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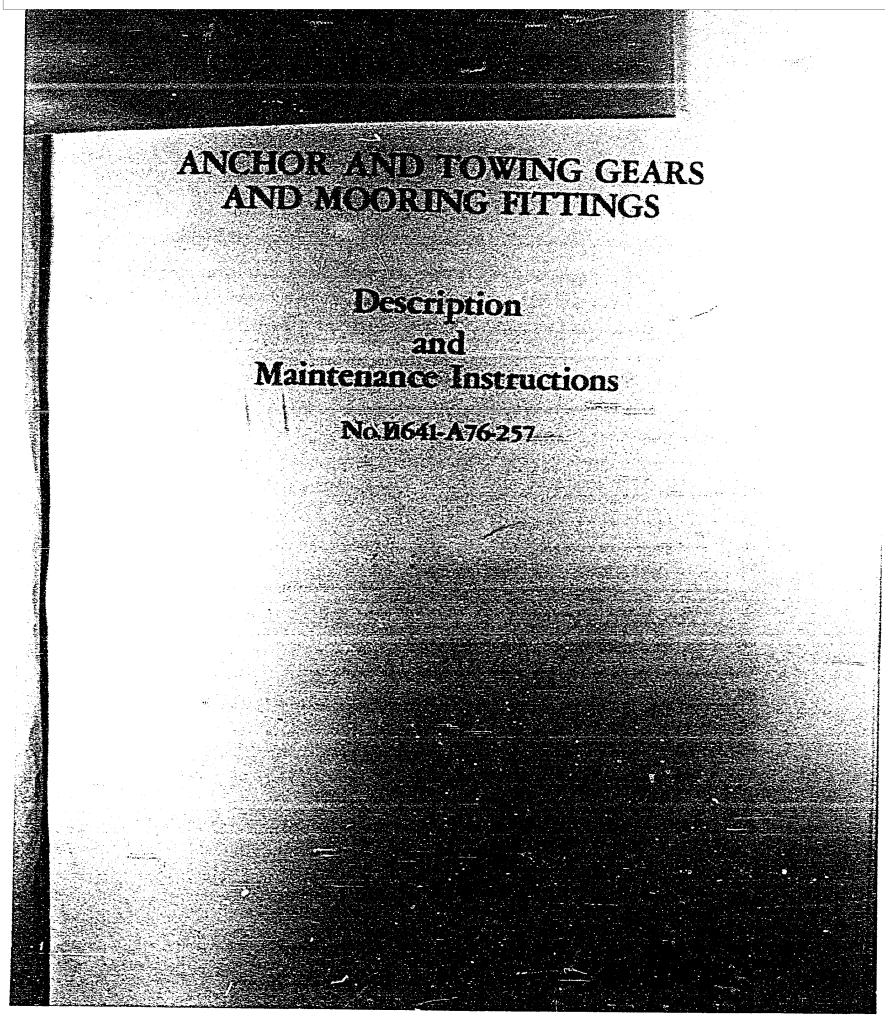


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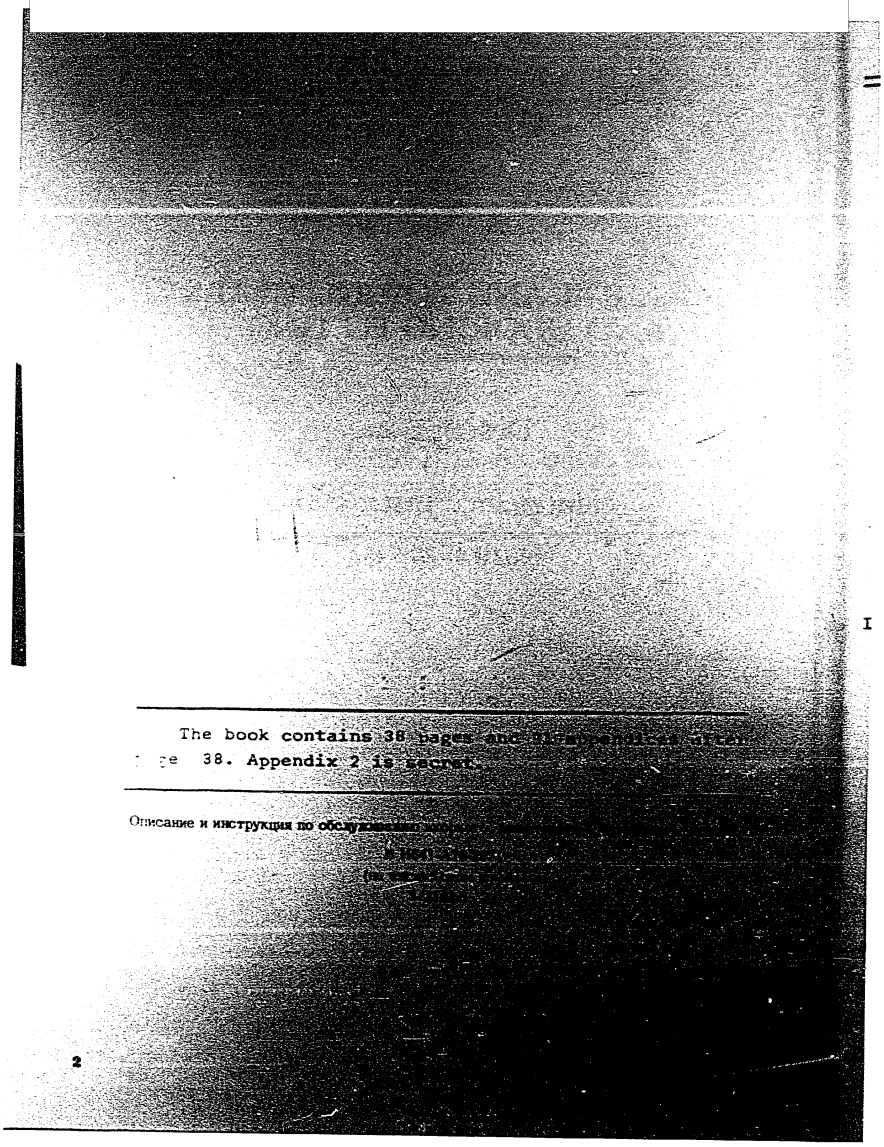

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# CONTENTS

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## A. PURPOSE AND SPECIFICATIONS

### 1. Anchor Gear

The anchor gear serves for dropping and hoisting the anchor from the submarine in the surface condition.

The anchor gear is actuated by an electrical anchor and warping capstan provided with an emergency hand drive.

The capstan can be controlled both from the deck and from the compartment.

The anchor gear specifications are:

| | |
|---|---|
| number of anchors, pc | 1 |
| anchor weight, kg | 1000 |
| calibre of anchor chain, mm | 31 |
| anchor chain length (of all 7 links), m | 176 |
| weight of anchor chain, kg | 3660 |
| maximum permissible anchoring depth, m | 60 |
| anchor hoisting speed (by capstan), m/min | 10 |
| anchor hoisting time (by capstan), min | ca.18 |

### 2. Mooring Fittings

The mooring fittings serve for laying up the submarine at mooring space.

The fittings are actuated both by the forward and after capstans.

Basic specifications of the mooring fittings are as follows:

| | |
|---|---|
| number of mooring ropes, pc | 4 |
| diameter of mooring rope (both forward and after ropes), mm | 19.5 |
| length of mooring rope, m | 100 |



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mooring rope heave-in rate:
by forward capstan, m/min ..... about 14
by after capstan, m/min ..... about 14

3. Towing Gear

The towing gear serves for securing and releasing the towing cable during submarine towage.

The maximum weight of the assemblies of the above-mentioned gears and fittings to be handled during repairs does not exceed 1116 kg, the maximum dimensions do not exceed 900 mm in dia. and the height does not exceed 2681 mm.

B. GENERAL AND DETAILED DESCRIPTION

1. Anchor Gear

(See Appendix 1)

The anchor gear consists of: bower anchor 9, anchor chain 4, electrical anchor and warping capstan, chain locker, screw stopper 5, guide rollers 3 and 7 and bitter end release 10. The bower anchor with turning flukes and a shortened shank is located in the starboard chain hawse near frames 1 and 5.

The anchor is secured to the anchor chain through swivel-clamp 8.

The bitter end of the anchor chain is secured to the hook of the bitter end release in the locker. It is released from the forward compartment by means of hand drive 11 installed on the end domed bulkhead. When the anchor is dropped or hoisted, the chain movement is directed by guide roller 7 and fair-lead roller 3 and finally stopped by screw stopper 5.

The screw stopper is controlled by a drive comprising hinged shafts 2 and 16, bevel drives 6 and 1 and hand drive 13.

Twin bevel drive 1 actuates screw stopper 5 both from the compartment and from the superstructure deck.

The wheels of the bevel drives are lubricated periodically with grease and the shafts of the bevel drives are lubricated by means of screw-cap lubricators.

Between the screw stopper and the locker the chain passes through a trough to the anchor and warping capstan chain grab mounted on the center line between frames 9 and 10.

The anchor and warping capstan consists of drive 12 mounted in the pressure hull and head 15 mounted in the superstructure.

The capstan is provided with a special indicator of the length of the veered-out chain and with band brake drive 14.

When the anchor is dropped, it goes to the bottom under its own weight with the electric motor switched off and with the chain movement being controlled by means of the band brake.

But the anchor may be also veered to the bottom with the help of the electric drive.

The anchor is hoisted by means of the capstan and the electric motor or with the help of the emergency hand drive.

2. Mooring Fittings

(See Appendix 2)

The mooring of the submarine is ensured by four reels 22 supplied with mooring ropes. The reels are mounted on the center line under the superstructure deck: two reels in the forward part in the vicinity of frames 15 - 24 and two reels in the after part in the vicinity of frames 105 - 116.

While mooring, the rope is directed by four pairs of warping guides 20 mounted along the sides: two pairs in the forward part of the superstructure in the vicinity of frames 7 and 23 and two pairs in the after part of the superstructure in the vicinity of frames 104 - 116.

The warping guides are retracted inside the superstructure and secured for sea.

While mooring, the ropes are secured to eight bollards 21 also retractable inside the superstructure in the secured for sea position.

The bollards are installed in the following places:

two - in the vicinity of frames 15 - 19, starboard, two - in the vicinity of frames 18 - 19, port side, in the forward part of the superstructure and four bollards - in the after part of the superstructure with two pieces on either side in the vicinity of frames 112 and 113.

While mooring, the ropes are heaved in by the warping of capstan 23 or by after warping capstan 18 installed in the after part in the vicinity of frames 106-107.

When the warping ends are removed from the capstans, the holes in the superstructure deck are protected by covers.

On both sides in the conning tower sail provision is made for four collapsible cleats 19 designed to secure the gangway, soft fenders, boat or a motor boat. The cleats are arranged as follows: two in the forward part of the superstructure in the vicinity of frames 44 - 46 and two in the after part of the superstructure in the vicinity of frames 67-70.

3. Towing Gear

(See Appendix 3)

a) Forward Towing Gear

The forward towing gear is located at the end of the bow superstructure and consists of towing hook 27, towing strop 28 for connecting the towing cable with the hook, pneumatic mechanism 29 for casting off the towing cable with compressed air and drive 32 for manually casting off the towing cable.

In the secured for sea position the towing strop is attached to the deck by means of special lugs 30 and tightened by tension adjusting gear 31 mounted in the vicinity of frames 11 - 13.

Before towing, the cable cast from another ship is secured to the thimble of the towing strop.

When towing, the towing cable together with its strop is cast off the hook either by the pneumatic mechanism or by hand.

b) After Towing Gear

The after towing gear is installed in the vicinity of frames 142 - 143. It is designed for turning the submarine and for towing it in narrow places.

The gear consists of the towing clamp welded to the deck and of towing gear hook 24 (See Appendix 2).

In the secured for sea position the towing hook is kept in the compartment.

