse with the aperture and lens of the projector is of utmost importance. This is particularly so when used with the high speed F:1.9 or F:2.0 projection lenses. Fig. 1 not only shows the position of the reflector relative to the projector aperture but also the ideal method of vertical and lateral alignment. For exact alignment simple tools are necessary as shown. These consist of a lens adapter 5003 through the exact center of which passes a 1/2" diameter rod 5002 upon the end of which is flange 5004. The above assembly is for determining the optical center of the projector. Flange 5005 is removable, while the rod 5001 is passed through the exact center of the reflector, the water jacket and the rotating head of the Super-High lamp. Flange 5001 is then placed on the rod and the two flanges brought into contact. For exact alignment the two flanges should be even on the top and sides. The two front surfaces which are in contact should be parallel. When the flanges are even all around and the two surfaces parallel it may be assumed that the optical system of the lamphouse coincides exactly with that of the projector.

While the distance between the silvered surface of the reflector and the aperture is shown as 36" a tolerance of plus or minus 1/4" is permissible without detracting from the illumination.

In the absence of the aligning tools a simpler method is to use a full 36" length of straight drill rod passed through the water jacket, the rotating head and the center of the aperture. The rod should then extend through into the lens mount and if the alignment is correct the end of the rod will be in the center of the lens mount. Of course, this is not an exact method of alignment. For this purpose when a 10mm carbon is to be used a 13/32" diameter drill rod should be used; for the 9mm the diameter should be 11/32".

## RECTIFIERS, GENERATORS AND BALLAST RHEOSTATS

By far the simplest and least expensive power source for the operation of the Ashcraft Super-High lamp is by means of the Ashcraft Selenium rectifiers. This rectifier is made in two sizes. The first for operation of the 9mm carbon. This rectifier has a current range up to 90 amperes. The line voltage is from 190 to 230 volts. For use with the 10mm carbon the larger capacity rectifier is made for currents up to 105 amperes. No ballast rheostats are necessary for these rectifiers, they merely are connected to the line and to the lamp.

If motor generators are to be used for supplying current to the lamp, it is suggested that, when the 9mm carbon is to be used, with currents up to 90 amperes, that the voltage of the generator be 80 and capacity 100-200 amperes.

For the 10mm carbon, an 85 volt, 125-250 ampere generator is recommended.

It is recommended that the ballast resistors in series with the generator, when the 9mm carbon is to be used, be designed for a current range of from 70-90 amperes with at least 4 paralleling switches being provided for easy adjustment of the current. In the design of these rheostats the arc voltage should be figured on a basis of 54-56.



When 10mm carbon is to be used, the ballast current range should be from 75-115 amperes. The arc voltage estimated at 58-60.

### WATER CONNECTIONS

Fig. 12 shows the best method of water supply and drainage in projection booths where the lamps are to be installed after the booth is built. This method consists of one common supply line to both projectors and a separate drain from each. These lines should not be less than 3/8" inside diameter and preferably of copper tubing, the drains may be 1/2" iron pipe or copper tube.

As shown these lines are secured to the front wall of the booth. In line with the left hand side of the projectors 1/4" pipe size female tees or elbows should be provided for attaching the hose connections.

In the construction of new projection booths, the pipe or tubing may be laid in the concrete floor, being brought up either inside or outside, on the left hand side of the projection pedestal, about the center of the pedestal. Shut off valves on both the supply and drain of each lamphouse are advisable for isolation purposes.

Two six foot lengths of 1/2" O.D. rubber hose (if available) are supplied with each lamp. These are of ample length for any installation for connecting the water lines of the lamp to the lines on the front wall of the booth.

*Important.* Under no circumstances should metallic water lines be connected directly to the lamp housing. The water terminal lines of the lamp housing are connected to the positive carbon contacts, therefore are electrically energized and must be insulated by the rubber tubing from the grounded water lines.

### WATER FLOW

One pint of water per minute is the normal flow required, slightly less than this amount is adequate but any amount over one pint is unnecessary.

The water jacket and contact holder No. 8102 Fig. 5 is one solid bronze casting, cored out hollow. No silver solder or brazing is used.

Should the water supply fail during operation, no great damage will result, however, the chromium plating on the jacket may be damaged. It is recommended that after such failure, the contacts No. 8103 be inspected for pitted or corroded surfaces and carefully cleaned with fine carborundum cloth.

### ELECTRICAL CONNECTIONS

Two lengths of No. 4 motion picture cable are supplied with each lamp (when available) for connecting the lamphouse terminals No. 8242 Fig. 6 to the projector switch. The forward lamphouse terminal is of positive polarity. All connections should be tight and care used that the cable terminals to the lamphouse connections are completely clear and insulated from the water terminal block No. 8245.



## CARBON CONTACTS

Current is fed to the rotating carbon by means of the chromium plated contact shoes No. 8103 Fig. 5 located directly behind the water jacket. These contacts are held in contact with the carbon by the two contact arms No. 8104 at the lower end of which is the contact or pressure spring No. 8105. At the upper ends of the contact arms are studs which fit into recesses in the contact shoe. It is important that these studs be in place in the recesses before the lamp is lighted, their function is to hold the contact in the proper position on the carbon.

To remove the contacts, disconnect shunt terminals No. 8108 Fig. 5, remove spring No. 8105. The contacts together with the contact arms may then be lifted out.

When replacing the contacts, place a length of carbon through the water jacket for centralizing the contacts. The arms and spring may then be replaced easily.

## PLACING THE REFLECTOR IN THE RING

Remove the lower right hand retaining clip on the reflector ring. Place the reflector in the ring so that the negative jaws will pass through the center of the large hole in the reflector. Caution should be used in having the proper amount of tension on the springs which push the reflector against the retaining clips. Be sure that the reflector is absolutely free in the ring, having clearance all around and that it is resiliently held forward by the springs No. 8453 Fig. 7.

## INSERTING THE POSITIVE CARBON

Open the rear door of the lamphouse and pass the beveled end of the carbon through the opening in the lamphouse back and through the hole in the center of the reflector. The carbon may be easily pushed through the water jacket and contact shoes up to collet which rotates the carbon. A wrench 8122A (see Fig. 2) is furnished with each lamp for insertion between the collet and rotating head. When the wrench is turned it will force the collet forward, opening the jaws so that the carbon may be inserted. If the carbon does not enter the collet easily, press the bent end of the wrench forward, toward the front of the lamphouse. This will increase the collet opening.

## VERTICAL POSITION OF NEGATIVE CARBON TIP RELATIVE TO POSITIVE CRATER

Fig. 3 shows the correct and incorrect relation between the negative and positive carbons. While the position of the crater is fixed by the contact shoe assembly, the position of the negative carbon, i.e.; the angle between the positive and negative carbons which is normally 25 degrees may be varied to a certain extent by turning the guide post No. 8440 Fig. 7. This post holds the upper portion of the negative frame 8301 in position. A certain portion of this guide post is turned eccentric to the main member, therefore rotation of the guide post, by unlocking set screw No. 8106 and inserting the set screw wrench in the hole in the guide post, may be accomplished.

The ideal position of the negative carbon relative to the positive is where the negative flame does not attempt to envelop the lower edge of the positive carbon. This will occur if the negative carbon tip is too low. Too high a position of the negative carbon tip will result in



an unstable light and uneven flow of the flames. The two flames should merge to form a steady, somewhat flattened arc flame.

#### LATERAL POSITIONING OF NEGATIVE CARBON

To adjust the tip of the negative carbon toward or away from the operator knob No. 8443 Fig. 7 is provided. Clockwise rotation of this knob will move the entire negative assembly to the left away from the operator.

To inspect the flames, a dark colored glass may be held over the small hole in the lamphouse back and the arc viewed directly into the crater. It may be that when the positive and negative flames merge properly that the tip of the negative carbon will be slightly to the left of the center of the positive crater. The reason for this is that there may be a certain amount of "magnetic blow" caused by the electrical wiring entering the left hand side of the lamphouse. Offsetting the negative carbon slightly will counteract this "blow".

The correct position is that where the negative flame impinges upon the gases emerging from the positive crater in a manner to form a straight flattened surface. Should the negative carbon tip be off center to the right or left of the crater, two distinct flames flowing in opposite directions will be formed. This will cause a loss of light and an extremely poor burning condition of the arc. Once the correct position has been obtained resetting will not be necessary.

