FRICTION ROLL DRIVES
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers friction roll drives.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Reference shall be made to Section 020-010-711 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

*1.04 Asterisk: Requirements are marked with an asterisk (*) when to check for them would necessitate the dismantling or dismounting of apparatus, or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or its performance indicates that such a check is advisable.

1.05 KS-16326 oil is an inhibited oil, whereas KS-2245 oil does not contain an inhibitor. The inhibitor will retard the formation of organic acids, which would react with the oil to produce soapy compounds, or sludge, and impair lubrication. While the formation of acids is accelerated in the presence of copper and copper allows, the inhibitor in KS-16326 oil is sufficient to give a service life of five years. To insure the 5-year interval when first changing to KS-16326 oil, it is important that the gear cases and bearing boxes be drained and flushed as covered in the requirements to eliminate acids and residues from the old oil.

2. REQUIREMENTS

2.01 Cleaning

(a) The cork surface of the friction rolls must be smooth and free from oil or grease to prevent the rack from slipping.

(b) The exterior surfaces of the gear case and bearing box shall be cleaned when necessary in accordance with approved procedures.

2.02 Lubrication

(a) The gear cases and bearing boxes shall be filled with KS-16326 oil to within the following limits with the drives in operation:

(1) Gear Cases - Drives With External Oil Pipes: Fig. 1(A) - The level of the oil shall not be above the center of the oil sight and not below the bottom of the oil sight.

Gauge by eye.

(2) Gear Cases - Drives With Integral Oil Pumps: Fig. 2(A) - The running level of the oil shall not be higher than 1/4 inch below the top, and not lower than 1/8 inch above the bottom of the oil sight.

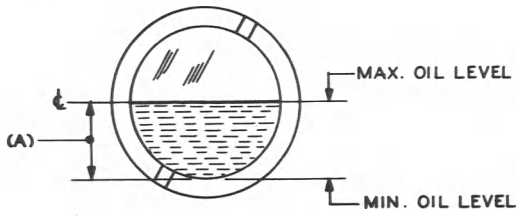

Fig. 1 - Oil Level Limits
Gear Cases
Drives With External Oil Pipes

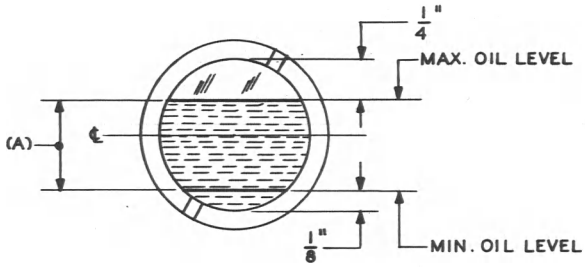

Fig. 2 - Oil Level Limits
Gear Cases
Drives With Integral Oil Pumps

Gauge by eye .

(3) Bearing Boxes (Except the No. 45A, 46A, 47A, and 48A Drives): Fig. 3(A) - The running level of the oil shall not be higher than 1/8 inch above and not lower than 1/8 inch below the center line of the oil sight.

Gauge by eye.

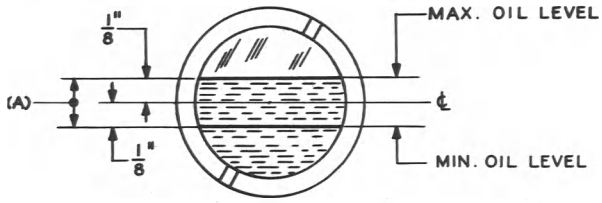

Fig. 3 - Oil Level Limits
Bearing Boxes
Drives With Integral Oil Pumps
(Except No. 45A, 46A, 47A, and 48A Drives)

(4) Bearing Boxes (No. 45A and 46A Drives): Fig. 4(A) - The running level of the oil shall not be higher than the center line and not lower than 1/8 inch below the center line of the oil sight.

Gauge by eye.

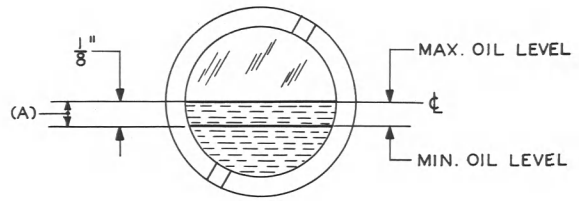

Fig. 4 - Oil Level Limits
Bearing Boxes
No. 45A and 46A Drives

(5) Bearing Boxes (No. 47A and 48A Drives): Fig. 5(A) - The running level of the oil shall not be higher than 1/16 inch above and not lower than 1/8 inch below the center line of the oil sight.

Gauge by eye.

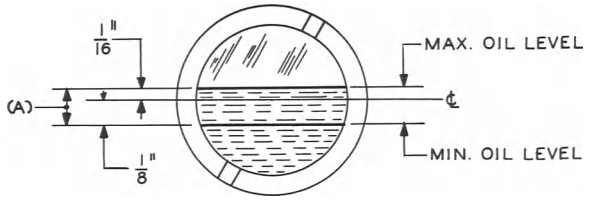

Fig. 5 - Oil Level Limits
Bearing Boxes
No. 47A and 48A Drives

(b) Recommended Lubrication Intervals

(1) Periodic inspections shall be made to insure that the oil level is kept within these limits.

Note: Where drives are operating with KS-2245 oil, either KS-2245 or KS-16326 oil may be added as necessary to maintain the oil level until the changeover to KS-16326 oil has been made.

Caution: Exercise care while replenishing the oil to prevent the oil level being above the maximum level specified after it has had time to reach its true level.

(2) After turnover, it is recommended that the oil be drained off, examined, and the gear cases and bearing boxes filled with KS-16326 oil to the levels covered in (a) at the following intervals.

Drives operating with KS-2245 oil 2 years
Drives operating with KS-16326 oil 5 years

When first changing to KS-16326 oil for drives previously operating with KS-2245 oil, the gear cases and bearing boxes shall be flushed with KS-16326 oil as covered in requirement 2.03.

2.03 Flushing

(a) Before Turnover: The gear cases and bearing boxes shall be drained and refilled with KS-16326 oil. Following this, the drive shall be operated under power for a minimum of 5 minutes, drained, and again refilled with KS-16326 oil as covered in requirement 2.02.

(b) After Turnover

(1) Where KS-2245 oil or a mixture of KS-2245 and KS-16326 oils have been in use, the gear cases and bearing boxes shall be drained and refilled with KS-16326 oil. Following this, the drive shall be operated under power for a minimum of 15 minutes, drained and again refilled with KS-16326 oil as covered in requirement 2.02.

(2) Where KS-16326 oil has been in use, the gear cases and bearing boxes shall be drained and the oil examined. The parts shall then be refilled with KS-16326 oil as covered in requirement 2.02 unless such conditions as excessive dirt and sediment, which give evidence of impaired lubrication, are observed. In such instances only, it will be necessary to refill the parts with KS-16326 oil, and operate the drive under power for a minimum of 15 minutes, following which the oil shall again be drained and the parts refilled with KS-16326 oil.

(3) If the oil is drained from the gear cases and bearing boxes and immediately refilled, it will not be necessary to stop the drive.

2.04 Record of Lubrication and Flushing: During the period of installation, a record shall be kept, by date, of the flushing out of the gear cases and bearing boxes and of the oil replacements, and this record shall be turned over to the telephone company with the equipment.

2.05 Leakage at Sealed Joints

(a) All seals shall be unbroken and leakproof to the extent that the total accumulation of oil which leaks or seeps from all sealed joints of a gear case or bearing box shall not be sufficient to form one drop in 24 hours. When there is any question as to whether or not this requirement is being met, a gear case or bearing box may be observed over a period of several days. If the accumulation of oil for the entire pe-

riod averages one drop or more per day, the sealed joints shall be considered unsatisfactory.

(b) When necessary, the joints shall be resealed with KS-6824 sealing compound.

(c) Shaft guards associated with 2-type or No. 10A shafts shall be sealed at the time of turnover, although they may not be sealed at the time the drive is assembled in the shop.