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Screw Stopper
(See Appendix 4)

The screw stopper takes the load off the anchor chain by making the projections of the turning grips installed on the axles of the brake block engage the chain links.

The stopper is controlled by means of the screw drive both from the compartment and from the deck.

The stopper consists of block (body) 36, two grips 37, shaft 39 with left-hand and right-hand threads and of sliding nuts 40.

Steel cast block (body) 36 has a groove to guide the chain, bushes to secure the axles of the turning grips and supporting lugs for securing to the base.

Steel cast grips 37 have the shape of double-arm levers easily turned about pins 38.

The longer ends of the grips terminate in forks for connection with the trunnions of the sliding nuts screwed on shaft 39.

When shaft 39 is turned in either direction, the longer ends of grips 37 are displaced, thus making the projections of the shorter ends either engage or disengage from the chain links.

Periodically the stopper sliding nuts are lubricated with grease and the grip pin is lubricated with the help of pressure lubricator 41.

Screw Stopper Hand Drive
(See Appendix 5)

The hand drive of the screw stopper is installed on the ceiling of the forward compartment. It consists of steel cast body 47, brass shaft 48 with indicator nut 52 and handle 53.

The misalignment of the rod is limited by a bead and union nut screwed on the upper end of the body. The sealing of the rod in the body is ensured by gland 49.

When the rod is turned, indicator nut 52 screwed on it is displaced and in the extreme positions marks the engaged and disengaged positions of the stopper on indicator column 51.

The rod is lubricated by means of screw-cap lubricator 46.





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## Bitter End Release

(See Appendix 6)

The bitter end release consists of slip hook 59 which [illegible] turns around pin 58 secured in bracket 57, stopper 61 connected with nut 62, threaded shaft 63 and actuating shaft 65.

Slip hook 59 is fixed with stopper 61 which turns freely around pin 60.

When the shaft is turned, the nut screwed on it pulls the end of the stopper, connected with it, making the stopper turn and release the hook end. The tightened anchor chain makes the hook turn around pin 58 and release the chain.

Shaft 63 is mounted in the bush of sleeve 64 and its outlet from the locker is sealed with a gland packing.

The hand drive installed in the compartment is connected with shaft 63 through actuating shaft 65.

The hand drive consists of: steel cast sleeve 67, shaft 66 whose outlet from the pressure hull is sealed with gland packing and handle 68 sealed in the position when the chain is on the [illegible].

## Anchor and Warping Capstan

The anchor and warping capstan consists of two major units: a drive and a head. The head is mounted on a special base plate in the superstructure and consists of a body, planetary clutch with hand brake, hollow shaft with chain drum, warping end shaft passed through the hollow shaft, detachable warping end and the drive for the veered-out chain length indicator.

The head is connected with the capstan drive through an elastic clutch mounted on the shaft of the warping end.

The drive is secured through the base plate to the ceiling in the compartment. It consists of an electric motor, electromagnetic brake, emergency hand drive, two-stage planetary reduction gear and of the veered-out chain length indicator.

a) Electromagnetic Disc Brake

(See Appendix 7)

The electromagnetic disc brake serves for automatic braking





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of the drive when the electric motor is stopped and for tripping the drive after the electric motor is started.

The brake is mounted in welded body 74 whose upper flange is secured to the housing of the planetary reduction gear. It consists of driven half-clutch 77, case 84 with knurling made of friction material "Ferrodo", forked lever 83 and electromagnet 79.

The driven half-clutch mounted on the shaft of the planetary reduction gear is coupled with the driving half-clutch through the pins provided with rubber shock-absorbing rings. The half-clutch carries bevel gear wheel 75 of the emergency hand drive.

The brake case is hinged to the pins of lever 83 and is permanently pressed to the end face of the driven half-clutch by eight springs 85 installed in the seats of the case. The springs are compressed by the adjusting bolts screwed into the body.

Lever 83 is easily turned around pins 81 secured to the body and its longer end is hinged with the armature of the electromagnet.

As soon as the electric motor is started, the current flowing through the electromagnet winding connected in parallel with the electric motor builds up magnetic field which pulls the electromagnet core into the body.

Since the electromagnet core is pulled upwards, it will turn lever 83 around pin 81 pushing case 84 off the driven half-clutch, thus releasing the drive.

As soon as the electric motor is switched off, the current flow in the circuit vanishes and the magnetic field vanishes too, thus releasing the core of the electromagnet. Case 84 being actuated by springs 85 and under the weight of the electromagnet armature is pressed with its knurled side against the end face of the driven half-clutch, thus braking the drive.

When the anchor is hoisted in case of emergency by means of the hand drive, the drive is released manually by forcing the longer end of lever 83 upwards and locking it in the body with rod 82.

b) Emergency Hand Drive

(See Appendix 7)

The emergency hand drive serves for hoisting the anchor in case of emergency.

The drive is mounted within the frame of the electromagneti brake. It consists of chain wheel 80 with a closed chain, ratchet 76, bush 73 and shaft 72 with a bevel wheel.

The hand drive is engaged by shifting bush 73 together with shaft 72 and the smaller bevel wheel till it engages bevel wheel 75. The extreme positions of the shaft corresponding to the engaged and disengaged positions of the hand drive are fixe by the screws driven into the body and the holes in bush 73.

When the emergency hand drive is used, the reverse movement of the capstan drive is made impossible by the ratchet device including ratchet 76 mounted on the shaft and pawl loaded with spring 78 secured to bush 73.

Bush 73 is fixed in place by a key.

The friction surfaces of the hand drive are lubricated by means of the screw-cap lubricator.

c) Planetary Reduction Gear

(See Appendix 8)

The planetary reduction gear is of a two-stage coaxial type with two spur gear wheels.

The inner cavity of steel forged body 102 has two gear rims with internal teeth forming one piece with the body and diaphragm 100 pressed into it.

The body is provided with two steel cast covers 89 and 94.

Shaft 97 is mounted in the guide bushes of cover 94 and in the body of carrier 98; it is sealed with a rubber cup.

The shaft carries central gear 96 engaging three satellites 101 of the reduction gear first stage.

Satellites 101 together with the ball bearings press-fitted on them are mounted on pins 99 secured to body 98 and cover 95 of the first stage carrier.

The shank of the first stage carrier mounts central gear 93 fixed in place with a key and engaging three satellites 90 of the reduction gear second stage.

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The satellites are mounted on pins 91 housed in cover 104 and body 92 of the second stage carrier. The shank of the second stage carrier is connected with the shaft of the capstan head warping end through a flexible coupling.

When the central gears are turned, the engaging satellites run on the fixed gear rims with internal teeth and pull the carriers, thus reducing the number of revolutions.

The gear wheels and the bearing bushes of the reduction gear are lubricated with the oil filled directly into the reduction gear body. The oil level is checked with indicator 105.

d) Forward Capstan Head

(See Appendix 9)

The housing of the capstan head consists of steel cast base 110 and welded pedestal 119. Supporting bush 109 designed to guide warping end shaft 126 is pressed into the hub of base 110.

The protruding cylindrical part of the hub is finished with non-ferrous alloy and serves as a support trunnion for brake drum 111 of the planetary clutch.

The second support for the drum of the planetary clutch is located in the middle portion of the pedestal; the upper part of the pedestal mounts bearing body 121 for shaft 118 of chain drum 120.

Bearing body 121 houses a band stopper retaining the shaft of the chain drum when the capstan operates for the warping end. When the capstan is used to rotate the warping end, the band stopper should be pressed and during all other operations it should be released.

The capstan head mounts the actuating shafts [illegible] out chain length indicator and for the band brake.

The chain drum is provided with conical guard [illegible] troughs taking away the mud flowing off the chain.

The planetary clutch is located in the drum [illegible] head and consists of brake drum 111 rotating [illegible] and on trunnion 110 of the base, gear [illegible] gear wheel 115 with internal teeth, of [illegible] on the shaft of the warping end, three [illegible]



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gear 108 and wheel 115. Every satellite is mounted on separate pin 113 secured to cover 112 and body 116 of the carrier.

The carrier is spline-connected with hollow shaft 118 of chain drum 120 rotating in the bush of brake drum 111 and in bearing 121. The upper part of shaft 118 carries pulley 133 of the band stopper and chain drum 120.

Inside hollow shaft 118 provision is made for the supporting bushes designed for the hub of warping end 123 and shaft 126. Warping end 123 is connected with shaft 126 via a key and its misalignment is limited by shaft 122 screwed into the seat in the end face of shaft 126.

The gear wheels of the planetary clutch are lubricated by applying grease directly through the detachable hatches in the pedestal diaphragm and through the holes in drum cover 111.

All other friction surfaces are lubricated by means of a screw-cap lubricator. The access to the lubricators is ensured through the slots specially provided for this purpose.

The band brake serves for stopping brake drum 111 when the anchor is being hoisted and for slowing down the movement of the chain when the anchor is dropped under its weight.

The band brake consists of steel band 135 enveloping the clutch drum (angle of contact about 630°), threaded rod 136, bevel drive 137 and actuating shaft 129 with bearings and gland sleeve 130.

The running-in end of the band is secured to the bracket mounted on the head body and the running-off end of the band is connected with the bevel wheel of drive 137 through the threaded rod.

The upper end of actuating shaft 129 terminates in a square designed to control the brake from the upper deck. The lower end passes through sleeve 130 to the compartment and terminates in handwheel 131.

The veered-out chain length [illegible] tical shaft mounted in sleeve [illegible] partment is sealed with [illegible] nut 133 screwed on [illegible] ged actuating shaft.





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Outside the pressure hull the shaft carries spur gear wheel 128 engaging the gear wheel mounted on the hollow shaft of the chain drum through the idler gear wheels.

The forward capstan may be used to perform the following operations:

to drop the anchor under its own weight;

to drop and hoist the anchor by means of an electric motor;

to hoist the anchor by hand;

to bowse the submarine to the pier while mooring.

To drop the anchor under its own weight, it is sufficient to release the screw stopper and release the band brake.

The chain is pulled out of the locker by the weight of the dropping anchor.

In this case the chain drum does not interfere with the dropping of the chain since the satellites run freely around the fixed central gear wheel of the planetary clutch pulling the brake drum. The fixed position of the central gear of the clutch as well as of the whole drive is ensured by the electromagnetic disc brake.

The rate at which the chain is veered out is controlled by slowing down brake drum 111 with the band brake.

To drop or hoist the anchor by means of the electric motor, it is sufficient to release the screw stopper with the band brake in the pressed position and switch on the electric motor. Depending on the direction of rotation of the electric motor the anchor will be either hoisted or dropped.

In this case the warping end shaft is rotating idle.

To hoist the anchor by hand, it is necessary to engage the hand drive with the band brake in the pressed position to release the disc electromagnetic brake and press off the screw stopper with the help of the chain on wheel 80 (See Appendix 7).

While mooring, screw stopper 5 (See Appendix 1) of the anchor chain remains pressed, the band brake is released and the electric motor is switched on in the required direction of rotation.

In this case warping end shaft 126, central gear 108, satellites and the brake drum are rotating. Carrier 116, shaft 118, chain drum 120 and the anchor chain remain motionless.



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## Warping Capstan

The warping capstan consists of two main units: head and a drive.

The head is mounted in the superstructure on the boss welded to the pressure hull.

The drive is secured to the base installed on the ceiling in the compartment. It consists of an electric motor and of a worm self-braking reduction gear interconnected through an elastic coupling and mounted on one base frame.

a) Worm Reduction Gear

(See Appendix 10)

The worm reduction gear consists of steel cast body 142 split in the horizontal plane, worm 145 and worm wheel 141. The worm is mounted in the body in two sleeves 144 and 146 on roller bearings. The end of the worm shaft protruding from the body is sealed in sleeve 146 with a gland. The worm wheel consists of a steel hub and a bronze rim. Wheel 141 is mounted in the body on the bronze bushes.