#### STRIKING AND REGULATION OF THE ARC

Before striking the arc the reflector protecting dowsers *must* be in a down position. Striking of the arc *must* be done by moving the negative carbon into contact with the positive. This action should be rapid and the negative carbon rapidly withdrawn to a distance of  $3/8$ ". Should at any time the negative flame on striking the arc tend to envelop the end of the positive carbon and threaten to damage the copper nose on the water jacket, the positive carbon should be momentarily moved slightly back toward the nose. This will bring the flame to the front surface of the positive carbon. This particular condition only occurs when the crater of a new carbon is being burned in.

After the arc is burning smoothly and with the positive control pointer set at approximately 10 in calibrated dial #8464 and the control pointer at zero on dial #8466, the relative feeding of the two carbons should be watched closely. If it is necessary to increase the speed of the negative carbon, a black knob extending through the rear cover of the lamp house and located at the extreme lower left hand side No. 8437 Fig. 7 should be turned clockwise. Proper control of the positive carbon of course can be made by means of the aforementioned knob on the calibrated dial No. 8464.

The dual rheostat control should not confuse the projectionist. Instead of one large 500-ohm rheostat, two smaller 250-ohm rheostats are used in order to give a wide range of carbon control. It is suggested that the rheostat dial #8464 be used for the positive carbon feed control while the one on the side of the case back #8466 merely used as an auxiliary for maintaining the main control in the center of the dial.



## OBTAINING THE BEST SCREEN LIGHT

After the arc has been regulated so that the two carbons remain on the indicating lines of the arc scope screen, the projector should be set in motion *without film*. The light should be thrown upon the screen. With hands both on the negative and positive manual control knobs, the entire arc should be moved slightly toward and away from the reflector. One point will be reached when the light is brightest, the distribution good and the color whitest. This is the point where the arc should always be operated. Setting of the arc scope may now be made and locked into position.

A more accurate method of determining the best position of the crater relative to the reflector and at the same time checking the optical alignment is by means of a pin-hole aperture. These special aperture plates may be obtained from the various projector manufacturers.

A target or any piece of light paper is held about 18" in front of the projection lens when the light is projected through the pin-hole aperture the disc of light on the target should be uniformly illuminated by moving the crater toward and away from the reflector the ideal position may be determined. When the crater is too far forward a brownish color will appear, when too far away the field will be blue but in the proper position, it will be of uniform brilliance.

## SELECTION OF CARBONS - BURNING RATES

Two combinations of carbons are, at the present time, available. These are:

9mm x 20" High Intensity Projector Positive 75-90 amperes 5/16 x 9" Orotip Negative

10mm x 20" High Intensity Projector Positive 85-110 amperes 11/32 x 9" Orotip Negative

Experience has indicated that the best current to be used with each of these carbons is that where an excellent light is produced with reasonable economy and beyond which the carbon consumption is out of all proportion to the small increase in light. We do not believe any exhibitor would consider the use of one carbon per double reel of film. This is the case when the maximum current shown is used, that is 90 amperes with the 9mm carbon and 110 amperes with the 10mm.

It must be kept in mind that with any lamp using a rotating carbon and contact shoes there will be a waste of about 4" so the usable length is 16". In order to obtain two full reels of burning from each positive carbon a safe consumption per reel is  $7\frac{1}{2}$ ". This indicates a current of 87 amperes for the 9mm and 103 amperes for the 10mm. However, these are not the currents where the maximum light for the carbon consumed is reached. Those currents are 85 amperes for the 9mm and 100 amperes for the 10mm. At this current two double reels and a single reel can be obtained from each positive carbon. The negative carbon rate of consumption is relatively low being about  $1\frac{1}{4}$ " per double reel (21 minutes).

It is for the exhibitor to balance light against carbon consumption. There is no set rule but the recommended currents are 85 amperes for the 9mm and 100 amperes for the 10mm.



## COMPARATIVE SCREEN ILLUMINATION 9-10mm CARBON

While the screen illumination, when the 9mm carbon is used at its maximum is about 21000 lumens that from the 10mm will be about 23000 or slightly higher. While the light from the 10mm has a center brilliance of about 5% in excess of the 9mm the great increase is attributable to the more even distribution of light over the entire screen, that is, the ratio of center to side illumination is much higher. While the distribution when the 9mm is used is about 60% that of the 10mm is about 75%.

From the above it is apparent that the 10mm carbon will produce much better screen illumination with very little increase in operating expense.

## DRIVING CHAIN TENSION

Both positive and negative driving chains have at their rear extreme ends an idler sprocket which is mounted upon the eccentric shaft. The positive shaft is shown in Fig. 6 #8155. This extends through the element side plate and may be reached from the outside of the lamphouse. This shaft is slotted for insertion of a screw driver and is locked in position by means of an 8-32 set screw No. 8121. Rotation of this shaft will alternately loosen and tighten the chain. The negative adjusting shaft is shown in Fig. 9 #8314. The positive chain should not be too tight but should sag in the center approximately 1/4". The negative chain tension may be tighter than the positive. Intermediate adjustment of both chains is possible in order that they may not bind causing friction or be sufficiently loose to cause excessive lost motion.

## LUBRICATION

Since all rotating shafts are equipped with anti-friction bearings very little lubrication is necessary. Do not at any time put oil or any other lubricant upon the chains or sprockets. The only points necessary to lubricate are the surfaces of the gears which are grouped together at the front left hand side of the lamp house and protected by the gear cover No. 8201. This cover should be removed approximately every two weeks and a mixture of vaseline and oil placed on the gears. Do not use heavy cup grease or any lubricant which might coagulate or gum. It is advisable about once a week to remove the lower element cover inside the lamp house which will expose the lower slide rod and long oscillating cam which rotates the carbon. See that these are clean and free from dirt or grit. SAE 20 lubricating oil in small quantities may be rubbed on these to keep them in perfect condition. This also applies to the slide rods on the negative assembly at rear of the lamp house.

An important point of lubrication is the positive rotating head and ratchets. These are shown in Fig. 2. It will be noted that two oil holes are provided in the head for lubricating the enclosed ball bearings. Both the rotating head and pawls become quite warm due to being directly in the light beam but if lubricated as directed, they will be no difficulty. A bottle of graphite lubricant is supplied with the lamp together with an oil can. After lubrication, these parts should be wiped clean in order to prevent burning of the lubricant on the exterior surfaces.



## CLEANING THE REFLECTOR

We recommend the use of Bon Ami for cleaning the front surface of the reflector. Do not use any other substance. Of course cleaning should only be done when the reflector is at room temperature.

### TO REMOVE AND REPLACE WATER JACKET (See Fig. 5)

1. Unscrew tubing unions No. 8116.
2. Remove cap screws No. 8102-S.
3. Lift jacket from standard No. 8107.

### TO REMOVE ROTATING HEAD

1. Loosen upper set screw No. 8106.
2. Lift head from stud No. 8140.

### TO REMOVE PAWLS AND PAWL YOKE

1. Loosen set screw No. 8121.
2. Lift yoke from rod No. 8130.

### TO INSTALL NEW WATER JACKET

1. Remove contacts - contact arms.
2. Place jacket on standard - replace cap screws No. 8102-S.
3. Insert steel rod same diameter as carbon through jacket and move forward to center hole in reflector. If it does not enter hole correctly:
4. Loosen cap screws No. 8102-S slightly - move head sideways and press steel rod up or down until correct alignment is made both with hole in center of reflector and hole in collet No. 8122.
5. Move rotating head No. 8117 forward as far as possible inserting carbon in collet and through water jacket.
6. Hold pawls No. 8126 away from ratchet so rotation is free. There should be no binding whatever when head is rotated by hand.
7. If necessary loosen set screw No. 8106 on head so that it may be moved upward or down or sideways to eliminate misalignment.
8. When proper alignment of carbon in reflector hole, water jacket and collet is made then secure cap screws No. 8102-S and set screw No. 8106.
9. Replace contacts - contact arms - spring and shunt No. 8108.

## CALIBRATING METER

If the ammeter should need correction at any time, the reading is easily adjusted by moving the shunt contact screw attached to wire 8448 up or down in the slot in the shunt strip (see Fig. 7). Moving the screw upward increases the meter reading. An accurately reading comparative ammeter should be used.