2.06 Leakage at Oil Closures: Oil closures shall not leak for at least 24 hours after cleaning. After an interval of 24 hours, an inspection shall be made of the cleaned oil closures to determine whether or not they are leaking. Those found to be leaking shall be cleaned. If the leaking is not due to dirt accumulating between the shaft and the oil closure lips, as determined by cleaning and inspection, the oil closure shall be considered unsatisfactory. This may be caused by lack of clearance. On drives having oil closures in the cover this may be corrected. See requirement 2.08.

2.07 Treatment of Exposed Metal Portions of Cork Rolls

(a) Before turnover to the telephone company, the exposed metal portions of the cork rolls shall be given two coats of KS-14688 Superla wax compound. These coats shall extend from the edge of the cork to within 1/8 inch of the gear cases or bearing boxes.

(b) The lubricant shall be prevented from creeping to within 1/2 inch of the cork rolls.

(1) Metal surfaces of cork rolls upon which such creeping is observed shall be cleaned and treated with KS-14688 Superla wax compound.

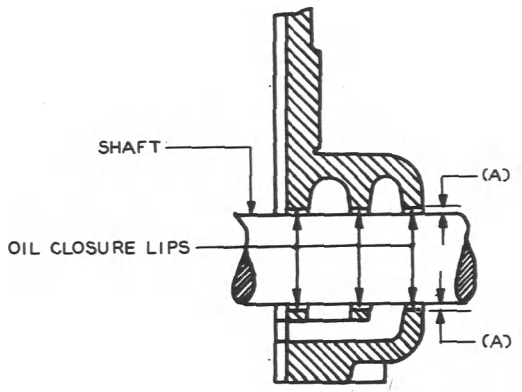

Fig. 6 - Oil Closures in Cover

(2) Periodic inspections shall be made to insure that the oil creepage does not exceed this amount.

*2.08 Clearance Between the Shaft and the Oil Closure Lips of Gear Case or Bearing Box Covers: Fig. 6(A) - There shall be a clearance between the shaft and the oil closure lips of gear case and bearing box covers of:

Test - Min 0.003 inch
Readjust - Min 0.005 inch

Use the No. 74D gauge or R-1026 gear case setting tool.

2.09 Freedom of Operation of Rolls and Gearing: The rolls and gearing shall be free from bind in any position of the rolls or gearing about their axes.

2.10 Freedom of Operation of Worm Shaft: The worm shaft shall be free from bind in any position of rotation.

Gauge by feel.

To check this requirement determine whether the worm case housing is abnormally hot by placing a hand on the gear case cover near the worm.

2.11 Freedom of Operation of Motor: The motor shall be free from bind in the bearings due to poor alignment with the worm shaft.

2.12 Alignment of Shaft Connected Drives: The center lines of two rolls connected by a drive shaft shall not be out of alignment more than 1/4 inch within the length of the two rolls. This need be checked on front of frames only.

This requirement may be checked for by the telephone company, if they require it, before the installation department has completed the assembly of the drive in the frame.

2.13 Drive and Clutch Alignment: The drive and clutches shall be so placed in the frame that when the rack is assembled into position, its alignment with the brush rod will be such as to prevent any abnormal side thrust, bind, or twist in the brush rod.

This requirement may be checked for by the telephone company, if they require it, before the installation department has completed the assembly of the drive in the frame.

2.14 Location of Coupling Assembly on Drive Shaft: Fig. 7(A) - With the motor stopped the clearance between the coupling

assembly on the drive shaft and the gear case shall be

Min 1/8 inch

Gauge by eye.

Note: The end play of the drive shaft need not be taken into consideration when checking this requirement.

2.15 Horizontal Distance Between Coupling Assembly on Drive Shaft and Motor Stop: Fig. 7(B) - The finished surface of the motor stop shall be 2-23/32 inches ±3/64 inch in a horizontal line from the face of the coupling assembly mounted on the drive shaft.

Use the 12-inch combination square.

2.16 Motor Coupling Assembly Location: Fig. 7(C) - The face of the coupling assembly on the drive motor shaft shall be set with its face located 2-7/16 inches ±1/64 inch from the finished end of the motor feet.

Use the 12-inch combination square.

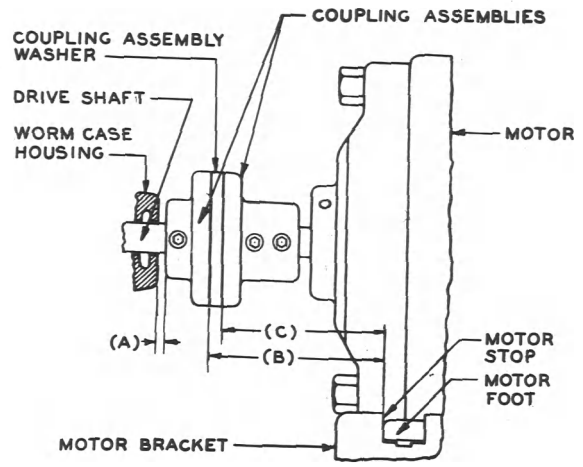

Fig. 7 - Relationship Between Motor and Coupling Assembly

*2.17 Clearance Between Guard Plates and Cork Rolls: Fig. 8(A) - The guard plates shall clear the cork rolls by

Min 3/64 inch

Use the R-2058 gauge.

Requirements for Alarm Mechanism

2.18 Run and Stop Alarm Operation: With the associated motor at rest the stop alarm contact shall make, and with the motor running up to speed the run alarm contact shall make. In the midposition, it is permissible for the two contacts to overlap but only for a small range of speed.

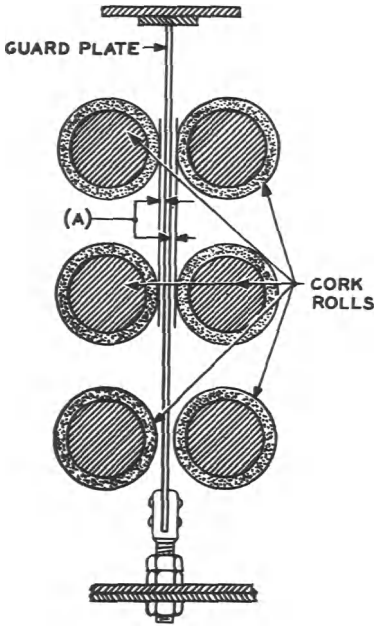

Fig. 8 - Clearance Between Guard Plates and Cork Rolls

Requirements for Cast Weight-type Alarm Mechanism

2.19 Contact Pressure

(a) Fig. 9(A) - With the motor running up to speed, the pressure between the run alarm contact and the operating spring contact shall be

Test - Min 35 grams, Max 60 grams
Readjust - Min 40 grams, Max 60 grams

Use the No. 68B gauge.

(b) Fig. 9(B) - With the motor stopped the pressure between the stop alarm contact and the operating spring contact shall be

Test - Min 35 grams, Max 70 grams
Readjust - Min 40 grams, Max 70 grams

Use the No. 68B gauge.

2.20 Spring Tension: Fig. 9(C) - With the run alarm contact open, the contact spring shall rest on its associated stop spring as close as practicable to the end of the spring nearest the contact with a tension of

Test - Min 75 grams
Readjust - Min 87.5 grams

Use the No. 70J gauge. This tension shall be measured at the contact.

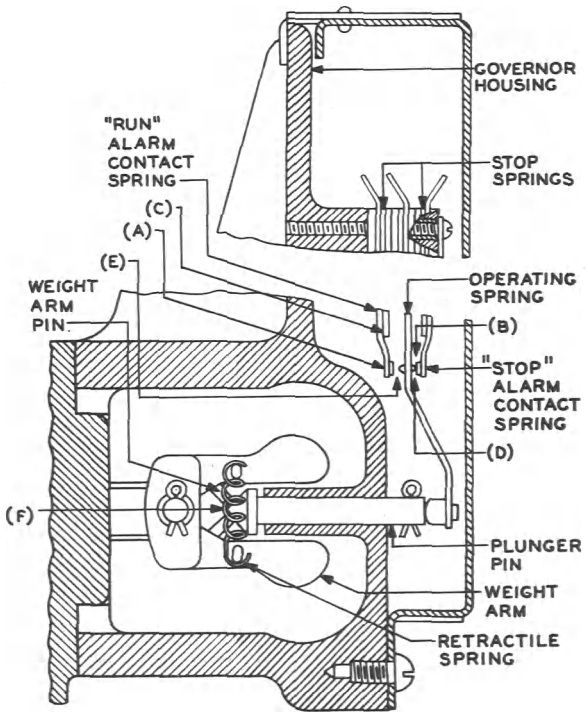

Fig. 9 - Cast Weight-type Alarm Mechanism

2.21 Contact Follow: Fig. 9(D) - With the motor stopped and with the end play of the motor worm taken up toward the motor coupling, there shall be a follow of the "stop" alarm contact of 0.005 inch.