The worm pair and the lower support of the wheel are lubricated with oil filled directly inside the reduction gear body. The upper support is lubricated with grease by means of a screw-cap lubricator.

The oil level in the reduction gear body is checked by means of oil level indicator 143. For filling and draining the oil the body is provided with plugs.

The hand drive of the capstan is made in the shape of a detachable chain wheel with a closed chain. It is installed for the time when it is supposed to be used on the end of the electric motor shaft.

b) After Capstan Head

(See Appendix 11)

The welded pedestal of the capstan head consists of cast welded base 155, body 154 and upper flange for bearing 151. Pressfitted into the base hub is a bronze bush to guide the shaft and to house a gland.

The body of bearing 151 accommodates the pressed-in bushes designed to guide the upper end of shaft 153 and the hubs of warping end 150 which is keyed to the shaft and fixed in place by threaded shaft 157. The warping end shaft is protected from misalignment by the bead and limiting ring 152. The supporting bushes are lubricated by means of the screw-cap lubricators.

### Controller Drives
(See Appendix 12)

The drives of the forward and after capstan controllers are similar in design.

The controllers are mounted on the frames installed on the ceiling by means of shock absorbers. Twin bevel drive 165 allows control of the controllers both from the compartment and from the upper deck.

Deck socket 167 is connected with the bevel drive through elastic clutch 164 and hinged actuating shaft 162.

The shafts are lubricated with grease by means of the screw-cap lubricators and the engagement of the bevel gear wheels is lubricated with grease periodically packed into the body of the bevel drive when its cover is removed.

### Supports for Warping Ends
(See Appendix 13)

For securing the warping ends removed from the capstans in the forward and after parts of the superstructure provision is made for supports 172 of tubular cross-section with guide bushes 173 and nuts 171 for locking the warping ends.

The supports are installed on the pressure hull in the superstructure. The warping ends are secured for sea by the threaded shafts installed on them.

When the warping ends are installed on the capstan, the supports are used for the covers taken off the end faces of the capstan shafts.

### Mooring Rope Reel
(See Appendix 14)

The mooring rope reel is actually welded drum 177 with discs 178 and trunnions 181 designed for securing it in bear-

ings 179. Locking lever 183 keeps the reel from spontaneous rotation. The bearings are lubricated by means of screw-cap lubricators 180.

Telescopic Bollard
(See Appendix 15)

The telescopic bollard consists of two tubes 187 and 188 moving one inside the other. The direction of movement of inner tube 187 with a blind flange on top is ensured by supporting bushes 189 press-fitted inside outer tube 188.

Screw 190 sliding along the longitudinal slot of the outer tube keeps the inner tube from turning and when the inner tube is raised, the screw enters a lateral slot and serves as a support for the inner tube in the upward position.

Warping Guide
(See Appendix 16)

Steel cast body 197 of the warping guide is provided with three lugs. Two of them bolted to the base hinges serve as an axle for the guide and the third is designed for securing the guide with rod 196 in the working position for mooring.

After the rod is extracted, the guide is secured under the deck for sea.

The upper part of the warping guide body is provided with collapsible trunnion 198 freely rotating on axle 199 and fixed with rod 194. Rods 194 and 196 are secured to the body with cables 195.

Collapsible Cleat
(See Appendix 17)

Collapsible cleat 203 is easily turned around bolt 207 but in the working position it is fixed with rod 204.

The rod and bolt are attached to two shoes 205 welded to the skin.

The cleat collapses under the deck and is secured for sea by rod 204 to stopper plate 208.

T o w i n g  H o o k
(See Appendix 18)

The towing cable is attached to hook 217 freely turning around axle 216 secured to bracket 212. The end of the hook is engaged by shaped lever 215 mounted on axle 214 in the same bracket.

The other end of shaped lever 215 is stopped by the lug on release lever 213 hinged to bracket 212. The ear on the release lever serves for the connection of the fork of the pneumatic mechanism cable. The pneumatic mechanism as well as bracket 212 are bolted to the bow extremity framing.

P n e u m a t i c  M e c h a n i s m
(See Appendix 19)

The pneumatic mechanism consists of case 222, piston 223 and union nut 221.

When the compressed air is supplied under the piston, the rod is displaced to the left pulling cable 225 and releasing lever 213, thus releasing lever 215 that engages hook 217 (See Appendix 18).

The tightened towing cable opens hook 217 (See Appendix 18) and releases the end of the cable.

At the moment when the towing cable is released, the air from the pneumatic mechanism is relieved through the holes in the case specially provided for this purpose. The rod is lubricated by means of a screw-cap lubricator.

T e n s i o n  A d j u s t i n g  G e a r
(See Appendix 20)

One end of the towing strop is attached to the hook and the other to a special tension adjusting gear installed on the deck. It consists of base 232, tension fork 233, a rope with thimbles and rod 234.

To attach the free end of rope 231, it is passed through the thimble of the towing strop into the fork and finally secured with a rod.

After that, the rope tension is adjusted with nuts.

To release the strop end attached to the deck, remove the rod of the tension rope.

## After Towing Gear

(See Appendix 21)

Towing clamp 244 is welded to the skin of the outer hull in the vicinity of frame 143. Bracket 246 is mounted on pin 243 in the towing clamp.

Pins 247 and 248 in the bracket carry collapsible hook 238, lever 239 and handle 242.

The lever and the handle are interconnected with spring 240. When the submarine is towed, the thimble of the towing cable is attached to hook 238 locked with the lug of lever 239.

The position of the lever is fixed by the lug on handle 242.

While releasing the towing cable, the handle is turned around pin 245 with the help of hand release rope 241, thus pulling lever 239.

The tightened towing cable makes hook 238 collapse and release the cable.

In the secured for-sea position the hook together with the hand release rope are kept in the after compartment.

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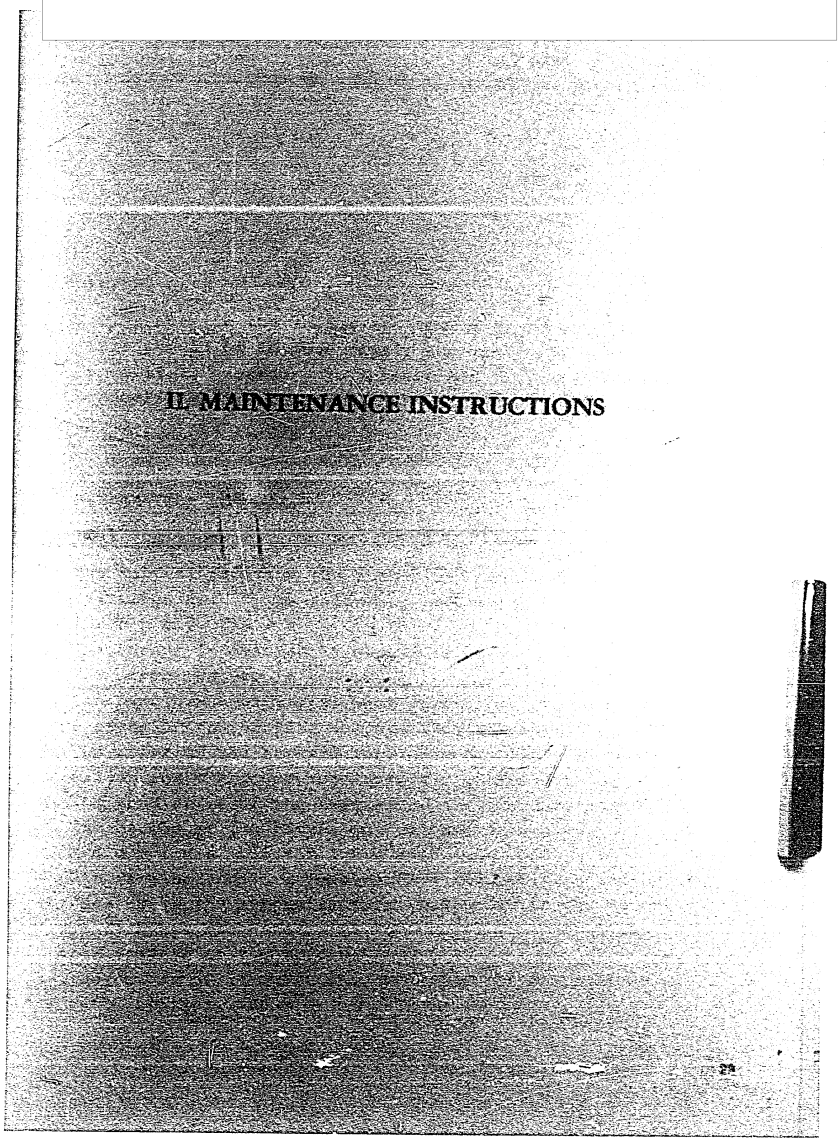




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A. GENERAL CARE

1. During service the anchor and towing gears and the mooring fittings should be in good repair and ready for use. For this purpose it is necessary to inspect and test them periodically as specified in Subsections "C" and "F" of the given Instructions.

B. PREPARATION FOR USE

Initial Position

In the initial position the anchor and towing gears and the mooring fittings are in the following positions:

a) A n c h o r G e a r

2. The anchor is hoisted in the hawse.

3. The screw stopper is pressed.

4. The band brake of the forward capstan is pressed while the band brake of the warping end shaft is released.

5. The drive of the forward capstan controller is in the zero position and the power supply to the controller is cut off.

6. The hand drive of the forward capstan is disengaged.

7. The handle of the bitter end release is sealed.

b) M o o r i n g F i t t i n g s

8. The warping ends are removed from the capstans and secured for sea under the superstructure. The holes in the superstructure deck are protected with the covers screwed to the shaft ends instead of the warping ends.

9. The drives of (forward and after)capstan controllers are in the zero position. The power supply is cut off.



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10. The mooring ropes are reeled, and the reels are [illegible] with the levers.

11. The collapsible warping guides are secured for [illegible] the deck.

12. The collapsible cleats are under the deck.

c) T o w i n g  G e a r

13. The towing cable is attached to the hook.

The stopper is ready for release.

14. The valve in the air supply line of the pneumatic [illegible] nism is in the CLOSED (ЗАКРЫТО) position.

Preparation for Use

a) A n c h o r  G e a r

15. Inspect the anchor paying special attention to the joints of the flukes with the anchor shank (because pieces of rock may cause fluke wedging).

16. Inspect the anchor gear from outside to make sure that it is in good operating condition and that there are no objects obstructing the movement of the chain or near the capstan.

17. Inspect the bitter end release and make sure that in case of necessity the chain can be quickly and easily released.

b) M o o r i n g  F i t t i n g s

18. Remove the covers protecting the holes in the superstructure deck from the capstan shafts.

Take the warping ends from the supports on which they are secured for sea, install them on the capstan shafts and fix them.

Screw the removed covers on the warping end supports.

19. Examine the mooring fittings from outside to make sure that they are in good operating condition and that there are no objects obstructing the movement of the ropes or near the capstans.

20. Prepare the mooring ropes and examine them.

Set the bollards, collapsible warping guides in the operating position and fix them.

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c) T o w i n g  G e a r

21. Check if the towing hook with the towing strop attached to it is locked and check the release assemblies.

Release the end of the towing strop attached to the deck.

C. STARTING, MAINTENANCE DURING USE AND STOPPING

a) D r o p p i n g  t h e  A n c h o r  U n d e r  I t s  O w n  W e i g h t

22. Check if the screw stopper and the band brake are pressed, if the power supply to the controller is cut off and if the band stopper of the chain drum shaft is released.

Check the functioning of the electromagnetic brake by manually lifting and lowering the longer end of lever 83 two or three times.

23. Release the screw stopper.

24. Gradually release the band brake for the necessary amount and check the rate at which the anchor chain is paid out. Adjust the rate by smoothly pressing (without jerks) the band brake: it should not exceed 1 - 1.5 m/sec.