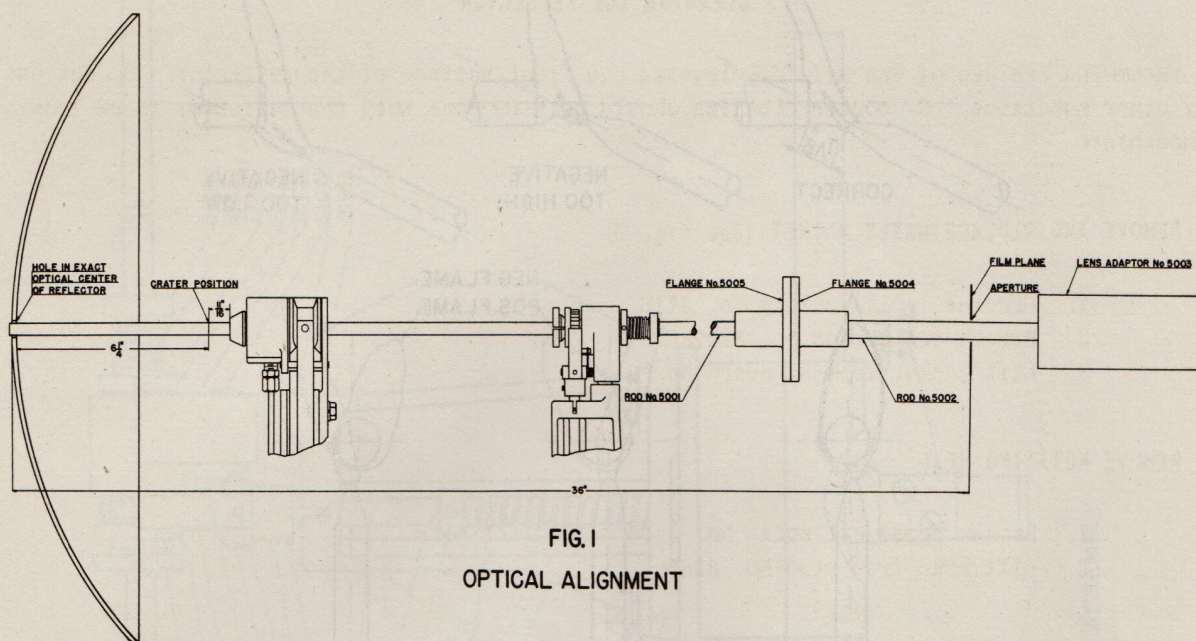
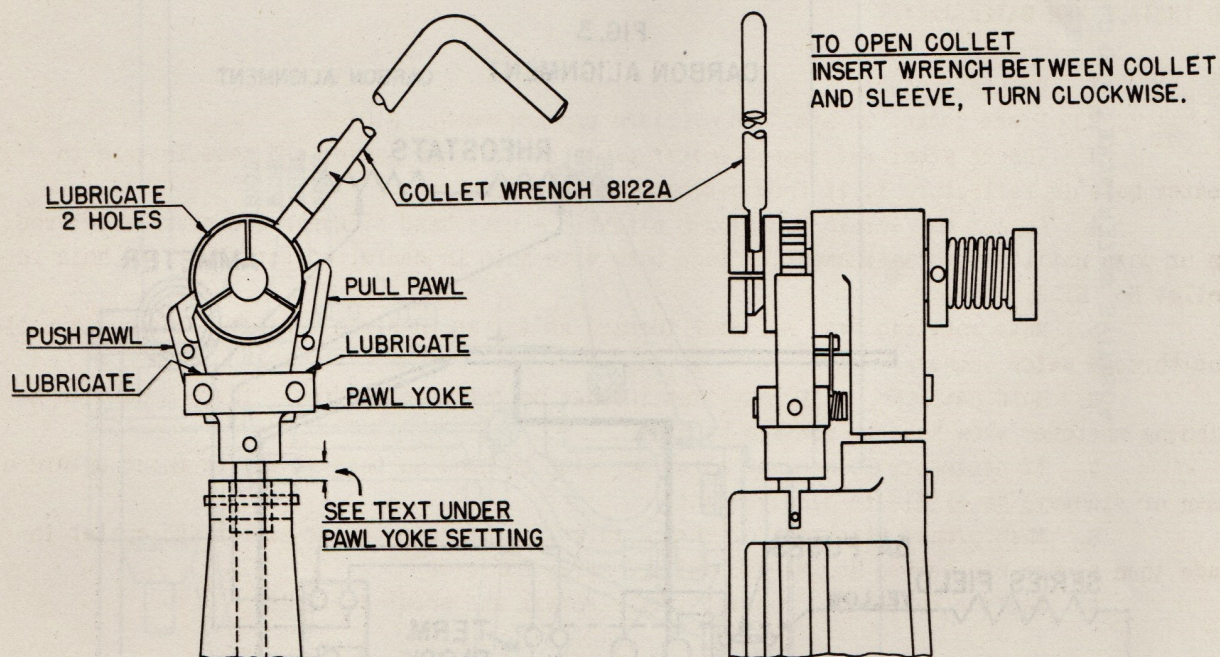


FIG. 1  
OPTICAL ALIGNMENT



LUBRICATE POINTS INDICATED  
EVERY 2 WEEKS WITH GRAPHITE  
LUBRICANT SUPPLIED WITH LAMPS.  
1 DROP ONLY, WIPE OFF RESIDUE.