Gauge by eye.

2.22 Contact Separation

(a) Fig. 9(E) - With the motor running up to speed, the separation between the stop alarm contacts and the operating spring shall be 0.010 inch.

Gauge by eye.

(b) With the motor stopped, the separation between the run alarm contact and the operating spring shall be

Min 0.015 inch

Gauge by eye.

The thickness of the contact spring is 0.018 inch.

2.23 Plunger Pin Pressure: Fig. 9(F) - With the motor running up to speed, the plunger pin shall not touch the pins on the weight arms with sufficient pressure to cause it to rotate.

Gauge by eye.

Requirements for Link-type Alarm Mechanism

*2.24 Contact Pressure

(a) Fig. 10(A) - With the motor running up to speed, the pressure between the run alarm contact and the operating spring contact shall be

Test - Min 35 grams, Max 60 grams
Readjust - Min 40 grams, Max 60 grams

Use the No. 68B gauge.

(b) Fig. 10(B) - With the motor stopped, the pressure between the stop alarm contact and the operating spring contact shall be

Test - Min 35 grams, Max 70 grams
Readjust - Min 40 grams, Max 70 grams

Use the No. 68B gauge.

*2.25 Spring Tension: Fig. 10(C) - With the run alarm contact open, the contact spring shall rest on its associated stop spring as close as practicable to the end of the spring nearest the contact with a tension of

Test - Min 75 grams
Readjust - Min 87.5 grams

Use the No. 70J gauge. This tension shall be measured at the contact.

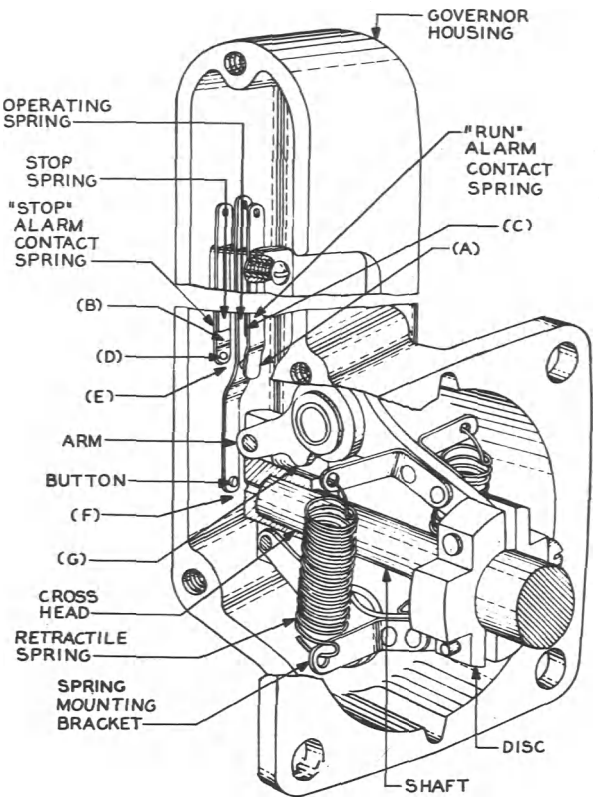

Fig. 10 - Link-type Alarm Mechanism

*2.26 Contact Follow: Fig. 10(D) - With the motor stopped and with the end play of the motor worm taken up toward the motor coupling, there shall be a follow of the stop alarm contact of 0.005 inch.

Gauge by eye.

*2.27 Contact Separation

(a) Fig. 10(E) - With the motor running up to speed, the separation between the stop alarm contact and the operating spring shall be 0.010 inch.

Gauge by eye.

(b) With the motor stopped, the separation between the run alarm contact and the operating spring shall be

Min 0.015 inch

Gauge by eye.

The thickness of the contact spring is 0.018 inch.

*2.28 Crosshead Position With Motor Running: Fig. 10(F) - With the motor running up to speed, the crosshead shall rest against the end of the shaft and there shall be a perceptible clearance between the button and the crosshead.

Gauge by eye.

*2.29 Position of Arms With Motor Stopped: Fig. 10(G) - With the motor stopped, the arms shall rest on the crosshead.

Gauge by eye.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, and Materials

Code or Spec No.	Description
Tools	
245	3/8- and 7/16-inch Open Double-end Flat Wrench
246	1/2-inch Open Single-end Flat Wrench
271	13/16-inch Open Single-end Flat Wrench
295	5/16-inch Bristo Setscrew Wrench
296	3/8-inch Bristo Setscrew Wrench
344	Offset Screwdriver
358	Cleaning Tool
388A	3/16- and 1/4-inch Open Double-end Offset Wrench
453A	Swivel Spanner Wrench
485A	Smooth Jaw Pliers
584A	Cork Roll Cleaner
KS-5000	Grease and Oil Gun
KS-6367	7/16- and 5/8-inch Open Double-end Flat Wrench
KS-6737	1/4-pint Screened Funnel
KS-7782	Parallel Jaw Pliers
KS-8097	5/8- and 7/16-inch 12-point Offset Box Wrench
KS-14164 (2 required)	Brush
R-1005	Jeweler's Screwdriver
R-1021	1/2-inch Flat Brush
R-1021 (modified)	1/2-inch Flat Brush
R-1026	Gear Case Setting Tool
R-1051	Pillar File
R-1060	Putty Knife
R-2485	5/32-inch Allen Socket Screw Wrench
R-2812	3/16-inch Allen Socket Screw Wrench
R-6440	3/8-inch Square Box Wrench
R-8950	Rubber Syringe
-	Small Stiff Brush (Typewriter Brush)
-	Brush (Bottle-type Typewriter Brush)
-	Impact Goggles
-	4-ounce Riveting Hammer
-	6-1/2-inch P-long-nose Pliers
-	No. 565 L.D. Starrett 5/32-inch Pin Punch
-	1 Pint Brass Oiler - 9-inch Spout
-	3-inch Cabinet Screwdriver
-	4-inch Regular Screwdriver
-	5-inch Regular Screwdriver
-	Scissors
-	Electric Fan
Gauges	
68B	70-0-70 Gram Gauge
70J (or replaced 70E)	0-150 Gram Gauge
74D	Thickness Gauge Nest
R-2058	0.045-inch Thickness Gauge
-	12-inch Combination Square

Code or Spec No.	Description
Materials	
AT-6684	Cotton Tape
KS-2423	Cloth
KS-6824	Sealing Compound
KS-7860	Petroleum Spirits
KS-~~8372~~ 19578	~~Stabilized~~ Trichloroethylene
KS-9402	Rosin Solution
KS-14666 (or replaced D-98063)	Cleaning Cloth
KS-14688 (or replaced D-89314)	Superla Wax Compound
KS-16326	Oil
-	Flat Piece of Hardwood (for stirring sealing compound)
-	Toothpicks, Hardwood, Flat at One End and Pointed at Other
-	Touch Up Paint (to match apparatus)
-	Shellac
-	Receptacles (for drained oil)
-	Metal Container (for KS-9402 rosin solution)
-	Wire and Block (for supporting drive shaft)
-	No. 22 Bare Tinned Copper Wire
-	Bell System Friction Tape
-	Pro-tek (E. I. DuPont de Nemours & Co., Inc.) or Practi-Kreme (Practi Laboratories)

3.002 Before stopping a drive to make any of the inspections or readjustments specified herein, ascertain whether it is necessary to make any of the associated circuits busy. Make busy circuits so affected in the approved manner.