25. Check the length of the veered-out chain by the marks on the chain or by means of the indicator installed in the compartment (see the diagram of marks on the anchor chain shown in Appendix No.1).

26. After the anchor is dropped, press the band brake and then the screw stopper.

N o t e : When the submarine manoeuvres with the dropped anchor (to moor alongside), the anchor chain is paid out additionally with the help of a band brake.

b) D r o p p i n g  t h e  A n c h o r  w i t h  E l e c t r i c  M o t o r

27. Check if the band stopper is released and if the screw stopper and the band brake are pressed. Make sure that the controller drive is in the zero position. Check the functioning of the electromagnetic brake according to Item 22 of the given Section.





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Cut in the power supply to the controller.

28. Release the screw stopper.

29. Gradually shift the handle of the controller drive to the extreme position PAY AWAY (ТРАВИТЬ), pay out the chain for the necessary length and then shift the handle of the drive to the zero position again; cut off the power supply from the controller and press the screw stopper.

N o t e : Start and stop the electric motor in accordance with the Maintenance Instructions for the electric drive.

c) H o i s t i n g t h e A n c h o r

30. Inspect the anchor gear to make sure that it is in good operating condition and there are no objects obstructing the movement of the chain or near the capstan.

31. Check if the band brake is pressed. Make sure that the controller drive is in the zero position. Check the functioning of the electromagnetic brake (as directed in item 22 of this Section) and of the screw stopper (by releasing and pressing the stopper).

Cut in the power supply to the controller.

32. Prepare the hose for flushing the anchor and the chain.

33. Release the screw stopper.

34. Start the capstan and tighten up the anchor chain at low speed of the electric motor (with the controller in position I).

N o t e : Do not let the submarine have the way on till the anchor has cleared the bottom.

35. Gradually shift the handle of the controller drive to the extreme HEAVE IN (ВЫБИРАТЬ) position and pay out the anchor chain washing the slime off the chain with the water stream from the hose.

N o t e s : 1. At the moment when the anchor clears the bottom, the electric motor may be stopped in the energized condition for not more than 1 min.

2. With the controller in the intermediate position, the electric motor can operate continuously for not more than 3 min.

36. As the anchor approaches the hawse, shift the control... to the zero position. After that, hoist the anchor by swit...





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over the controller to the 1st operating position for a short period of time.

37. Before the anchor is pulled into the hawse, wash the anchor with water and then pull the anchor into the hawse by switching on the capstan for a short period of time and see to it that the flukes freely enter their seats fitting closely the hawse.

N o t e : If the washing of the anchor requires much time, it is necessary to press the screw stopper and after washing pull the anchor into the hawse as instructed in Items 36 and 37 of this Section.

38. Press the screw stopper and cut off the power supply from the controller.

d) H o i s t i n g t h e A n c h o r w i t h H a n d D r i v e

39. Fulfil the requirements specified in Items 30 - 32 of this Section but do not cut in the power supply to the controller.

40. Check to see if the band brake is pressed and if the power supply to the controller is cut off. Check the functioning of the screw stopper by releasing and pressing the stopper.

41. Engage the emergency hand drive. Make the disc electromagnetic brake release and lock lever 83 with rod 82.

42. Release the screw stopper and hoist the anchor by turning the chain wheel of the hand drive and wash the chain with the water stream from the hose.

43. As the anchor approaches the hawse, wash it and pull into the hawse paying special attention to the fact that its flukes freely enter their seats and fit closely the hawse.

44. Press the screw stopper, engage the disc of the electromagnetic brake and disengage the hand emergency drive.

e) B i t t e r E n d R e l e a s e

45. When it is impossible to hoist the anchor, but when it is urgent to let the submarine have the way, break the chain link nearest to the stopper provided the situation permits it in order not to loose the whole chain.



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46. If the situation does not permit breaking the nearest link of the chain, release the screw stopper and the band brake and release the chain bitter end from the hook by turning the handle of the bitter end release, having broken the seal.

f) M o o r i n g t h e S u b m a r i n e

When the submarine is to be moored by means of the electric drive, do as follows:

47. Check to see if the screw stopper is pressed and release the band brake. Press the band stopper of the warping end.

48. Make sure that the controller drive is in the zero position. Cut in the power supply to the controller and make the capstan mechanism run idle.

49. Pass the end of the mooring cable through the corresponding warping guide to the mooring bitts and secure it to them.

50. Pass the mooring cable through the warping end (at least three turns).

51. Switch on the capstan by shifting the controller handle from the zero position to the third position in the direction of PAY AWAY or HEAVE IN (depending on the direction in which the warping end should be turned) to pull the submarine to the pier.

N o t e : With the controller in the third position, the capstan may be used continuously for not more than 10 min.

52. After the submarine is moored, stop the capstan and secure the cable to the bitts. Cut off the power supply from the controller, apply the band brake of the planetary clutch, release the band stopper of the chain drum, remove the warping end, take it to the superstructure and secure it for sea on the support.

Put a cover on the capstan shaft to protect the hole in the superstructure deck.

When the submarine is to be moored with the after capstan by means of the electric drive, proceed as follows:

53. Perform all the operations listed in Items 48 through of this Section.

54. Switch on the capstan by shifting the controller han to the sixth position either in the direction of PAY AWAY HEAVE IN and moor the submarine.





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55. After the submarine is moored, stop the capstan and secure the cable. Cut off the power supply from the controller. Take the warping end off the shaft and secure it for sea in the superstructure. Put the cover on the capstan shaft.

When the submarine is to be moored through the after capstan by means of the emergency hand drive, do the following:

56. Put the chain wheel together with the chain onto the shaft of the electric motor and run the capstan mechanism.

57. Perform the operations listed in Items 49, 50 of this Section and turn the capstan in the required direction by means of the hand drive.

58. After the submarine is moored, secure the cable to the bitts, remove the chain wheel and the warping end. Secure the wheel and the warping end for sea.

Put the cover onto the capstan shaft to protect the hole in the superstructure deck.

g) T o w i n g  t h e  S u b m a r i n e

59. Attach the end of the towing cable cast from the tugboat to the thimble of the towing strop connected with the hook.

60. After towing, cast off the cable by supplying air to the pneumatic mechanism. At first opportunity offered, set the towing gear in the initial position.

D. MAINTENANCE DURING LONG PERIOD OF STANDSTILL

General

61. During long period of standstill all the mechanisms should be processed and prepared for stowage as prescribed in Items 89 and 90 of the given Instructions.

62. Once every fortnight check the condition of the assemblies and the preservation coating on them. If any defects are detected, recondition the coating.

63. Once a month check the functioning of the mechanisms as required in Section II-C of the present Instructions.

64. Once a year open the mechanisms to check their condition and reprocess their major assemblies.



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E. TROUBLES AND REMEDIES

65. All the probable troubles and defects and their remedies will be found in the table below:

| Nos | Trouble | Cause | Remedy |
|---|---|---|---|
| 1 | Noticeable vibrations during capstan operation | Off-center operation of electric motor and reduction gear | Adjust the centers of electric motor and reduction gear |
| 2 | Water leakage through glands | Loose or worn-out gland packing | Tighten the glands If the leakage does not cease, replace the gland packing |

F. PREVENTIVE MAINTENANCE INSPECTIONS AND REPAIRS

a) Daily Inspections

66. Inspect the drives and mechanisms from outside and clean them. Check the oil level in the housings of the planetary and worm reduction gears and the lubrication of the gear drive of the forward capstan head.

67. Turn the screw stopper, the band stopper and the band brake.

68. Run the warping end idle with the help of the electric motor.

69. Check the position of the bitter end release drive and the condition of the seal.

b) Weekly Inspections and After Each Cruise

Perform all the operations of the daily inspection and in addition to that do the following:





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70. Check the condition of all the drives, hinges and sliding screws. Work out all the difficult-to-turn drives and eliminate all the detected defects.

71. Clean and lubricate all the exposed surfaces of the drives inside and outside the pressure hull.

72. Add grease to the housings of the worm and planetary reduction gears, force the screw-cap lubricators through.

73. Clean and lubricate the swivels. Pay out and then pay in 5-10 m of the anchor chain to check the functioning of the veered-out chain length indicator.

c) M o n t h l y  I n s p e c t i o n

Perform all the operations of the weekly inspection and in addition to that do the following:

74. Check the condition of the glands in the pressure hull; if necessary, tighten them.

75. Check the functioning of the pneumatic mechanism of the towing gear.

76. Use the grease fitting to lubricate the bitter end release drive.

77. Check the attachment of the base plates and the drives of the capstans.

d) T h r e e - M o n t h  I n s p e c t i o n s

Perform all the operations of the monthly inspection and in addition to that do the following:

78. Check the condition of the anchor chain, the attachment of the clamp spacers and swivels. Make sure that the screw and band stoppers and the band brake are in good operating condition.

79. Open the bevel drives in the superstructure and pack them with grease.

80. Clean the hinges and the sliding screws from dirt and old lubricant and lubricate them anew.

81. Change the grease in the housings of the planetary and worm reduction gears (once every six months).

e) D o c k i n g  I n s p e c t i o n s

82. Check the condition, clean and cover the anchor chain; work out and lubricate the swivels.



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83. Check the condition of the bitter end release drive. Work out the drive and check the grease supply.

84. Check the readings of the veered-out length indicator.

85. Make measurements of the chain links in the places mostly subjected to wear. To ensure uniform wear of the chain, it is good practice to interchange the running and bitter sections of the chain and every chain length.

86. Examine the locker; if necessary, restore its paint coating or lining.

f) Inspection During Maintenance

Perform all the operations of the three-month inspection and in addition to that do the following:

87. Open and wash all the bearings of the drive, planetary and worm reduction gears, actuating shafts (of the screw stopper, band brake, veered-out length indicator, band stopper and controller drive) with kerosene and then lubricate them with fresh grease.

88. Wash the housing and the gears of the reduction gears. Overhaul the emergency hand drive.

G. DISASSEMBLY AND REASSEMBLY
(within the scope of preventive maintenance inspections and repairs)

a) General

89. Complete disassembly of the forward and after capstans should be carried out outside the submarine. For this purpose the heads and the drives should be removed from their installation places and delivered to the place where they will be disassembled. The holes in the bosses on the pressure hull should be plugged. Separate units of the anchor and towing gears and the mooring fittings may be disassembled aboard ship.

90. Prior to complete disassembly of the gears and separate units, the mating parts and especially spacers should be marked.

91. Partial disassembly of the capstan units for processing and deprocessing their parts installed in difficult-to-get-at places should be performed aboard ship.

b) D i s a s s e m b l y

92. For complete disassembly of the forward and after capstans remove the heads and the drives and deliver them to the place where they will be disassembled.

93. To remove the heads of the forward and after capstans, remove the detachable plates from the upper deck, uncouple the union clutches connecting the heads with the drives, disconnect the heads from the base plates, disconnect the shafts of the veered-out chain length indicator drives and of the forward capstan band brake drive, stop the heads and use the crane or tackles to take them off their installation places and deliver to the place where they will be disassembled.

94. While taking the head out of the forward capstan to avoid damage of the warping end shaft, see to it that the head is removed gradually without misalignment till the warping end shaft is completely out of the gland sleeve body.

N o t e : Prior to the removal of the capstan head, it is good practice to disconnect the gland sleeve body from the boss on the pressure hull and after that remove the head together with the sleeve.

95. Use the Appendices for Instructions to disassemble all the units of the capstan, anchor and towing gears and the mooring fittings.

96. Install plugs with sealing gaskets on all bosses welded to the pressure hull from which separate assemblies of the capstan and anchor gear have been removed for an inspection or repair.

c) R e a s s e m b l y

97. The reassembly of the gears is carried out in the order reverse to the disassembly. All the dismantled units should be installed in their due places.