FIG. 2  
ROTATING HEAD AND COLLET



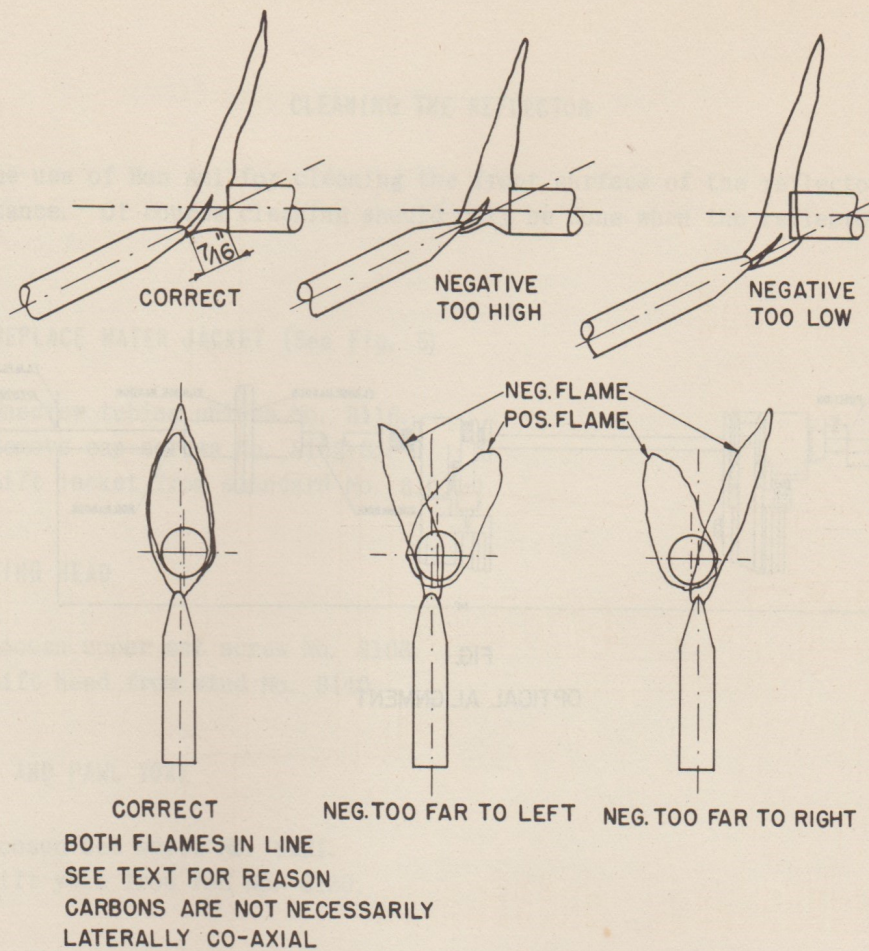


FIG. 3  
CARBON ALIGNMENT CARBON ALIGNMENT

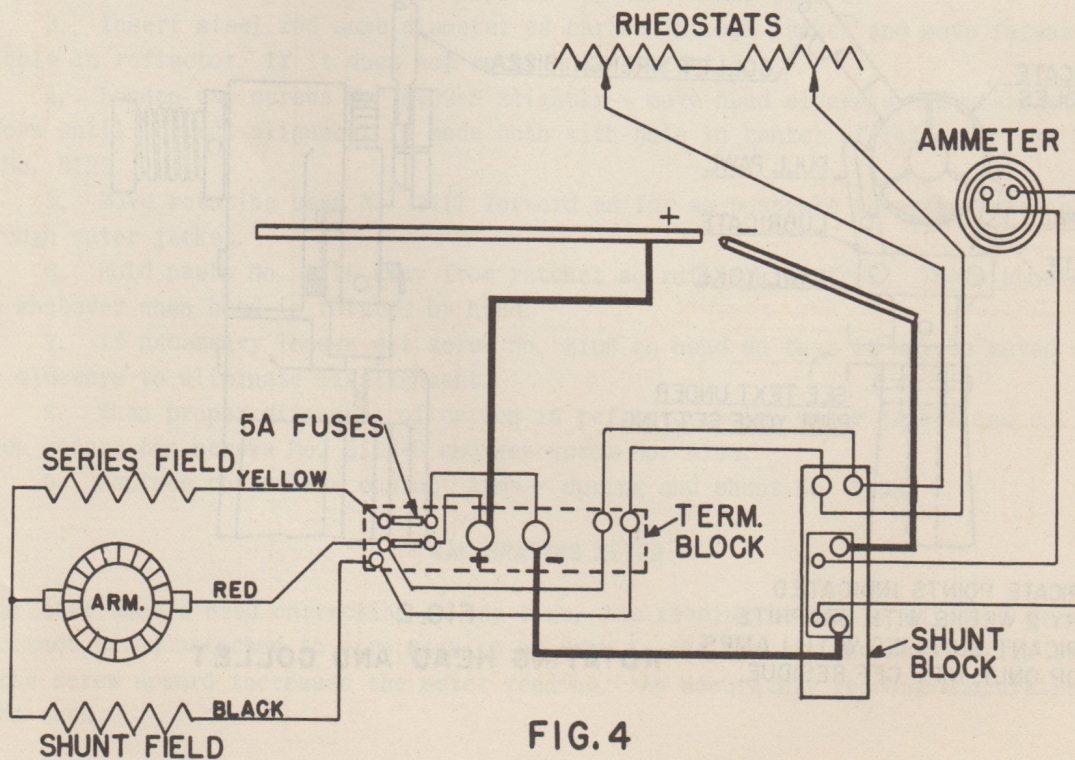


FIG. 4  
WIRING DIAGRAM



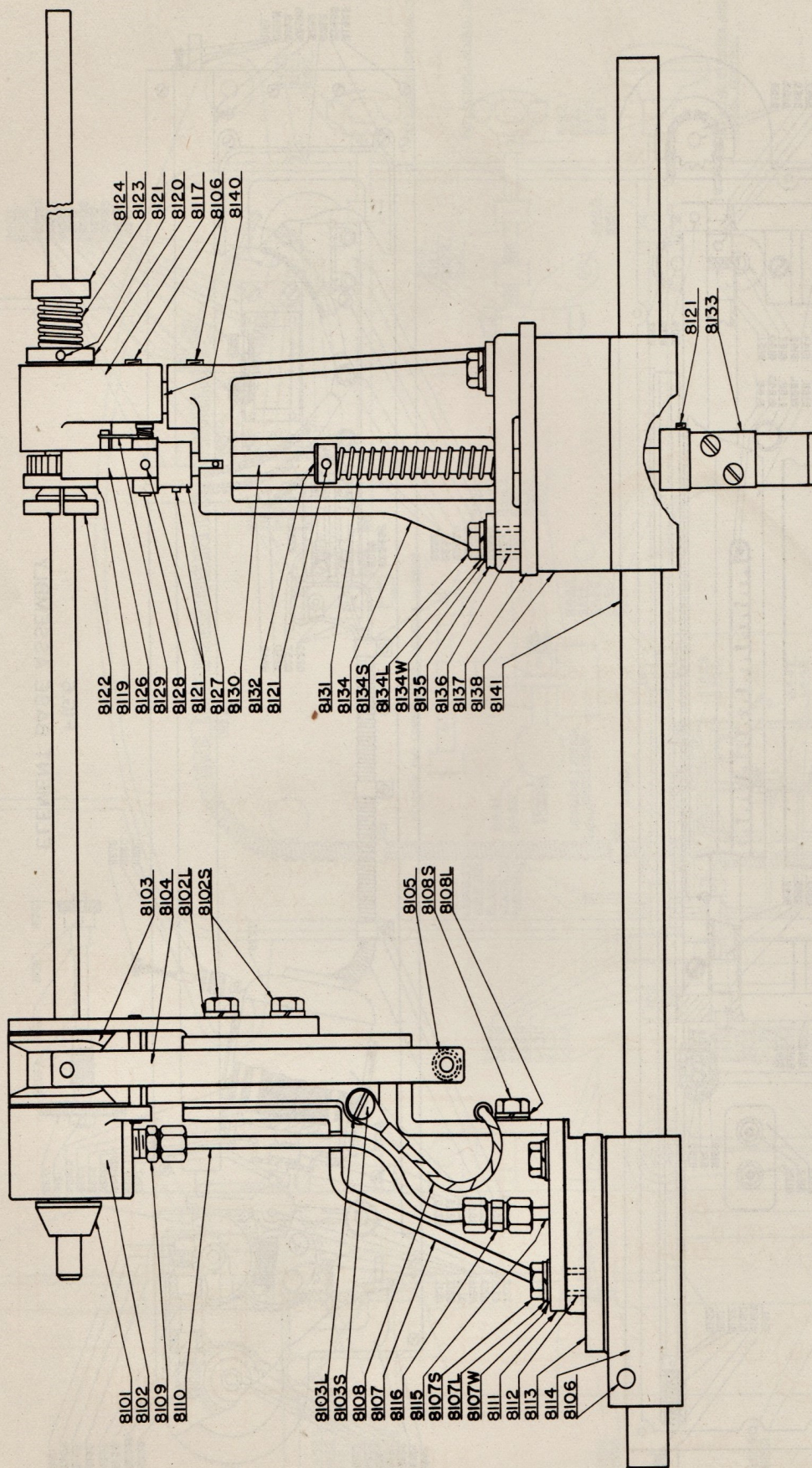


FIG. 5  
POSITIVE WATERJACKET AND CARBON CONTACT ASSEMBLY



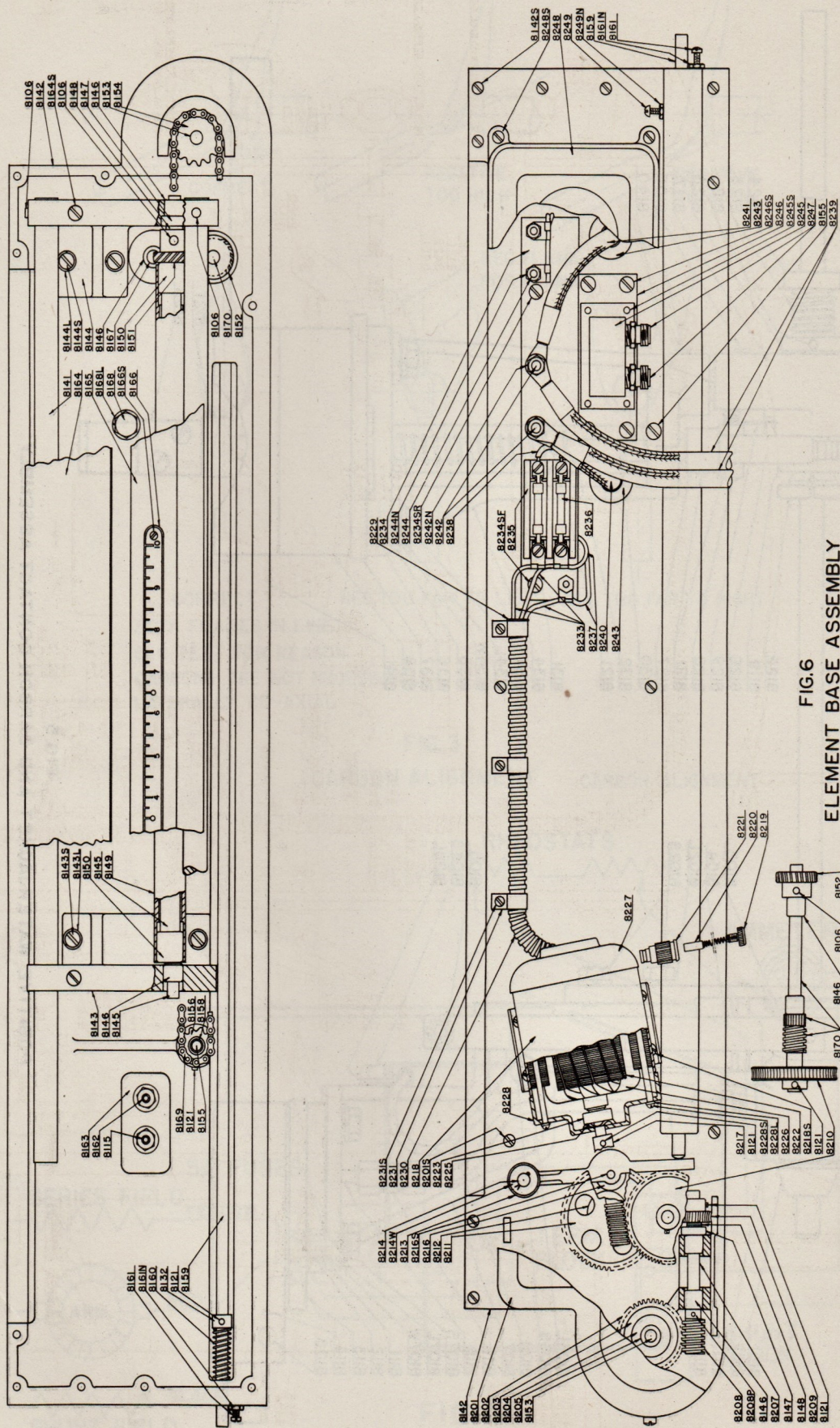


FIG.6  
ELEMENT BASE ASSEMBLY



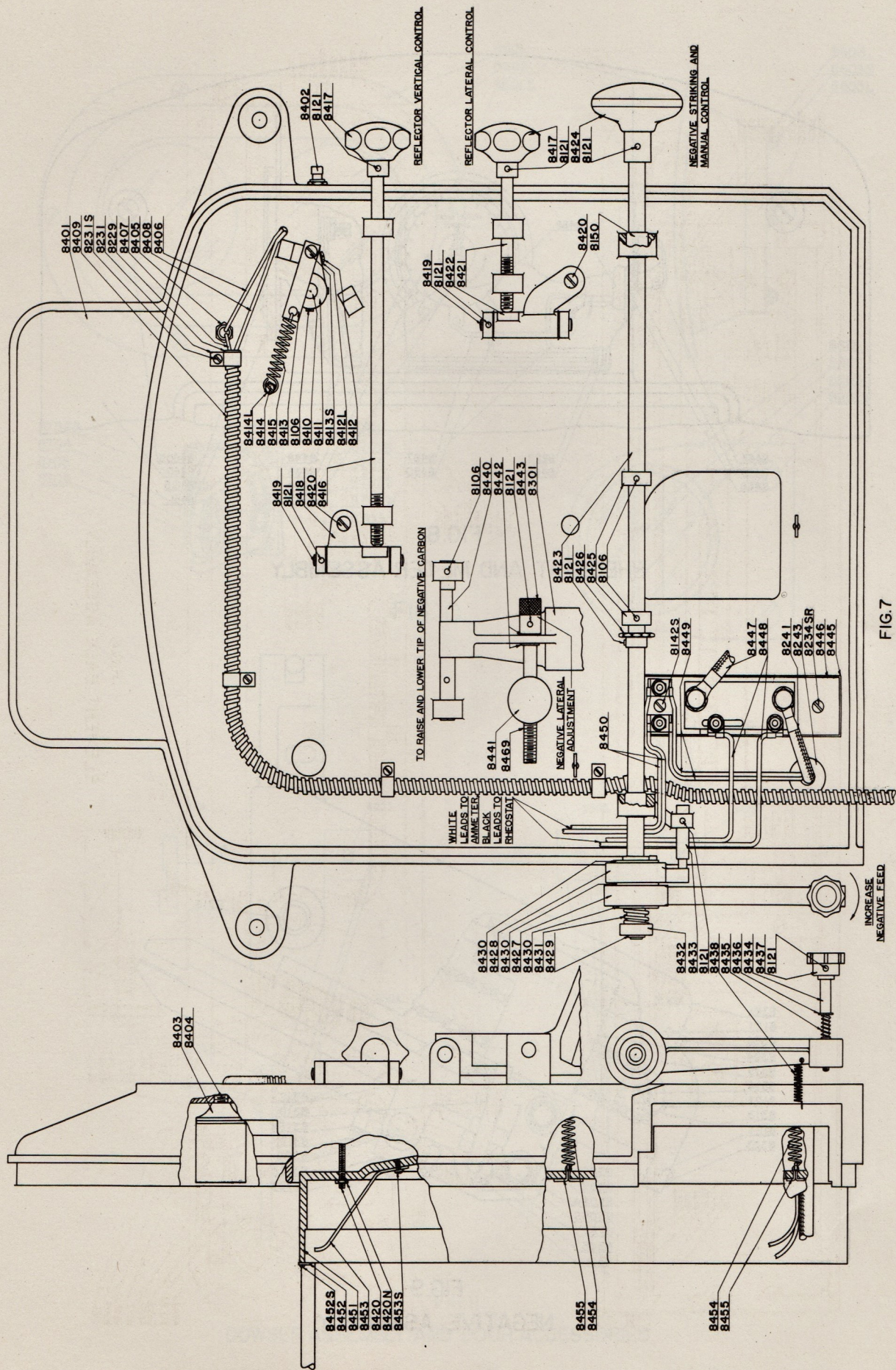


FIG. 7  
LAMPHOUSE BACK ASSEMBLY



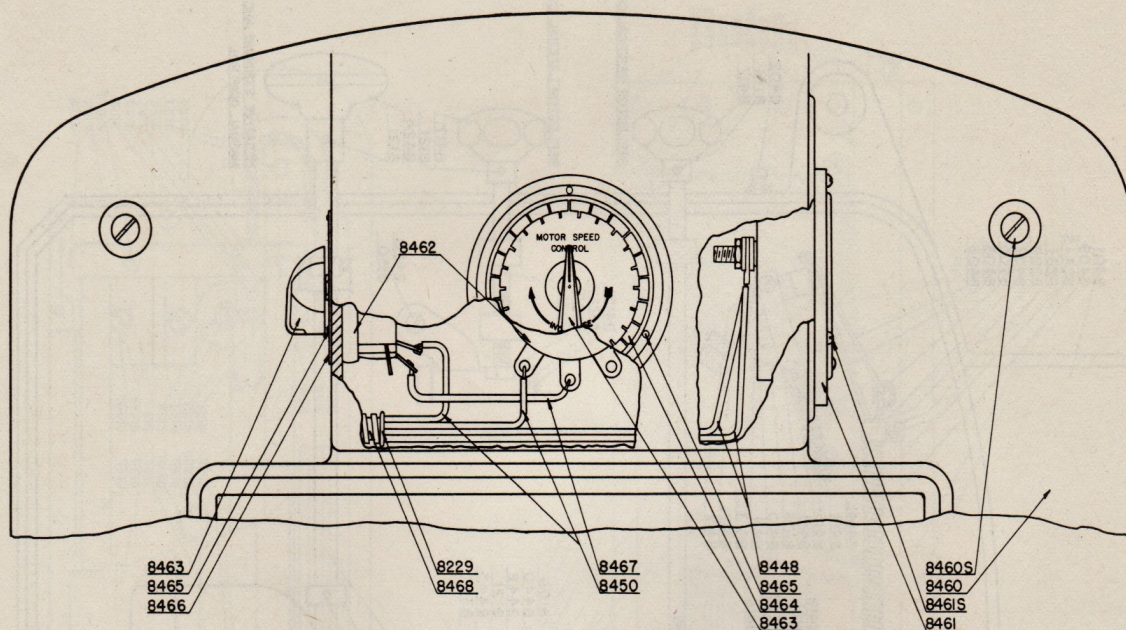


FIG. 8  
RHEOSTAT AND METER ASSEMBLY

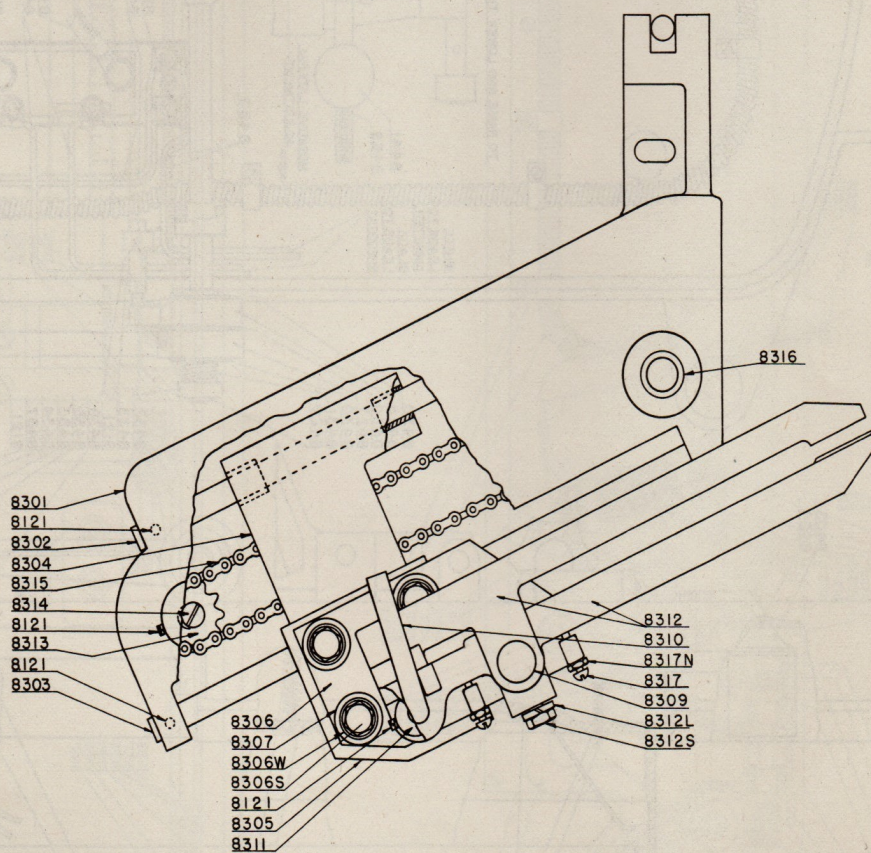


FIG. 9  
NEGATIVE ASSEMBLY



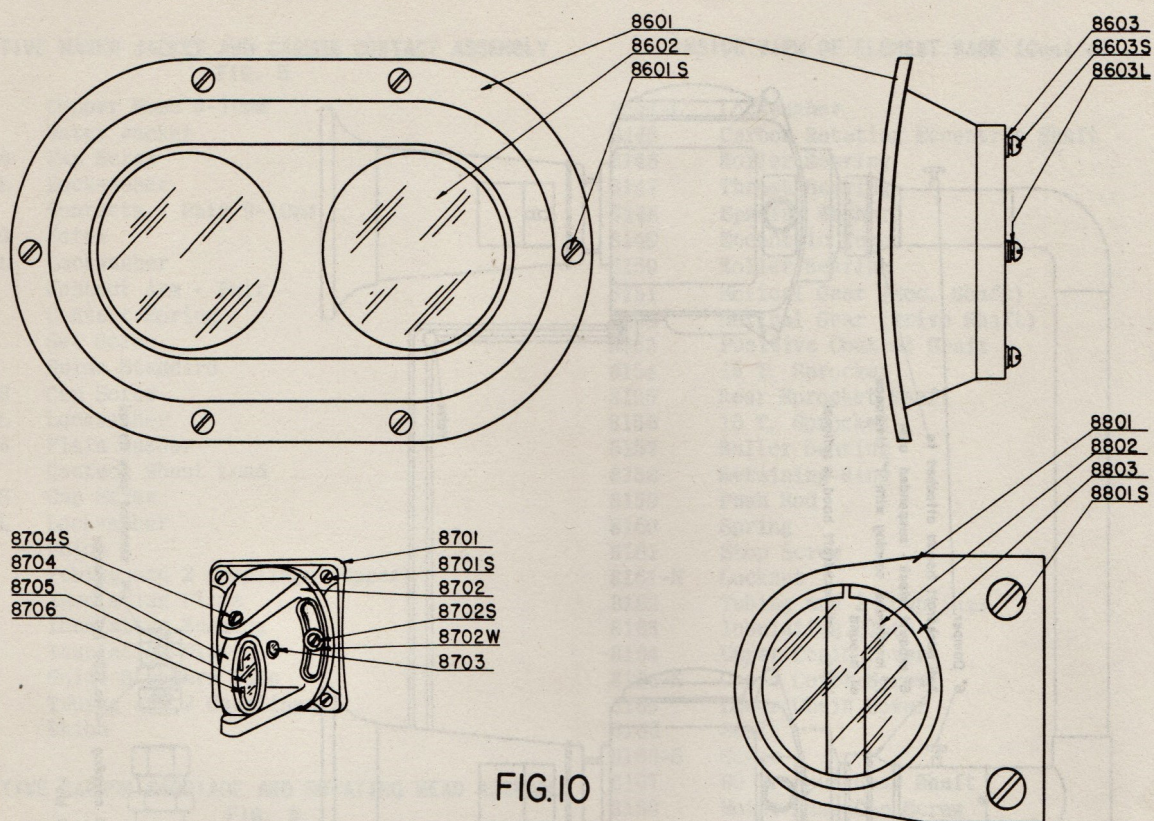


FIG. 10

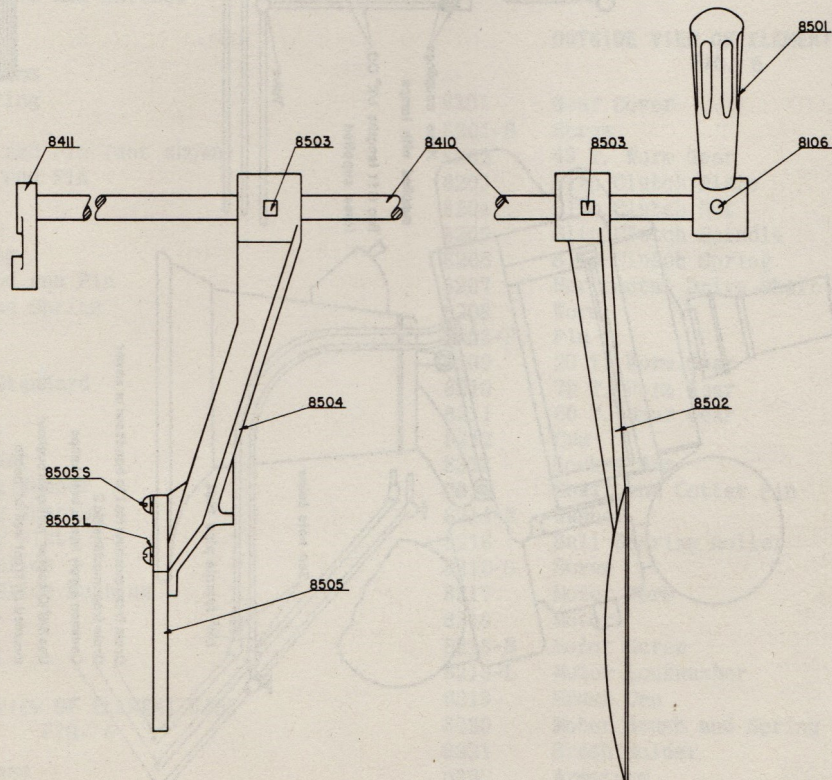


FIG. II

DOWSER ASSEMBLY AND DOOR ACCESSORIES



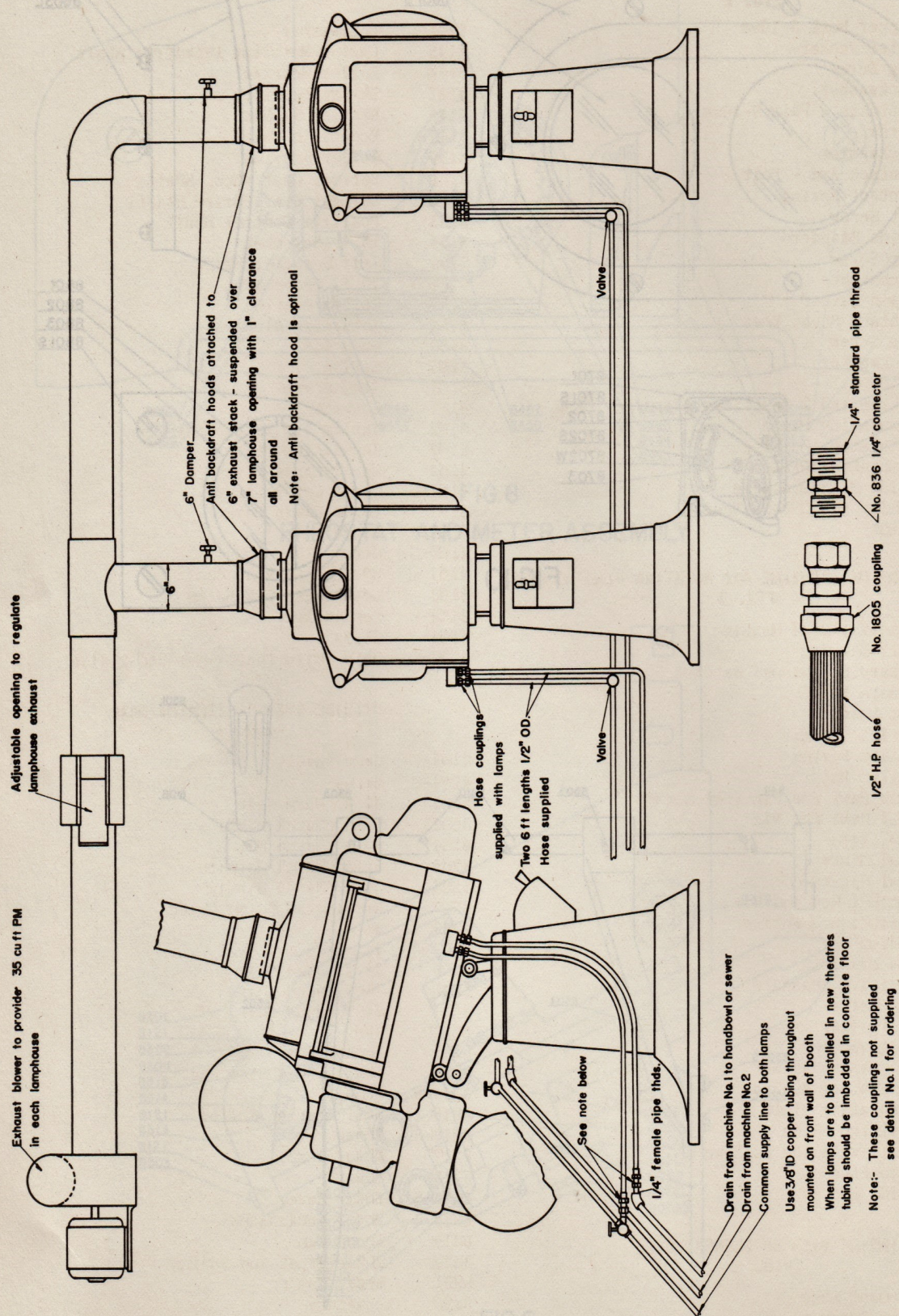


FIG.12  
WATER CONNECTIONS - LAMPHOUSE EXHAUST



## PARTS LIST

### POSITIVE WATER JACKET AND CARBON CONTACT ASSEMBLY FIG. 5

8101	Copper Nose 9-10mm
8102	Water Jacket
8102-S	Cap Screw
8102-L	Lockwasher
8103	Contacts - Pair 9-10mm
8103-S	Screw
8103-L	Lockwasher
8104	Contact Arm - Pair
8105	Contact Spring