3.003 If the mounting of the safety motor fuse box on the base angle interferes with checking or adjusting for requirements specified herein, remove the cover mounting screws with the 5-inch regular screwdriver and remove the cover. Then remove the screws that secure the fuse box to the mounting bracket with the 5-inch regular screwdriver. Then remove the bracket mounting bolts with the No. 246 wrench and remove the mounting bracket. Then, using the conduit as an axis, rotate the fuse box forward so as to clear those points of the drive on which inspections and adjustments are to be made. After the requirements are satisfactorily met, rotate the fuse box backward to its normal position and replace the parts in the reverse order to that outlined above. In some cases, it may be necessary to loosen the connectors at the sides of the fuse box in order to rotate it as outlined above.

3.004 If for any reason it is necessary to remove the oil sight, remove it with the No. 453A wrench. Replace the gaskets.

3.005 When removing KS-6824 sealing compound from a sealed part, it is advisable to use goggles to prevent flying particles of the compound getting in the eyes.

3.006 Before removing a cover of a gear case or bearing box which has been secured in place by means of stops, proceed as covered in Section 159-720-812.

3.01 Cleaning (Rq 2.01)

General

(1) If an up drive is observed to be slipping and an inspection shows that it is not due to incorrect clutch adjustment, it is probably due to oil or grease or a glazed surface on the cork rolls. Where this condition is observed, make the associated circuits busy and then proceed as covered in (2) to (9), inclusive. If, after cleaning the cork rolls, slipping is still observed, apply a thin coat of KS-9402 rosin solution as covered in (10) to (19), inclusive.

Cleaning Cork Rolls

(2) Remove the rack and clutch as covered in the Division 026 section covering the type of clutches involved, in order to gain access to the cork roll.

Caution: When using KS-8372 trichloroethylene, exercise care to avoid the use of excessive amounts. To avoid excessive evaporation, the cloths used with KS-~~8372~~ trichloroethylene may be thrown into a suitable closed container. If considerable usage of ~~KS-8372~~ trichloroethylene is to be made at one location, use a fan to dissipate the fumes. Locate the fan so that it will direct a current of air toward the part being cleaned. The fumes from the cleaning fluid are heavier than air and the use of the fan avoids the accumulation of the fumes in sufficient quantities to be objectionable.

(3) Thoroughly coat the hands and wrists with Pro-tek or Practi-Kreme, rubbing the cream into the pores of the skin and under and around the nails of both hands. One application of Pro-tek or Practi-Kreme will last 3 to 4 hours. After coating the hands, proceed as follows.

(4) Loop the AT-6684 tape through the three metal brackets of the No. 584A cork roll cleaner. The tape should be sufficiently long so that a new section may be drawn in front of the cutouts when the exposed surface of the tape becomes dirty and will not absorb additional dirt, or when it is desired to clean the cork rolls at two or more

clutch positions. The loose ends of the tape can be held by pressing them against the handle of the cork roll cleaner with the hand.

(5) Moisten the section of the tape adjacent to the cutouts with KS-8372 trichloroethylene, and insert the cork roll cleaner so that the cutouts press firmly against the surface of revolving up drive and down drive cork rolls at one clutch position.

(6) Two or three applications of the trichloroethylene in this manner, while the rolls are rotating, should be sufficient to remove the oil or grease.

(7) When portions of the cork roll have been cleaned with KS-8372 trichloroethylene, it will be satisfactory to clean the associated racks with a KS-2423 or KS-14666 cloth moistened with the same fluid. Where racks only are to be cleaned, clean them as covered in the Division 026 section covering the type of clutches and associated racks involved.

(8) After all work using the trichloroethylene has been completed, thoroughly wash the hands and wrists with soap and warm running water to remove the Pro-tek or Practi-Kreme.

(9) Mount the clutch as covered in the Division 026 section covering the type of clutches involved. Remount the rack and check the setting of the multiple brushes on the bank terminals, the trip rod, and the trip finger adjustments as covered in the Division 026 section covering the type of elevator apparatus involved. Check the setting of the commutator brushes as covered in Section 026-120-701.

Application of KS-9402 Rosin Solution

(10) Remove the rack as covered in the Division 026 section covering the type of clutches involved, in order to gain access to the cork roll.

(11) On frames where two up drive cork rolls are used, such as for the final selectors, apply the rosin solution only to the lowermost cork roll.

(12) In applying the rosin solution to a cork roll, it is recommended that the operator keep his head above the level of the rosin solution so as to avoid inhaling the fumes, which are heavier than air and tend to move downward.

(13) Pour a sufficient amount of rosin solution in a metal container to care for the necessary number of immediate applications. Make sure that the original container is tightly closed when not in use.

(14) If the R-1021 brush has not been modified for previous usage, using a pair of scissors cut off the bristles approximately one inch from the ferrule and on a slight bias. Then dip the modified brush the full length of the bristles into the solution and shake the excess off. Exercise care, when removing the excess solution, not to get it on the surrounding apparatus. The residue will be sufficient for one application.

(15) Insert the brush as prepared above at an angle of approximately 45 degrees through the lowermost opening in the frame of the associated clutch so that the brush is under and beyond the vertical center line of the cork roll. Then slightly increase the angle so that the bristles of the brush engage the revolving cork roll as shown in Fig. 11. Hold this position for 5 seconds. Exercise care when inserting the brush to avoid touching the clutch frame.

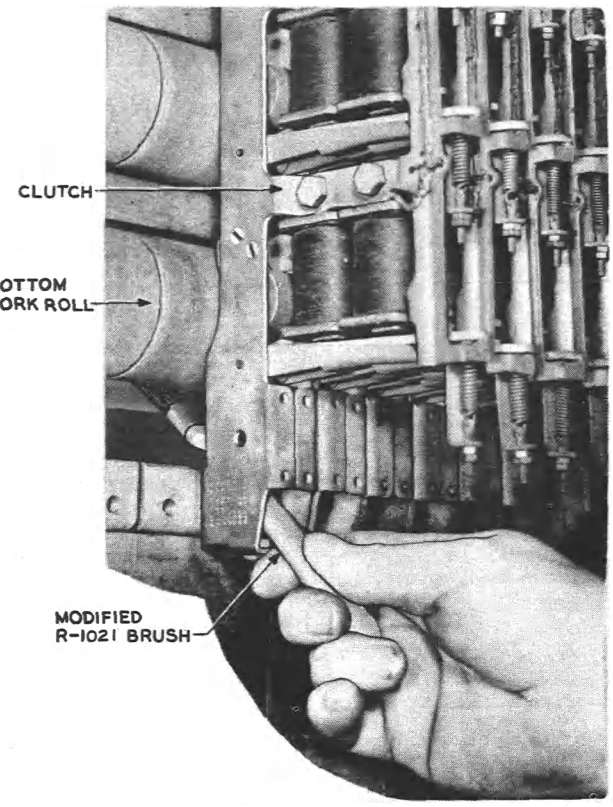

Fig. 11 - Position of Brush Against Cork Roll

(16) After each application, clean the brush in KS-8372 trichloroethylene to remove any remaining rosin; then dry the brush.

(17) Allow a minute or two for the rosin to dry on the cork roll; then remount the rack.

(18) Dispose of any remaining rosin solution to make sure that it will not be reused.

(19) Do not reapply the rosin solution to a particular cork roll position more frequently than 6-month intervals except where the cork roll position is cleaned between applications.

Cleaning of Gear Cases and Bearing Boxes

(20) To remove oil or grease and dirt from the ends of the rolls and adjacent surfaces of the gear case and bearing box, proceed as covered in 3.07.

(21) Remove oil and dust from the gear case and bearing box with the KS-2423 or KS-14666 cloth moistened with KS-7860 petroleum spirits. Do not use waste or cheesecloth for this purpose. Due precaution should be taken to prevent the cloth or fingers being pulled into the cork rolls.

(22) The appearance of oil on the surface of the gear case or bearing box should not necessarily be considered sufficient cause for any action, as this condition can sometimes be satisfactorily remedied by routine cleaning. If an accumulation of oil is noted on the under surface of the gear case or bearing box, clean the gear case or bearing box thoroughly; then keep the part affected under observation to determine the point and extent of leaking. Refer to requirements 2.05 and 2.06 of the section.