98. After all the gear units to be mounted on the bosses welded to the pressure hull are installed, test the joints by building up a vacuum in the compartment.

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99. After the anchor and towing gears and the [illegible] tings are reassembled and installed in their [illegible] their functioning as instructed in Section II-[illegible] in the initial position as instructed in Section [illegible] Instructions.

H. INACTIVATION AND ACTIVATION

1. Inactivation Aboard Ship

100. Clean all the exposed, friction and [illegible] from old lubricant, wipe them with clean waste cloth [illegible] with rust grease.

101. Fill the screw-cap lubricators with fresh grease and lubricate the gears as directed in Items 97, 98 and 99 [illegible] Instructions.

2. Activation Aboard Ship

102. Clean parts and units from old lubricant.

103. Inspect and clean the screw-cap lubricators and lubrication holes from old lubricant.

104. Fill the screw-cap lubricators with fresh grease and abundantly lubricate all the friction parts and joints.

105. After unslushing the gears set them in the initial position and check their operation as instructed in Sections II-[illegible] and II-C of these Instructions.

I. REFERENCE DATA

106. Use grease, grade AMC-1, to lubricate all the parts installed outside the pressure hull and to fill the outboard grease fittings.

107. Use gun grease to lubricate the parts installed inside the pressure hull.

108. Fill the housings of the planetary and worm reduction gears of the capstans with diesel oil.





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# Appendices

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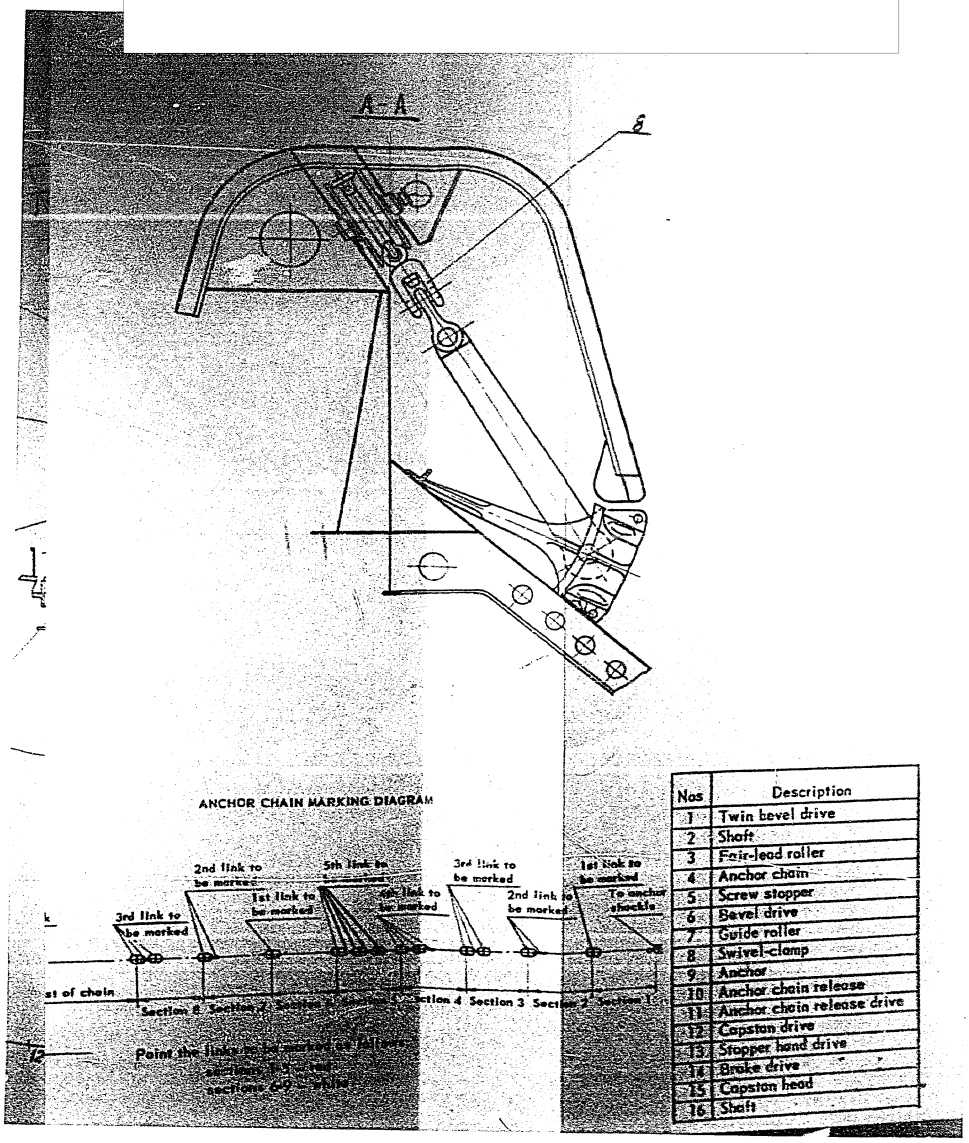


| Nos | Description |
|---|---|
| 1 | Twin bevel drive |
| 2 | Shaft |
| 3 | Fair-lead roller |
| 4 | Anchor chain |
| 5 | Screw stopper |
| 6 | Bevel drive |
| 7 | Guide roller |
| 8 | Swivel-clamp |
| 9 | Anchor |
| 10 | Anchor chain release |
| 11 | Anchor chain release drive |
| 12 | Capstan drive |
| 13 | Stopper hand drive |
| 14 | Brake drive |
| 15 | Capstan head |
| 16 | Shaft |

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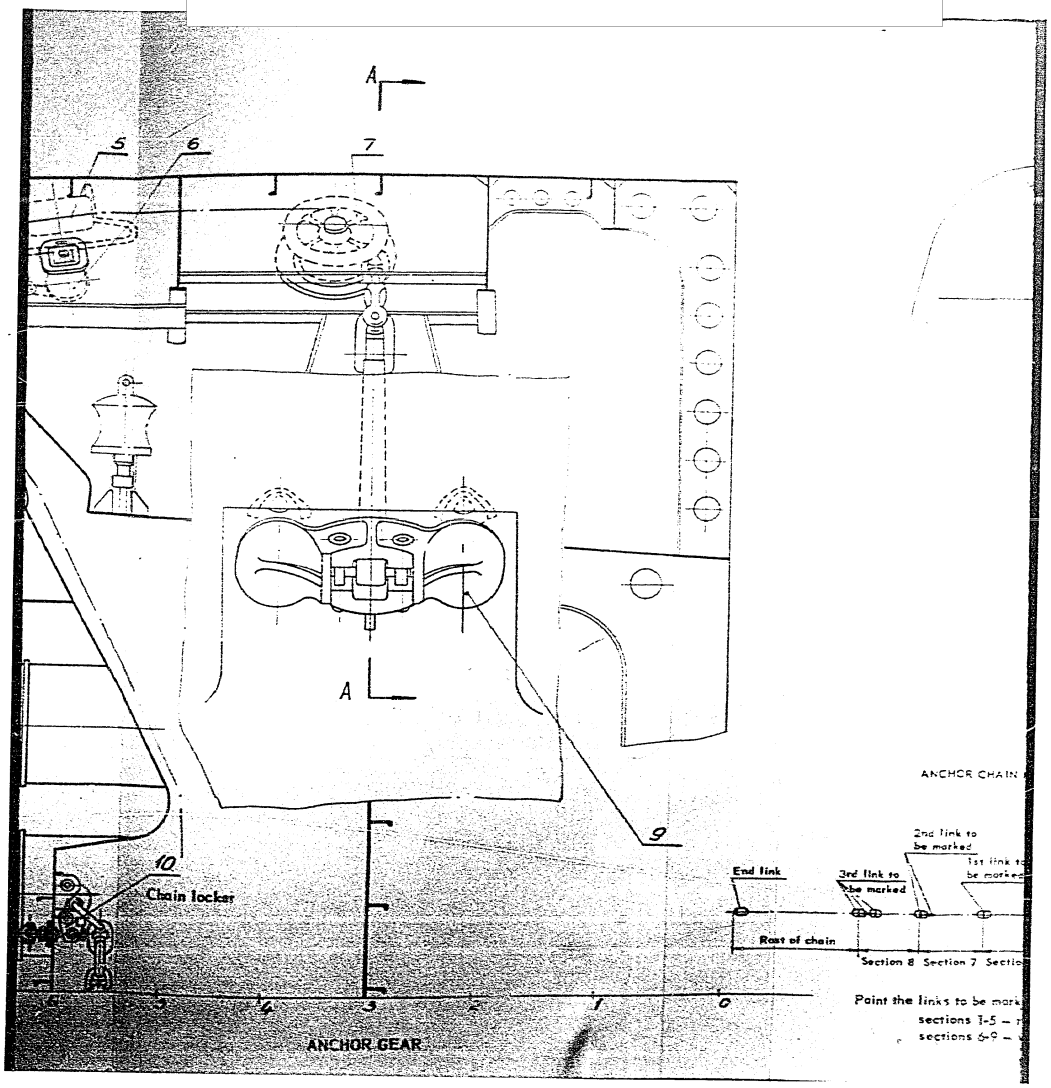




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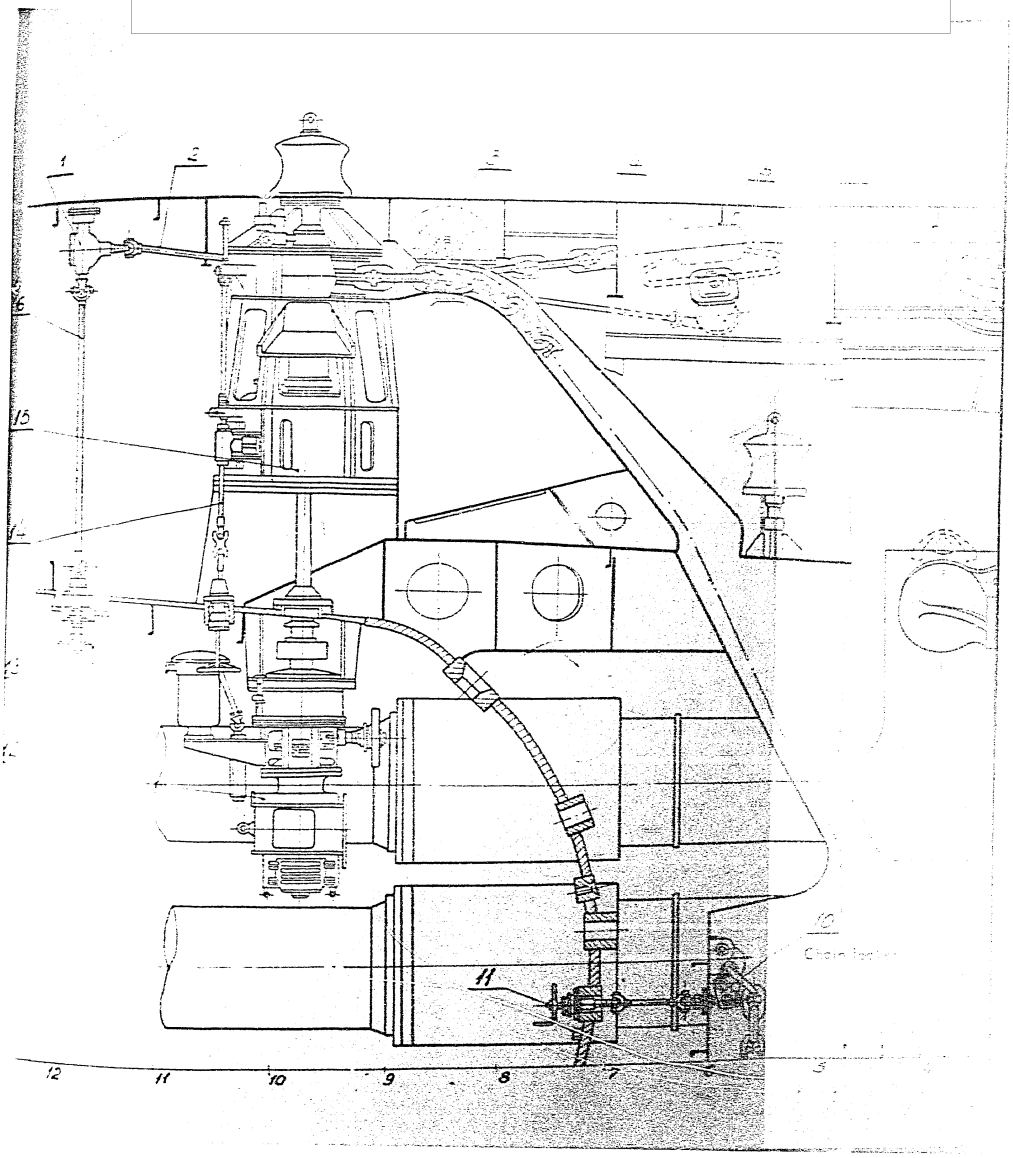