8106	Set Screw
8107	Guide Standard
8107-S	Cap Screw
8107-L	Lockwasher
8107-W	Plain Washer
8108	Contact Shunt Lead
8108-S	Cap Screw
8108-L	Lockwasher
8109	Union
8110	Tubing and 2 Couplings (Upper)
8111	Insulating Plate
8112	Insulating Bushing
8113	Insulating Plate
8114	Guide Standard Base
8115	Tubing and 2 Couplings
8116	Union

### POSITIVE CARBON CARRIAGE AND ROTATING HEAD ASSEMBLY FIG. 5

8117	Rotating Head Housing
8118	Ball Bearing
8119	Rotary Sleeve and Ratchet
8120	Sleeve Nut
8121	Set Screw
8122	Collet 9-10mm
8123	Collet Spring
8124	Collet Nut
8125	Push Pawl and Pin (not shown)
8126	Pull Pawl and Pin
8127	Pawl Yoke
8128	Pawl Shaft
8129	Pawl Spring
8130	Ratchet Rod and Pin
8131	Ratchet Rod Spring
8132	Collar
8133	Cam Rider
8134	Positive Standard
8134-S	Cap Screw
8134-L	Lockwasher
8134-W	Plain Washer
8135	Insulating Washer
8136	Insulating Bushing
8137	Insulating Plate
8138	Positive Slide
8139	Positive Slide Bushing
8140	Head Stud
8141	Slide Rod

### INSIDE VIEW OF ELEMENT BASE FIG. 6

8142	Element Base
8143	Rear Bracket
8143-S	Screw
8143-L	Lockwasher
8144	Front Bracket