3.02 Lubrication (Rq 2.02)

(1) When the oil foams excessively in the gear case or the bearing box, it is usually an indication that the oil is too low and that air is being forced through the pump with the oil.

(2) If, upon inspection through the oil sight, it is found necessary to replenish the oil in a gear case or bearing box, remove the filling plug with a No. 245, No. 388A, KS-6367, KS-8097, or R-6440 wrench depending upon size of plug and the shape of the plug head. Then pour in KS-16326 oil through the KS-6737 screened funnel until the housing fills to approximately the maximum level specified. The screened funnel is used to prevent foreign matter being carried into the housing with the oil. If the funnel cannot be used, insert the nozzle of the brass oiler in the filling hole and fill the gear case or bearing box to the required level. Take care in using the oiler, that the oil in the container has been strained through the KS-6737 screened funnel before being used.

(3) Exercise care while replenishing the oil to prevent the oil level being above the maximum level specified when it has had time to reach its true level.

(4) Insert the filling plug finger tight to prevent subsequent difficulty in removing it except where the plug is a taper plug and mounted in the face of the cover. In this case, seal the plug as covered in 3.03.

(5) Wipe off with the KS-14666 cloth any oil that may have been spilled.

3.03 Flushing (Rq 2.03)

(1) When it is found necessary to flush a gear case or a bearing box of a drive equipped with integral oil pumps, remove the filling and drain plugs with the appropriate wrench as specified in 3.02 and allow the oil to drain from the gear case or bearing box into one of the receptacles provided.

(2) If the drive is equipped with an oil screen, examine the screen through the oil sight at the bottom of the gear case and if it appears to be dirty, remove the oil sight with the No. 453A wrench and clean the screen by brushing it with the bottle type typewriter brush. In order to make all sections of the screen accessible for cleaning, rotate the screen by means of a hook made from No. 22 bare tinned copper wire. If the gear case cover is removed for any reason, remove the oil screen as experience has indicated that it is no longer needed.

(3) If the drain plug of a bearing box cannot be removed, proceed as follows. Remove the oil sight with the No. 453A wrench and catch whatever oil flows from the bearing box. Withdraw the oil that remains at the bottom of the bearing box with the KS-5000 oil gun. In order to do this, unscrew the knurled ferrule between the handle and the top cylinder cap. This will permit the gun to be used as a pump. Then wind a coil of friction tape on the nozzle of the gun at a distance 2-1/8 inches from the end of the nozzle, until a coil of approximately 1 inch in diameter is formed. Insert the nozzle through the oil sight into the bearing box so that the end of the nozzle is resting on the bottom. Pump out the oil and sludge left in the bearing box. Discharge the oil into a receptacle provided for this purpose. Remove the filling plug as covered in 3.02 and fill the bearing box with fresh oil to the bottom of the oil sight hole. Then withdraw that oil as outlined above.

(4) Then insert the drain plug and pour a small amount, (approximately 1/2 pint) of KS-16326 oil into the gear case or bearing box through the filling hole at the top or if the drain plug of the bearing box was not removed, fill the box to the bottom of the oil sight. Remove the drain plug, if possible, and allow the oil to drain off.

(5) Repeat this operation several times until the sludge and dirt in the bottom of the bearing box are removed. Then remount and seal the oil sight if it was removed.

Note: Do not use a knife or other sharp instrument to remove the sludge as this may cause injury to the gear case, bearing box, or parts.

(6) The drive should be run while the flushing operation is being performed.

(7) After flushing, insert and, if necessary, seal the drain plug as follows. Where the drain plug is a taper plug, insert the plug 1/4 of its length into the gear case or bearing box. Apply KS-6824 sealing compound to the remaining threads and tighten the plug. Do not dip the plug into the sealing compound before inserting it into the gear case or bearing box as this may seal the plug so tightly that difficulty may be experienced in removing it. Where the plug is not a taper plug do not apply the sealing compound to either plug or gasket. Take care in tightening the plug not to tighten it too tightly to avoid shifting the position of the gear case. Where a paraprene gasket is used, an effective seal will not be obtained when the plug is excessively tightened due to the gasket tending to be squeezed out of place. Paraprene gaskets may be recognized as such by a strong sulphur odor when the gaskets are new. Remount the oil sight securely in place. Refill the gear case or bearing box as covered in 3.02. Insert and tighten the filling plug finger tight to prevent subsequent difficulty in removing it except where the plug is a taper plug and is mounted in the face of the cover. In this case, seal the plug as outlined above.

3.04 Record of Lubrication and Flushing (Rq 2.04)
(No Procedure)

3.05 Leakage at Sealed Joints (Rq 2.05)

(1) General: Do not break the seals unless it is absolutely necessary. When it is necessary, however, stop the drive, if this can be done without interfering with service. If the drive cannot be stopped due to service reactions, make a special effort to arrange the work so that it can be completed in the shortest time possible so that the bearings will not overheat. Drain the oil from the gear case or bearing box affected as covered in 3.03.

(2) Remove the screws from the part or parts to be resealed with the No. 344 or 4-inch regular screwdriver. Take care not to burr the screws. Remove any sealing compound from the screws by first soaking them in a small container of KS-8372 trichloroethylene, then applying a small stiff type-writer brush to the coated parts. In some cases it may be more economical to replace screws that have been removed from the sealed joints with new screws rather than clean old screws.

(3) By tapping the part lightly, it may be readily loosened and then removed. If the coupling head of the horizontal shaft prevents moving a cover sufficiently to gain access to the surfaces to be resealed, remove the guard over the coupling and loosen the Bristo setscrews with the No. 295 Bristo setscrew wrench or the Allen hexagon socket setscrews with the R-2485 Allen socket screw wrench. Where the coupling head is pinned to the shaft, drive out the tapered pin using the 4-ounce riveting hammer and the 5/32-inch pin punch. Place a piece of wire around the shaft and fasten the wire to the frame or place a wooden block under the shaft in order to support it and prevent strain on the other coupling, and then shift the coupling head back on the shaft. If more convenient, the shaft may be removed.

(4) See that all oil is removed from the gear case or the bearing box and assembled parts where there is any possibility of the oil coming in contact with the surfaces to be sealed. This may be accomplished by squirting KS-7860 petroleum spirits on the oil covered parts by means of the R-8950 syringe and then wiping them with the KS-14666 cloth. In filling the syringe it is better to press in the end of the rubber bulb rather than press in the sides. If this operation is performed on a drive which is running, exercise care in applying the KS-7860 petroleum spirits to keep as much of it away from the bearing surfaces as possible, and in wiping with the KS-14666 cloth to prevent the cloth from catching in the rotating parts. It is very important that every trace of oil be removed from the vicinity of the surfaces to be sealed, as well as from the surfaces themselves. It may be necessary, in the case of drives equipped with external oil pipes to remove the oil pipes in order to eliminate the oil entirely. Use the No. 246 wrench on the feed oil pipe connections and the No. 271 wrench on the return oil pipe connections. Make sure that all the petroleum spirits are removed from the syringe after using it to retard deterioration of the rubber.

(5) The sealing compound used in the old seals must be thoroughly removed. This old compound may be washed off more readily if KS-8372 trichloroethylene is applied immediately after the seal is broken. However, in some cases it may require scraping with the R-1060 putty knife. Remove any burrs on the surfaces to be sealed with the R-1051 file. Be sure that the sealing compound is also removed from the screw holes in the covers and blind holes in the gear case and bearing box. To remove the sealing compound from the blind screw holes, insert

the R-1005 screwdriver in the hole, and while holding the screwdriver in place, rotate the screwdriver blade in order to cut the compound loose. Take care in doing this not to damage the screw threads. Flush the loosened compound from the hole with KS-7860 petroleum spirits using the R-8950 syringe as covered in (4).