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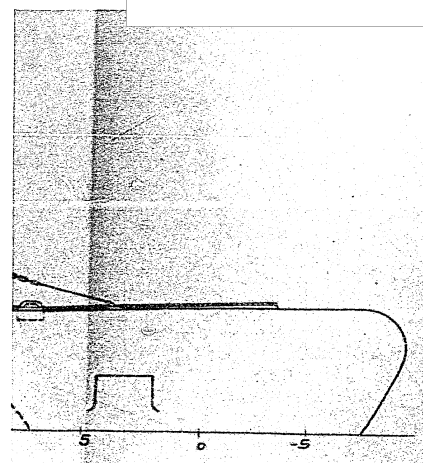
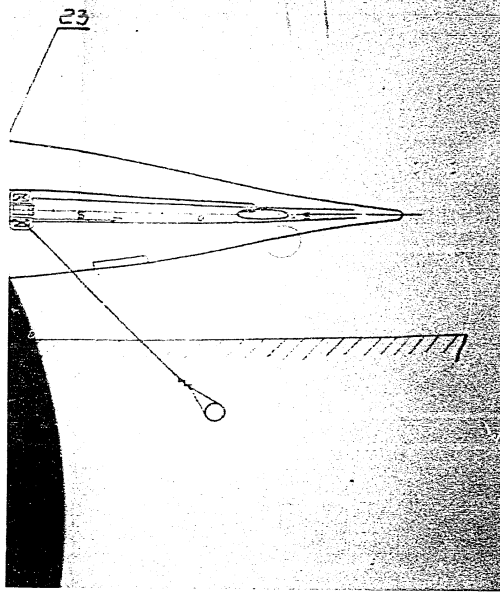
APPENDIX 2




| Nos | | Description |
|---|---|---|
| 18 | | |
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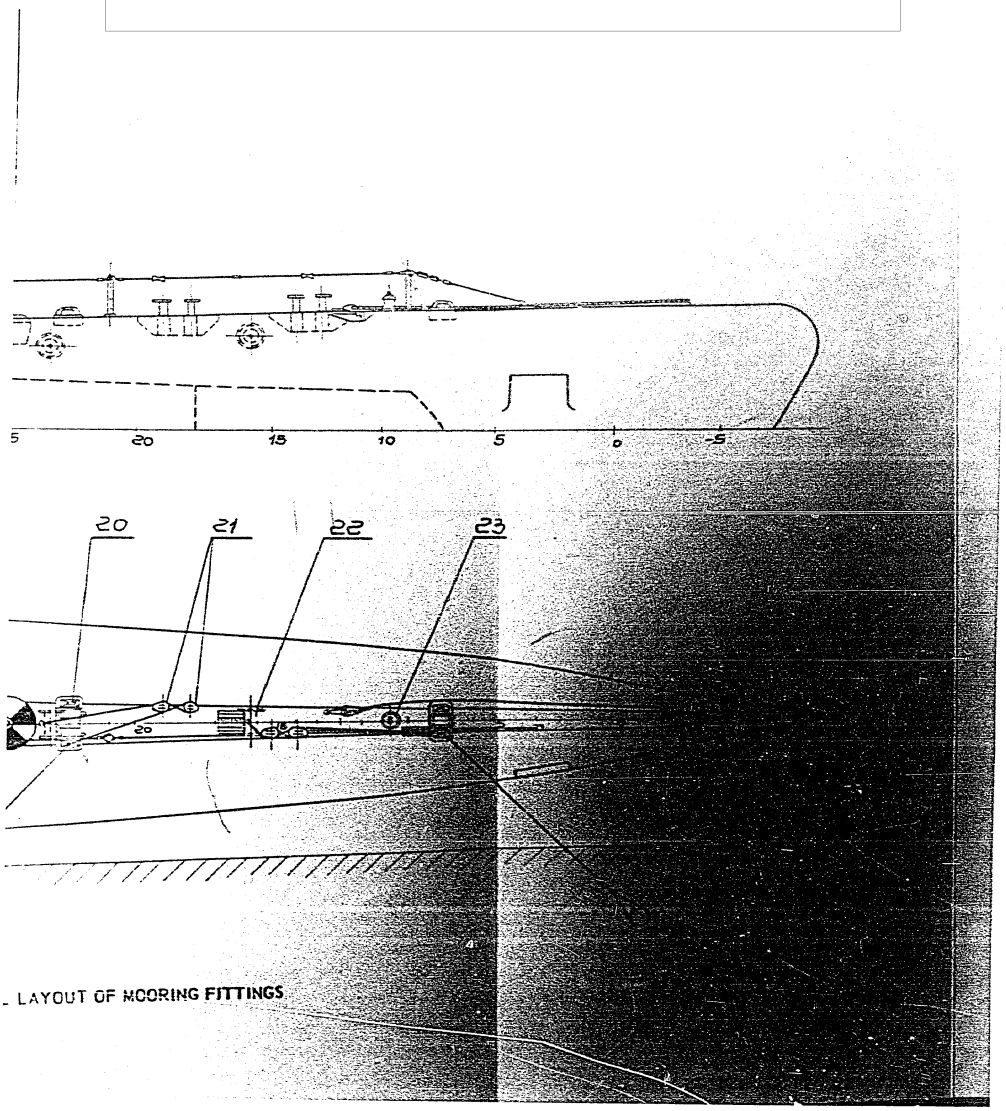


LAYOUT OF MOORING FITTINGS



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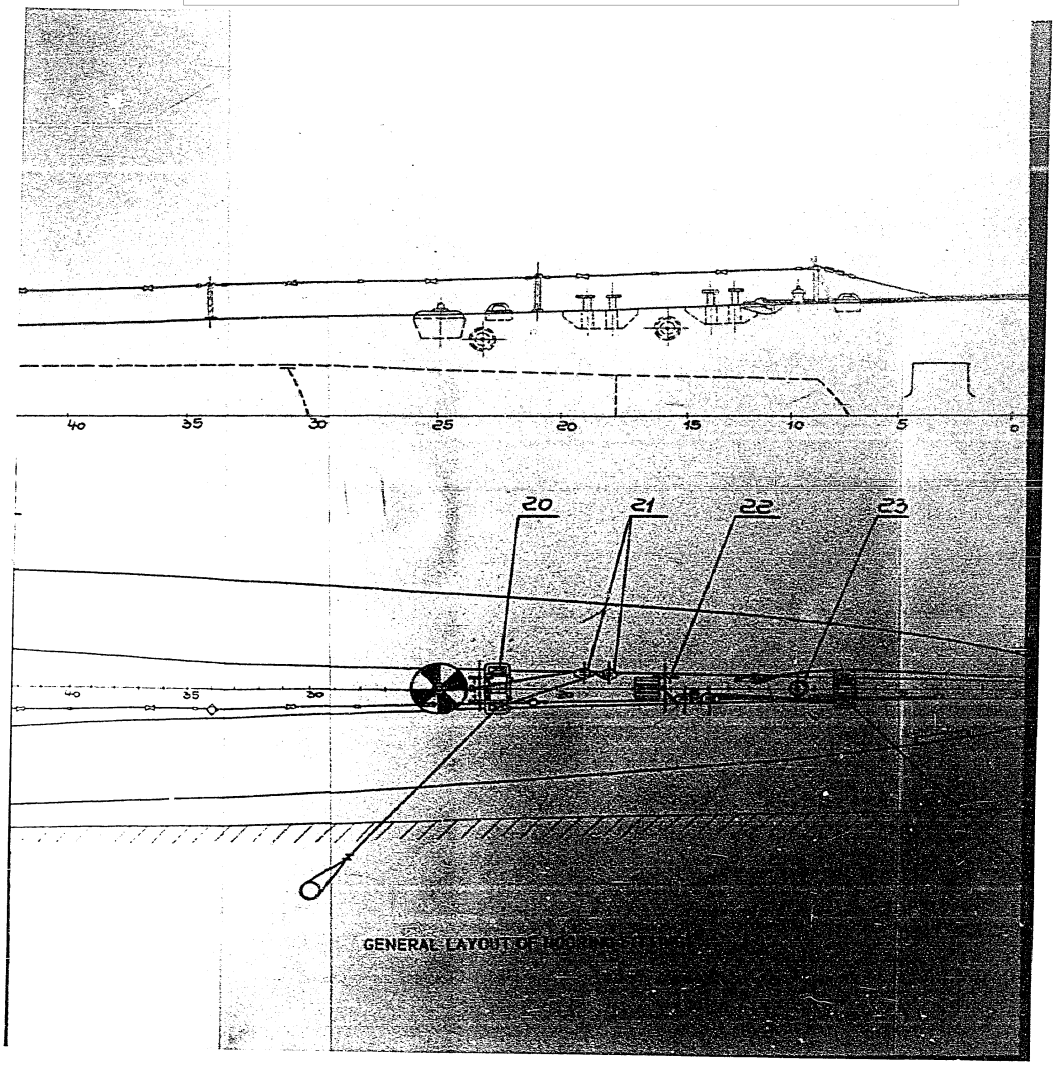


GENERAL LAYOUT OF [illegible]