8144-S	Screw

### INSIDE VIEW OF ELEMENT BASE (Cont'd)

8144-L	Lockwasher
8145	Carbon Rotating Eccentric Shaft
8146	Roller Bearing
8147	Thrust Bearing
8148	Spacing Washer
8149	Eccentric Tube
8150	Roller Bearing
8151	Helical Gear (Ecc. Shaft)
8152	Helical Gear (Drive Shaft)
8153	Positive Control Shaft
8154	15 T. Sprocket
8155	Rear Sprocket Shaft
8156	10 T. Sprocket
8157	Roller Bearing
8158	Retaining Ring
8159	Push Rod
8160	Spring
8161	Stop Screw
8161-N	Locknut
8162	Tubing and 2 Couplings
8163	Insulating Plate
8164	Upper Chain Cover
8164-S	Chain Cover Screw
8165	Lower Chain Cover
8166	Scale
8166-S	Screw
8167	60 T. Spur Gear Shaft
8168	Motor Base Cap Screw
8168-L	Lockwasher
8169	Chain
8170	Main Drive Shaft-Worm and Pinion

### OUTSIDE VIEW OF ELEMENT BASE FIG. 6

8201	Gear Cover
8201-S	Screw
8202	43 T. Worm Gear
8203	Slip Clutch Plate
8204	Slip Clutch Nut
8205	Slip Clutch Spindle
8206	Slip Clutch Spring
8207	Horizontal Drive Shaft
8208	Worm
8208-P	Pin
8209	20 T. Worm Gear
8210	70 T. Worm Gear
8211	60 T. Spur Gear
8212	Cam
8213	Rocker Arm
8214	Shaft and Cotter Pin
8214-W	Washer