Caution: When using KS-8372 trichloroethylene, exercise care to avoid the use of excessive amounts. To avoid excessive evaporation, the cloths used with KS-8372 trichloroethylene may be thrown into a suitable closed container. If considerable usage of KS-8372 trichloroethylene is to be made at one location, use a fan to dissipate the fumes. Locate the fan so that it will direct a current of air toward the part being cleaned. The fumes from the cleaning fluid are heavier than air, and the use of the fan avoids the accumulation of the fumes in sufficient quantities to be objectionable.

(6) If leaking is due to a porous casting, it may be advisable to shellac the interior of the gear case or bearing box using the R-1021 brush. In some cases it may not be possible to perform this operation with the drive running. Take care to prevent the shellac from getting on the gear teeth and bearing surfaces. The gear case or bearing box must not be resealed until the shellac is dry.

(7) Stir the KS-6824 sealing compound thoroughly with a flat piece of hard smooth wood just before using it. Make sure that the surfaces to be sealed are thoroughly dry and free from oil before applying a liberal coat of the sealing compound. Apply the compound with the R-1021 brush. When the sealing compound is of such a consistency that it cannot be applied easily with the brush, thin it with KS-8372 trichloroethylene. Make up the joints as soon as the compound has been applied to the surfaces to be sealed. When using the compound it is not necessary to leave an interval of time between applying the compound and making up the joints. The pigment or thicker part of the compound does the sealing and the thinner part of the compound is only used as an aid in conveying the sealing material to the surfaces to be sealed. At this time check the oil closure clearance (requirement 2.08).

Caution: When sealing the lower half of the cover of link type alarm mechanisms, take care not to get the sealing compound on the fracture between the upper and lower halves of the cover as the sealing compound will cause interference when reassembling the parts.

(8) Apply the sealing compound to the screw threads with the KS-14164 brush taking care not to get the compound on the end of the screw. When setting up the screws, make sure that the part bears uniformly throughout its entire contact surface. This can be accomplished by making several rounds of the screws in tightening. Do not tighten completely the first time around.

(9) After sealing and securing the gear case or the bearing box insert the drain plug as covered in 3.03 and then fill the gear case or bearing box with oil to approximately the maximum limit specified in requirement 2.02. If leaking is noted, the joint will have to be broken and resealed in accordance with the foregoing procedures.

(10) After the sealing compound has hardened, touch up the joint with a quick drying paint that matches the finish.

(11) If it is necessary to remove the worm case housing due to leaking at the joints, examine the oil hole in the housing around the worm shaft to see that it is not clogged. Take care in remounting the worm case housing to insure that the worm gear fully engages its associated gear, also that the housing is so set that the coupling assembly of the motor will line up with the associated coupling assembly of the motor as shown in Fig. 12. This may be accomplished by coupling the motor to the drive before the mounting screws are fully set up. The housing can then be shifted to correct any misalignment. If it is necessary to shift the housing, check that the gear case cover rests flush with the housing so that the joint may be properly sealed, as covered above.

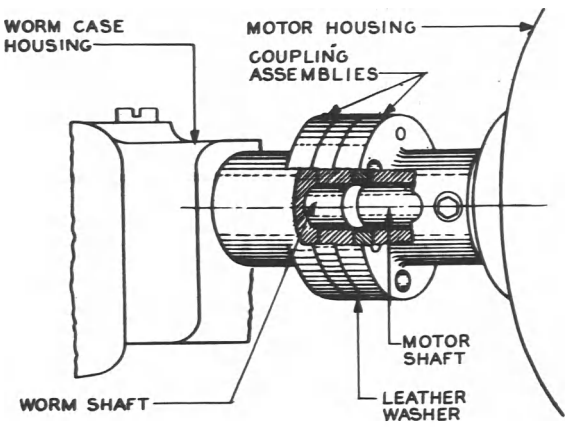

Fig. 12 - Alignment of Worm and Motor Shafts

(12) If the coupling assembly of a horizontal shaft has been removed remount it as covered in Section 159-735-701.

(13) Where oil leaks are noticed between the oil guard associated with the eccentric coupling and the gear case, the condition

may be corrected as follows. Stop the drive as covered in (1). Without removing the eccentric coupling guard, raise the oil guard as high as possible and thoroughly clean the bottom surface of the guard and top surface of the gear case with a KS-14164 brush saturated with KS-7860 petroleum spirits and wipe the parts dry with a KS-14666 cloth. Make sure that the oil guard rests evenly on the gear case. Then with another KS-14164 brush, apply a thick coating of KS-6824 sealing compound to the underside of the oil guard and the surface of the gear case on which the guard rests.

Note: The consistency of the sealing compound should be as heavy as application with the KS-14164 brush will permit and shall be liberally applied.

(14) Rotate the guard several times against the gear case to insure the sealing compound being distributed evenly all around the surfaces to be sealed. Then position the guard on the top of the gear case to insure that the oil guard does not touch the lugs of the eccentric coupling in any position and that the clearance between the oil guard and the eccentric coupling guard is satisfactory. Hold the guard in this position until the sealing compound has set.

(15) With the oil guard satisfactorily positioned, build up a bead of sealing compound around the sealed joint by additional applications of the sealing compound as shown in Fig. 13. Take care in doing this not to disturb the position of the oil guard.

Caution: Take care after sealing the joint between the oil guard and gear case that the position of the oil guard is not disturbed for approximately 24 hours as the heavy application of the sealing compound requires a long period to harden and shifting the oil guard will break the seal.

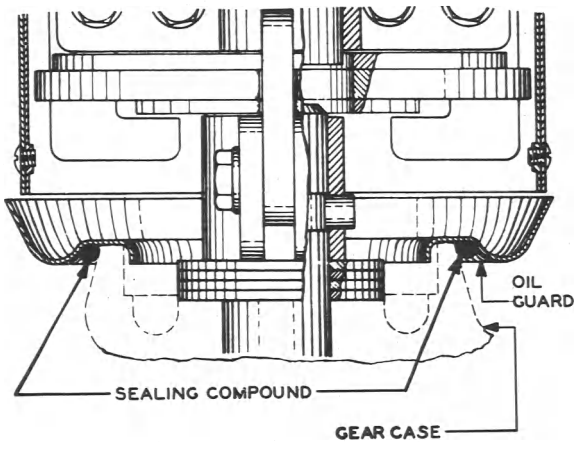

Fig. 13 - Sealing Oil Guard and Gear Case

(16) After the sealing compound has thoroughly dried, the sealed joint may be painted with a quick drying paint that matches the finish of the parts.

3.06 Leakage at Oil Closures (Rq 2.06)

(1) If there is evidence of oil leaking out of an oil closure, it is usually due to dirt accumulating in the clearance between the shaft and the oil closure lips. It may also be due to a lack of clearance between the lips and the shaft or to the oil return hole at the bottom of the lips being plugged.

(2) To gain access to the oil closures of gear case and bearing box covers, remove the shaft guard mounting screws with the No. 344 screwdriver or 4-inch regular screwdriver and remove the guard.

(3) Wipe off the outside of the gear case or bearing box with a KS-14666 cloth. If necessary also wipe off the metal portion of the cork roll as covered in 3.07(2). Do not use waste or cheesecloth for this purpose.

(4) Force KS-7860 petroleum spirits into the closure using the R-8950 syringe after which observe as far as possible that all dirt or lint has been removed. If dirt or lint is still present, again force the petroleum spirits into the closure and inspect. Repeat this operation until all dirt or lint has been removed.

(5) Immediately after flushing with the petroleum spirits empty the syringe and use it to force air into the closure. The purpose of this blowing operation is to effect the rapid evaporation of the petroleum spirits to prevent its acting as a conveyor of the oil inside the oil closure.

(6) It is not necessary to stop the drive to apply the above methods for cleaning provided precautions are taken to prevent the cloth from catching between the drive and the moving parts.

(7) If leakage at the oil closure in a cover continues, remove the cover as covered in 3.05 and clean the oil return hole at the oil closure. Remount the cover as covered in 3.05.

(8) After cleaning the oil closures, seal and remount the guard and the guard mounting screws, if provided, as covered in 3.05, (7) and (8).

(9) If oil leakage onto the metal portion of the cork rolls is excessive after cleaning the oil closures, it may be an indication that the drive is pumping air in which case replace the filling plug by one having a vent hole.