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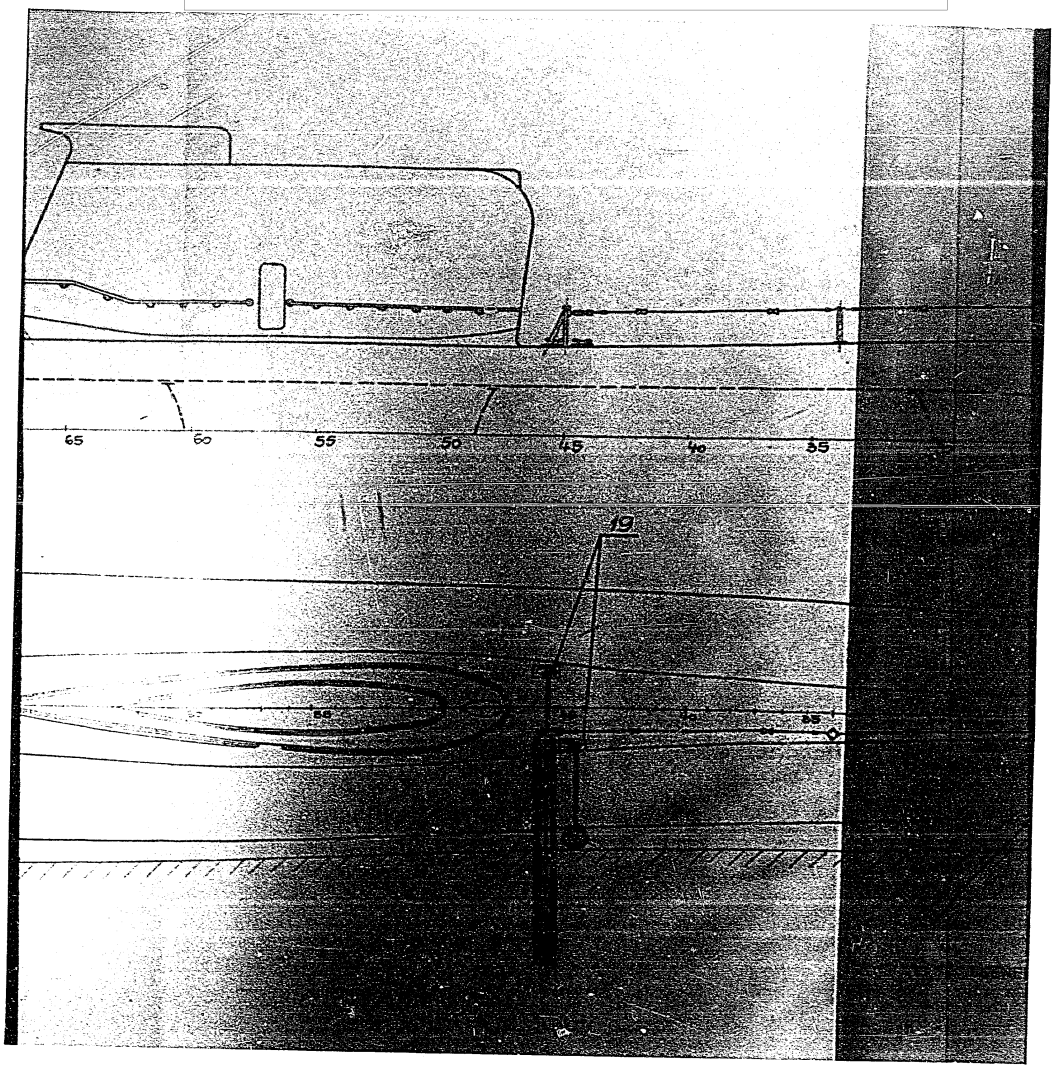




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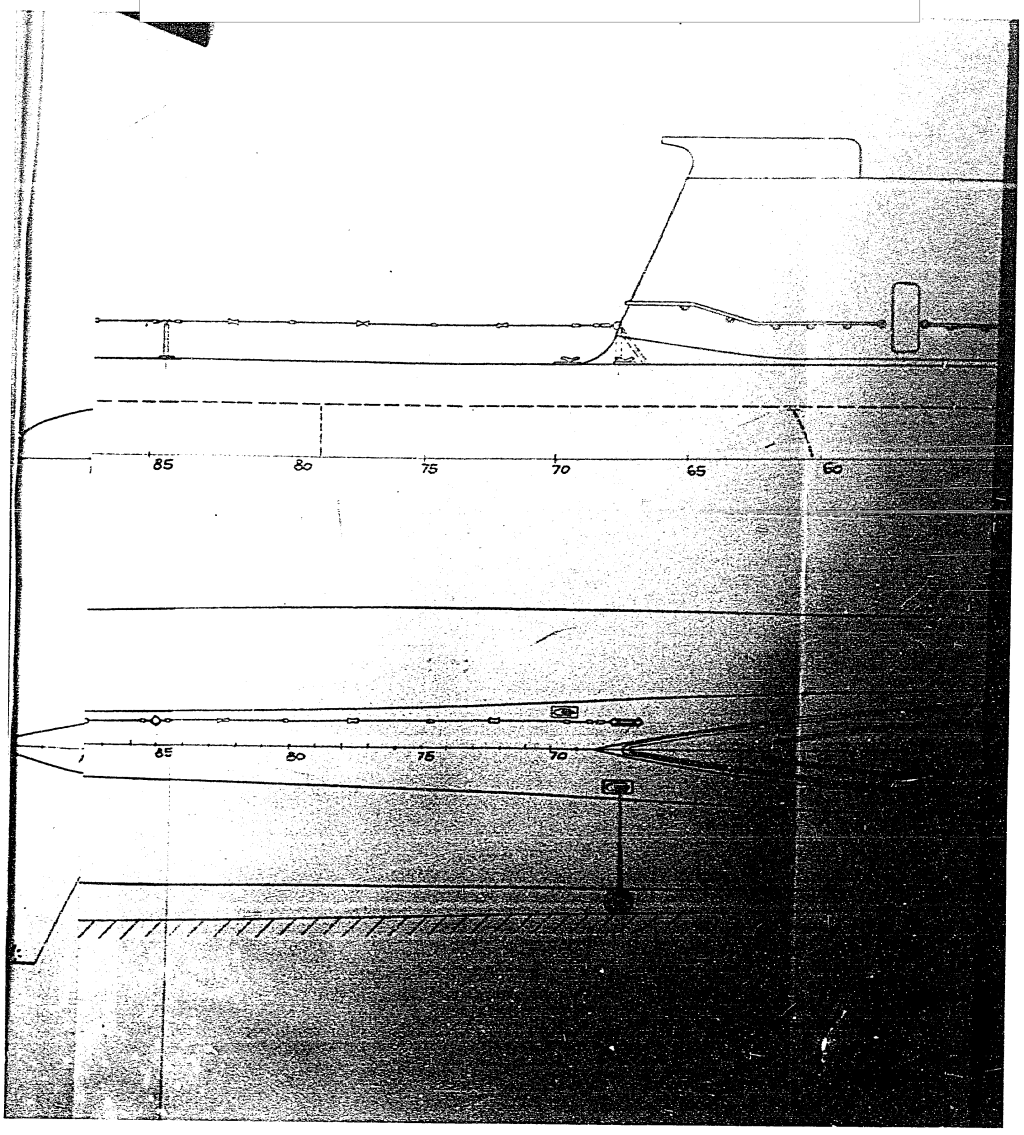


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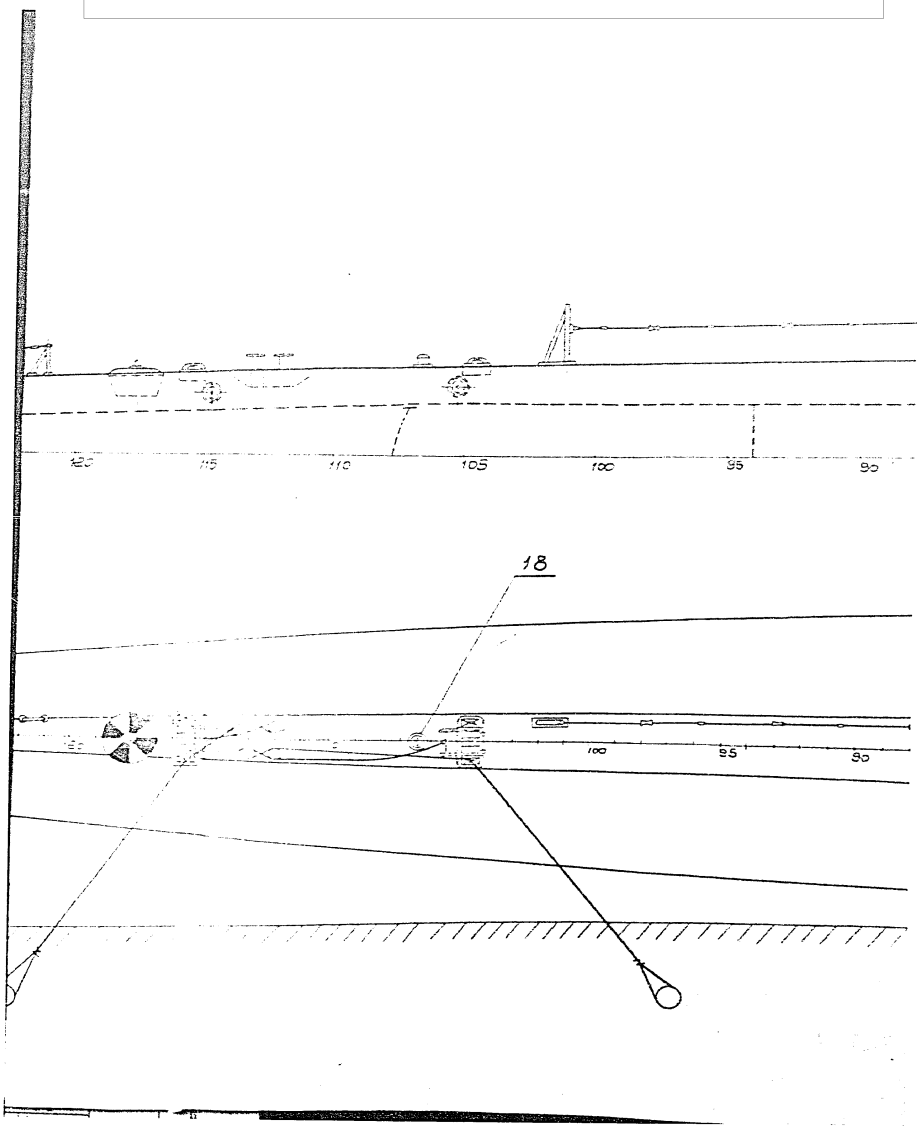


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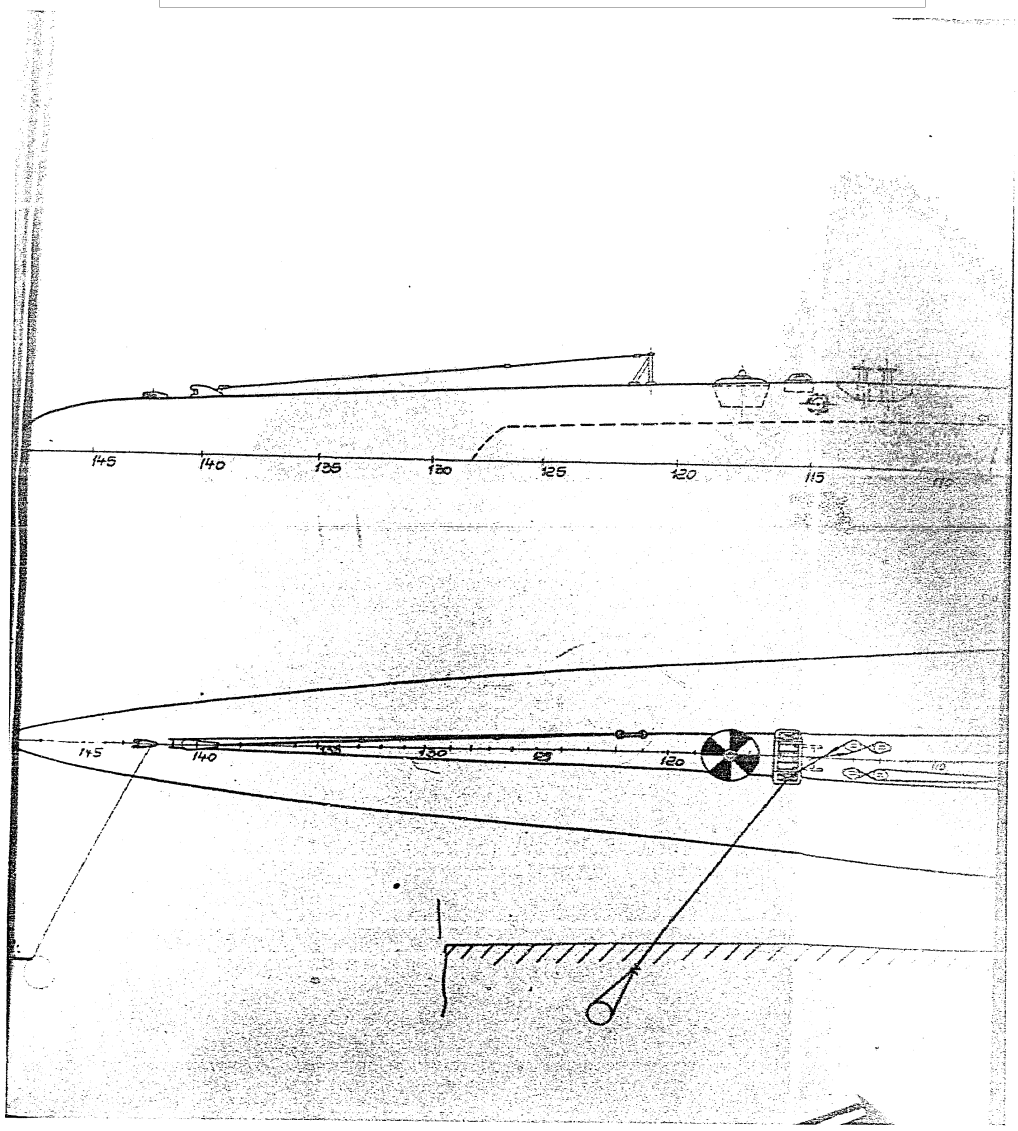