8216	Ball Bearing Roller
8216-S	Screw
8217	Motor Worm
8218	Motor
8218-S	Motor Screw
8218-L	Motor Lockwasher
8219	Brush Cap
8220	Motor Brush and Spring
8221	Brush Holder
8222	Armature
8223	Ball Bearing
8224	Bearing Plain Washer
8225	Bearing Spring Washer
8226	Field Coil
8227	Motor End Bell (Commutator End)



# OUTSIDE VIEW OF ELEMENT BASE (Cont'd)

## LAMPHOUSE BACK FIG. 7

8228	Motor End Bell (Shaft End)
8229	Anti Short Bushing
8230	Motor Flexible Tubing
8231	Motor Flexible Tubing Clamp
8231-S	Motor Flexible Tubing Screw
8231-L	Lockwasher
8233	Motor Leads
8234	Terminal Board
8234-SF	Screw (Front)
8234-SR	Screw (Rear)
8234-L	Lockwasher
8235	Fuse Block (Cutout)
8236	Fuses 5A
8237	Rheostat Leads
8238	Motor Lead wire
8239	Lead Switch to Terminal
8240	Positive Lead (cable)
8241	Negative Lead (cable)
8242	Line Terminal Studs
8242-N	Nuts
8242-L	Lockwasher
8243	Porcelain Bushing
8244	Rheostat Terminal Studs
8244-L	Locknuts
8245	Water Terminal Block
8245-S	Screw
8246	Insulating Base
8246-S	Screw
8247	Coupling Union
8248	Terminal Cover
8248-S	Screw
8249	Spring Stud
8249-N	Locknut