3.07 Treatment of Exposed Metal Portions of Cork Rolls (Rq 2.07)

(1) General: If any lubricant is observed on the metal portion of the cork rolls or if grease and dirt are present on the surfaces of the rolls adjacent to the gear cases or bearing boxes, clean them as follows.

(2) Metal Portion of Cork Rolls: Wrap a KS-2423 or KS-14666 cloth around the No. 358 cleaning tool in a spiral manner so that one end of the tool and about one half of the length of the tool is completely covered with the cloth. The loose end can be held with the hand or tied in place with a string. Saturate the cloth with KS-7860 petroleum spirits and press it firmly against the metal portion of the roll while it is rotating. One of the edges of the tool is rounded so that it will fit the oil groove in the roll shaft. Take care when cleaning this portion of the roll not to get the petroleum spirits on the cork surface. If this does occur, immediately clean the cork surface with KS-8372 trichloroethylene as covered in (4).

Caution: Take due precautions to prevent the cloth or fingers being pulled into the cork rolls.

(3) If the metal portions of the rolls have previously been coated with Superla wax, it may be necessary to use several applications of the petroleum spirits before all the wax is removed.

(4) Portions of Cork Roll Adjacent to Metal Portion: Locate the fan and coat the hands and wrists with Pro-tek or Practi-Kreme as covered in 3.01(2) and (3). Wrap a KS-2423 or KS-14666 cloth around the No. 358 cleaning tool as covered in 3.07(2). Saturate the cloth with KS-8372 trichloroethylene and press it firmly against the cork surface adjacent to the metal surface. Take care not to catch the cloth on the adjacent clutch.

Caution: Take due precautions to prevent the cloth or fingers being pulled into the cork rolls.

After the work has been completed, wash the hands and wrists as covered in 3.01(8).

(5) After the portions have been thoroughly cleaned, paint a coat of KS-14688 Superla wax compound on the metal portions with a clean R-1021 brush. Shake the bottle containing the compound thoroughly before each use so that all of the particles of the orange powder will be suspended in the liquid. The powder is used merely to aid in determining whether the compound has been applied to the roll ends. After this coat has thoroughly dried, apply a second coat over the first. Use care not to allow the wax to be deposited on the cork surfaces or within 1/8 inch of the gear case or bearing box.

3.08 Clearance Between the Shaft and the Oil Closure Lips of Gear Case or Bearing Box Covers (Rq 2.08)

(1) To check the clearance between the shaft and oil closure lips of the gear case or bearing box covers, proceed as follows. Stop the drive. Remove the guard mounting screws with the 4-inch regular screwdriver or loosen the screws with the No. 344 screwdriver and remove them with the 3-inch cabinet screwdriver and slide the guard back on the shaft. If the No. 74D gauge is used to check the requirement, rotate the shaft slowly by turning the motor coupling manually and at the same time attempt to insert the 0.003-inch blade of the gauge between the shaft and the oil closure lips at four points 90 degrees apart around the shaft. If the R-1026 gear case setting tool is used, remove the coupling, if used, as covered in 3.01 and slide the tool over the end of the shaft into the space between the shaft and the oil closure lips.

(2) If the clearance is not satisfactory, proceed as follows. Remove the cover screws as covered in 3.05. Clean and reseal the screws and surfaces of the cover and drive as covered in 3.05. If difficulty is experienced in cleaning the screws, replace them. Remount the cover, and insert and tighten the cover mounting screws finger tight. Before the sealing compound has set, shift the cover as required. If the gear case cover cannot be satisfactorily located, refer the matter to the supervisor. If the bearing box cover cannot be satisfactorily located, consider reaming oil closure lips as covered in Section 159-720-816. With the cover satisfactorily located, tighten the mounting screws securely. Tighten the assembly screws as covered in 3.05.

(3) If the coupling was removed, remount it as covered in Section 159-735-701.

3.09 Freedom of Operation of Rolls and Gearing (Rq 2.09)

(1) If the friction rolls appear to bind on their axes refer the matter to the supervisor.

3.10 Freedom of Operation of Worm Shaft (Rq 2.10)

(1) If the worm case housing feels abnormally hot to the touch, refer the matter to the supervisor as the bearing may have to be reamed as covered in Section 159-720-814.

3.11 Freedom of Operation of Motor (Rq 2.11)

(1) To remove a bind caused by poor alignment of the motor with the worm shaft, change the relative position of the motor

coupling head and drive coupling head either by shifting the position of the motor coupling, by shifting the motor bracket or by shifting the position of the drive.

(2) To shift the position of the motor coupling, loosen the motor clamp and slide the motor back. Turn the motor shaft 1/3 turn. This shifts the relative position of the coupling assemblies. Slide the motor back into place and tighten the motor clamp. Start the drive and check that the requirement is met. If there still is bind present, repeat the above operation until the best condition is obtained.

(3) If the bind cannot be removed in this manner, shift the motor bracket to a position in which the bind is removed provided the motor bracket is not pinned. If the bracket is pinned, refer the matter to the supervisor. If the bracket is not pinned, loosen the bracket mounting screws with the wrenches provided for the purpose and adjust the Bristo setscrews with the No. 296 Bristo setscrew wrench or the Allen hexagon socket setscrews with the R-2812 Allen socket screw wrench until the best position is obtained. Tighten the bracket mounting screws, then check the motor for bind by rotating the coupling slowly by hand.

(4) If bind is still present refer the matter to the supervisor as the gear case may have to be shifted.

3.12 Alignment of Shaft Connected Drives (Rq 2.12)

3.13 Drive and Clutch Alignment (Rq 2.13) (No procedure)

3.14 Location of Coupling Assembly on Drive Shaft (Rq 2.14)

3.15 Horizontal Distance Between Coupling Assembly on Drive Shaft and Motor Stop (Rq 2.15)

(1) Location of Coupling Assembly on Drive Shaft: If the clearance between the coupling assembly on the drive shaft and the cover is not satisfactory, loosen the Bristo setscrews or the Allen socket screws in the coupling assembly with the No. 295 Bristo setscrew wrench or the R-2485 Allen socket screw wrench respectively, and shift the assembly as required. Take care in making this adjustment that requirement 2.15 is met. Then securely tighten the setscrews or the socket screws.

(2) Horizontal Distance Between Coupling Assembly on Drive Shaft and Motor Stop: To check the horizontal distance between the drive coupling head and the motor stop, remove the motor from the bracket as covered in 3.11. Remove the leather washer from the coupling head. Loosen the clamp of the 12-inch combination square, place the long side of the head on a flat surface, and adjust the position of the blade in the slot so that the end is flush with the long side of the head. Then tighten the blade securely in place. Place the long side of the head against the face of the coupling and check the distance from the face of each motor stop as shown in Fig. 14. Revolve the coupling a half turn and recheck the distance.

(3) If the mean distance is not within the specified limits and the clearance between the coupling assembly on the motor shaft and the cover is satisfactory, refer the matter to the supervisor.