## NEGATIVE ASSEMBLY FIG. 9

8301	Negative Frame
8302	Upper Slide Rod
8303	Lower Slide Rod
8304	Negative Slide (carriage)
8305	Insulating Plate
8306	Carbon Jaw Mounting Casting
8306-S	Cap Screw
8306-L	Lockwasher
8306-W	Plain Washer
8307	Insulating Washer
8308	Mica Bushing
8309	Negative Jaw Stud
8310	Locking Handle
8311	Cam
8312	Negative Jaws - Pair
8312-S	Terminal Cap Screw
8312-L	Lockwasher
8313	Rear Sprocket
8314	Sprocket Eccentric Shaft
8315	Negative Chain
8315-S	Negative Chain Screw
8315-W	Plain Washer
8315-L	Lockwasher
8316	Roller Bearing
8317	Negative Jaw Limit Screw
8317-N	Negative Locknut
8318	Rear Sprocket Retaining Ring

8401	Back Casting
8402	Door Switch
8403	Lamp Receptacle
8404	Brass Pipe Nipple
8405	Locknut
8406	Lead (Lamp to Switch)
8407	Lead (Lamp to Line)
8408	Lead (Switch to Line)
8409	Flexible Metal Tube
8410	Dowser Control Rod
8411	Dowser Lever
8412	Stop Screw
8412-L	Lockwasher
8413	Spring Link
8413-B	Spring Link Bushing
8413-S	Screw
8414	Spring Stud
8414-L	Locknut
8415	Dowser Spring
8416	Vertical Reflector Control Rod
8417	Control Knob
8418	Vertical Refl. Swivel Casting
8419	Shaft
8420	Reflector Link Screw
8420-N	Locknut
8421	Lateral Reflector Control Rod
8422	Lateral Refl. Swivel Casting
8423	Negative Mounting Control Shaft
8424	Control Knob
8425	Collar
8426	Drive Sprocket
8427	Drive Clutch Housing
8428	Duplex Clutch Housing
8429	Clutch Spindle
8430	Slip Clutch Washer
8431	Slip Clutch Spring
8432	Slip Clutch Nut
8433	Duplex Clutch Stop Pin
8434	Neg. Speed Control Stud
8435	Spring
8436	Washer
8437	Knob
8438	Clutch Return Spring
8440	Neg. Vertical Adjusting Shaft
8441	Post
8442	Washer
8443	Knob
8445	Shunt Insulator
8446	Meter Shunt
8447	Shunt to Negative Lead
8448	Shunt to Ammeter Leads
8449	Rheostat leads - Terminal to Shunt Block
8450	Rheostat leads - Shunt Block to Rheostat
8451	Reflector Ring
8452	Reflector Clip
8452-S	Screw
8453	Reflector Holding Spring
8453-S	Screw
8454	Refl. Vertical Control Spring
8455	Cotter Pin
8460	Rear Cover
8460-S	Screw
8461	Meter



# LAMPHOUSE BACK (Cont'd)

8461-S Screw  
8462 Rheostat  
8463 Rheostat Knob  
8464 Dial  
8465 Pin  
8466 Dial  
8467 Rheostat Series Lead  
8468 Flexible Metal Tube  
8469 Lateral Neg. Adjusting Screw  
8470 Ash Tray

# DOWSER PARTS FIG. 11

8501 Dowser Lever  
8502 Front Dowser  
8503 Sg. Hd. Set Screw  
8504 Reflector Dowser Frame  
8505 Reflector Dowser Shield  
8505-S Screw  
8505-L Lockwasher

# RIGHT HAND DOOR PARTS FIG. 10

8601 Port Frame  
8601-S Screw  
8602 Colored Port Glass

# RIGHT HAND DOOR PARTS (Cont'd)

8603 Glass Clips  
8603-S Screw  
8603-L Lockwasher

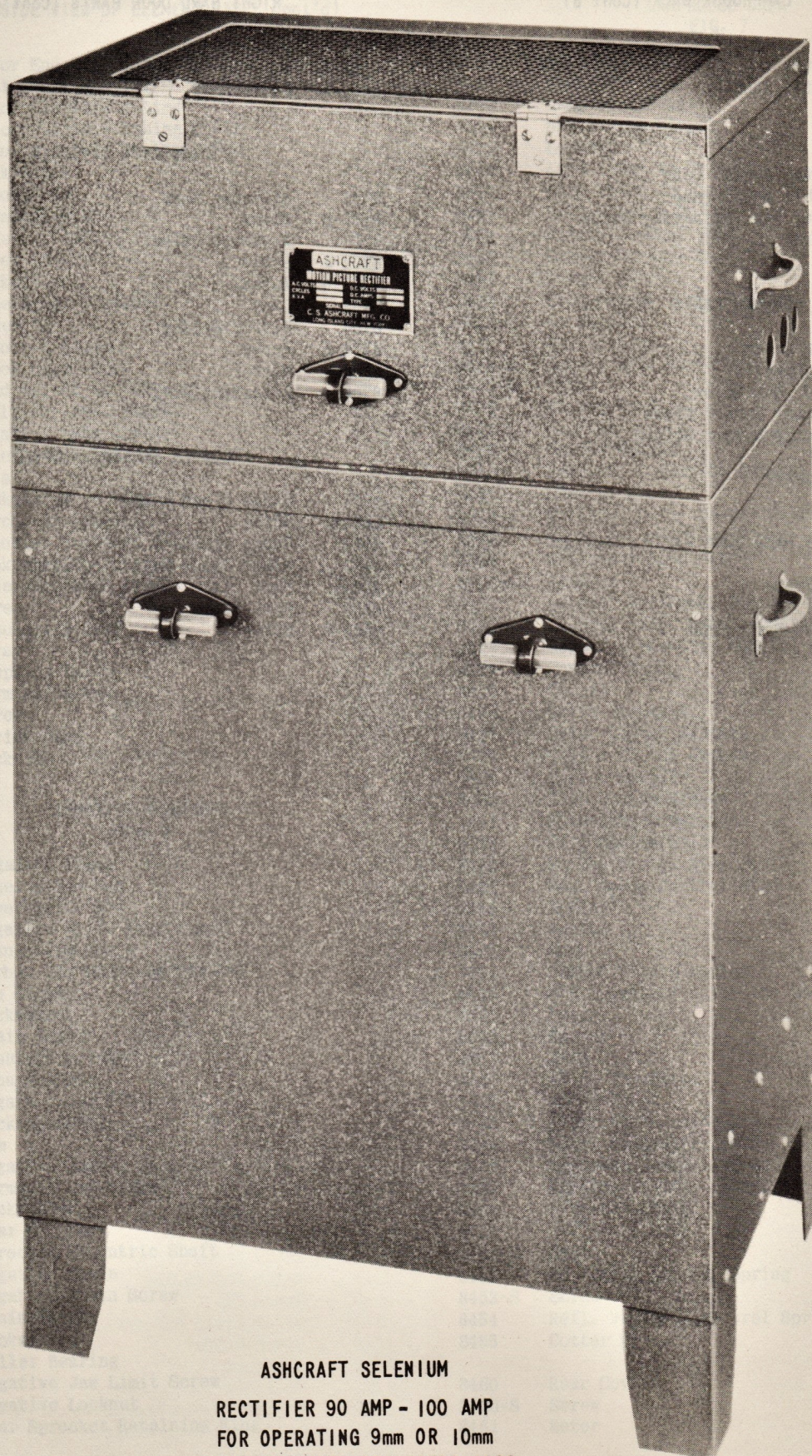
# ARCSCOPE FIG. 10

8701 Arcscope Base  
8701-S Screw  
8702 Arcscope Swivel  
8702-S Screw  
8702-W Washer  
8703 Lens  
8704 Mirror Holder  
8704-S Screw  
8705 Mirror  
8706 Retaining Ring

# ARCSCOPE SCREEN FIG. 10

8801 Gauge Glass Frame  
8801-S Screw  
8802 Gauge Glass  
8803 Gauge Glass Retaining Ring  
8804 Port Glass - Left Hand Door  
8805 Port Frame  
8805-S Screw





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