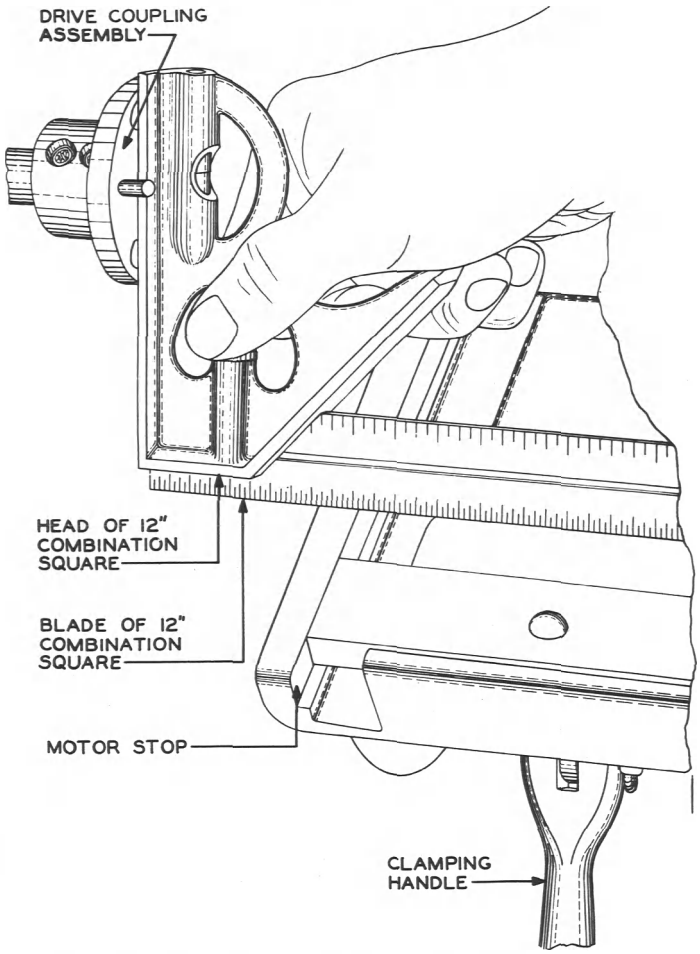

Fig. 14 - Method of Checking Horizontal Distance Between Coupling Assembly and Motor Stop

3.16 Motor Coupling Assembly Location (Rq 2.16)

(1) To check the location of the motor coupling assembly, remove the motor, place the long side of the head of the combination square against the face of the coupling and slide the blade of the square through the slot of the head until the end of the blade

touches the finished surface of the motor foot as shown in Fig. 15. Revolve the coupling a half turn and recheck the distance.

(2) If the mean distance is not satisfactory, loosen the Bristo setscrews with the No. 295 Bristo setscrew wrench or the Allen hexagon socket screws with the R-2485 Allen socket screw wrench, and shift the motor coupling assembly as required. Then tighten the setscrews or the socket screws securely.

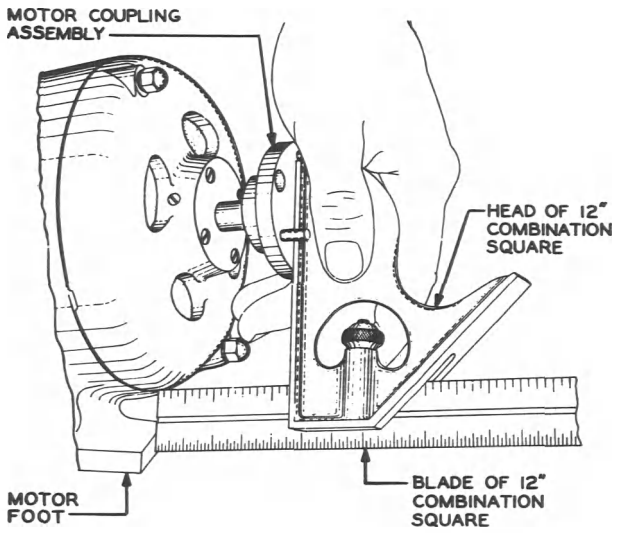

Fig. 15 - Method of Checking Motor Coupling Assembly Location

3.17 Clearance Between Guard Plates and Cork Rolls (Rq 2.17)

(1) Before checking the clearance between the guard plates and the cork rolls it will be necessary to remove the clutches from the front and rear of the frame that are located directly in front of each of the three guard plates. Then pass the R-2058 gauge around the cork roll and in front of the guard plates. This check should be made from both sides of the frame.

(2) If there is not sufficient clearance between the plate and the roll, refer the matter to a supervisor.

Procedures for Alarm Mechanism

3.18 Run and Stop Alarm Operation (Rq 2.18)

Procedures for Cast Weight-type Alarm Mechanism

3.19 Contact Pressure (Rq 2.19)
3.20 Spring Tension (Rq 2.20)
3.21 Contact Follow (Rq 2.21)
3.22 Contact Separation (Rq 2.22)
3.23 Plunger Pin Pressure (Rq 2.23)

Procedures for Link-type Alarm Mechanism

3.24 Contact Pressure (Rq 2.24)
3.25 Spring Tension (Rq 2.25)
3.26 Contact Follow (Rq 2.26)
3.27 Contact Separation (Rq 2.27)
3.28 Crosshead Position With Motor Running (Rq 2.28)
3.29 Position of Arms With Motor Stopped (Rq 2.29)

(1) Run and Stop Alarm Operation: If the alarm does not operate on or off at the proper speeds, proceed as follows.

(2) General: To check for contact pressure, spring tension, contact follow, contact separation, plunger pin pressure, cross head position with the motor running and the position of the arms with motor stopped, of both cast weight and link-type alarm mechanisms, it will first be necessary to remove the cover. On cast weight-type alarm mechanisms the cover is not sealed, remove the cover mounting screw with the 3-inch cabinet screwdriver and remove th ecover. On link-type alarm mechanism either the whole cover or, if the cover is split into two parts, the lower part of the cover, is sealed. Where the entire cover is sealed, remove the cover mounting screws with the No. 344 or 4-inch regular screwdriver and remove the cover and where only the lower part of the cover is sealed, remove the upper mounting screw with the 4-inch regular screwdriver and remove the cover. In some cases, however, it may be necessary to remove the entire cover to check and adjust for the requirements. After the contacts are satisfactorily adjusted, remount the cover. If on the link-type alarm mechanism, the cover is in one piece, split the cover as covered in Section 159-720-801.

(3) Contact Pressure, Spring Tension, Contact Follow and Contact Separation: Foreign matter wedged between the springs may prevent the springs from making contact. Remove the foreign matter with a clean toothpick which has been dipped in KS-7860 petroleum spirits. If the requirement is still not met, proceed as follows. Place the KS-7782 pliers on both the stop and contact springs just above the bend in the contact spring and slide it up to where the springs leave the clamping plates and insulators and adjust the springs to the right or left as required.

(4) If the desired pressure cannot be obtained by adjusting as covered in (3), place the KS-7782 pliers on the contact spring just above the bend in the spring and slide them back to where the spring leaves the clamping plates and insulators. Draw the pliers downward the length of the straight portion of the spring meanwhile applying pressure as required so that the

spring is formed into a slight gradual bow with the concave surface facing the associated spring. The magnitude of the bow to be formed in the spring must be learned by experience and should be such that when the final adjustment is made at the base, the spring will be approximately straight. Place the pliers on the stop and contact springs as covered in (3) and adjust as required.

(5) Do not straighten kinked springs unless the kink interferes with proper adjustment of the springs. Removing kinks tends to weaken the spring and to shorten its life. Normally straight springs that have been adjusted should have no sharp bends due to adjustment. A gradual bow not exceeding the thickness of the spring over its entire length is permissible.

(6) If after the above adjustments have been made, it is necessary to change the contact separation or contact follow, bend the spring slightly at the shoulder with the No. 485A pliers. In adjusting for contact follow of the stop alarm contact, take up the end play of the motor worm toward the motor coupling and spread the governor arms slightly. However, exercise care that when increasing the follow, the contact pressure is not more than the maximum specified. In no case should the bend be enough to make a visible kink in the spring. In making this adjustment it may be necessary to readjust as covered in (4).

(7) Plunger Pin Pressure (Cast Weight-type Alarm Mechanism): If the plunger pin touches the weight arm with sufficient pressure to cause it to rotate with the motor running up to speed, the retractile springs are tensioned too stiffly. Adjust them as follows.

(8) Remove one end of each of the two springs with the P-long-nose pliers and weaken each spring uniformly by stretching it with the pliers. Remount the springs and recheck the requirement.

(9) Cross Head Position With Motor Running (Link-type Alarm Mechanism): If the cross head does not rest against the end of the shaft with the motor running up to speed, it is an indication that the retractile springs are tensioned too stiffly. To decrease the tension of the retractile springs, adjust the brackets uniformly away from the cross head with the No. 485A pliers.

(10) Position of Arms With Motor Stopped (Link-type Alarm Mechanism): If the arms do not rest against the cross head with the motor stopped, it is an indication that the tension of the retractile spring is insufficient. To increase the tension of the retractile springs, adjust each of the four spring mounting brackets uniformly toward the cross head with the No. 485A pliers.