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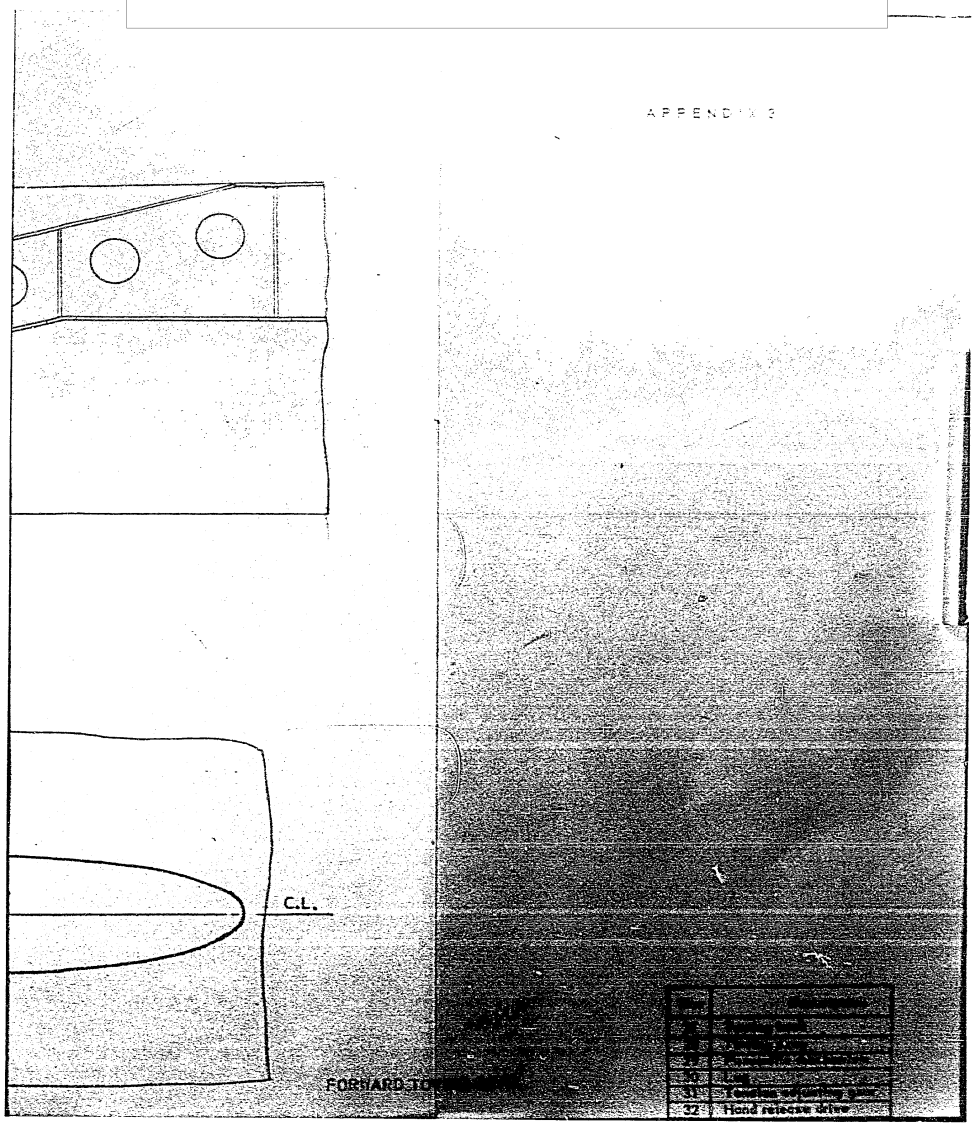




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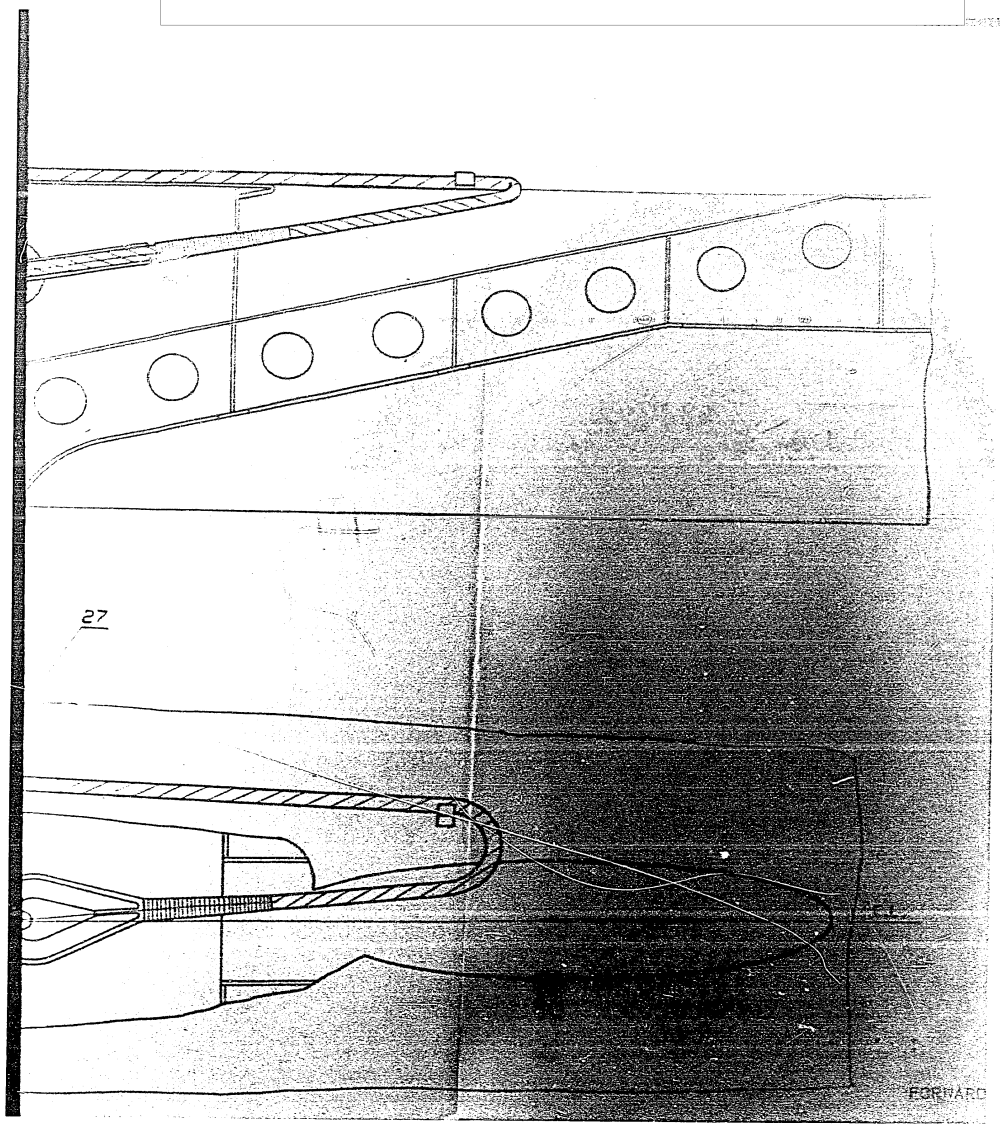


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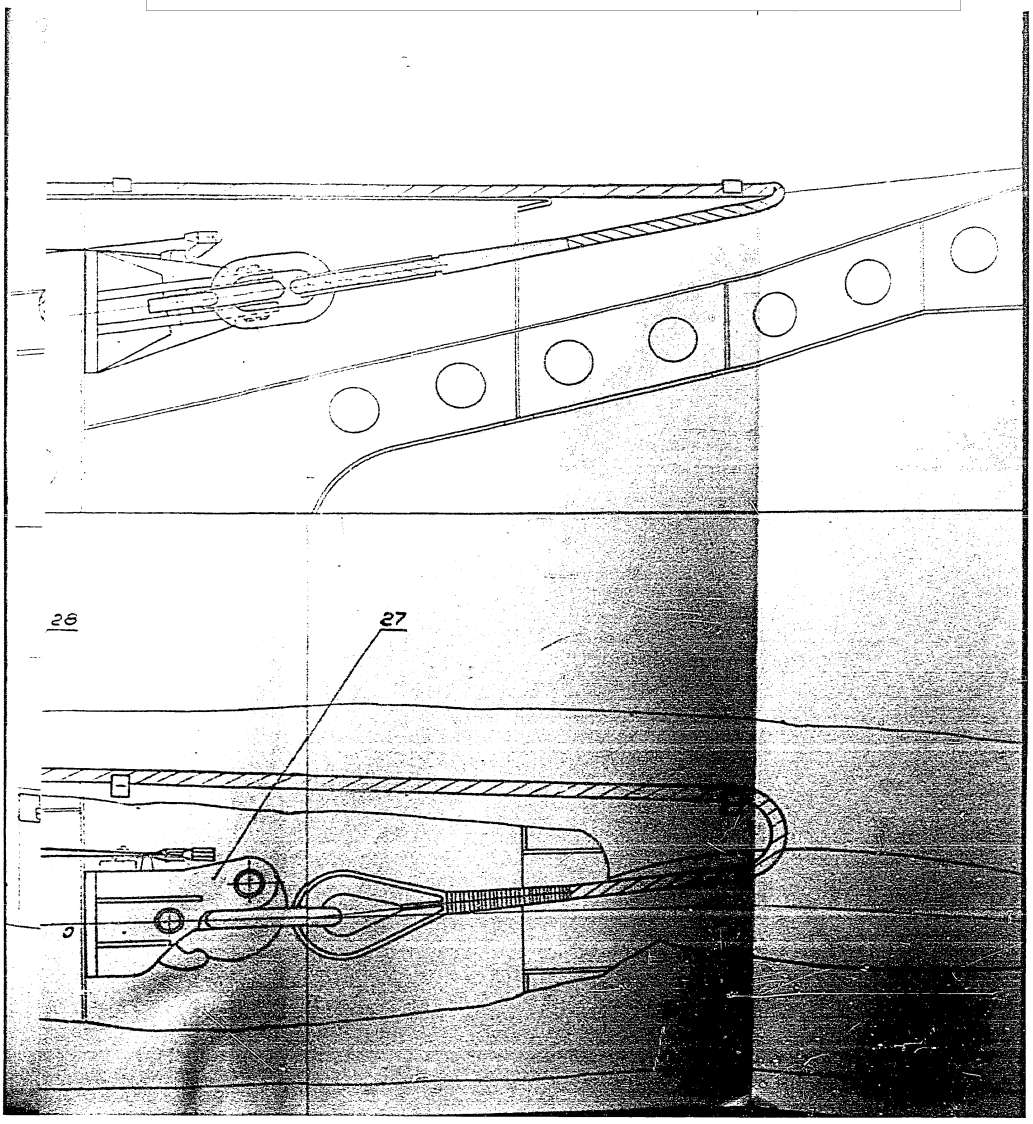




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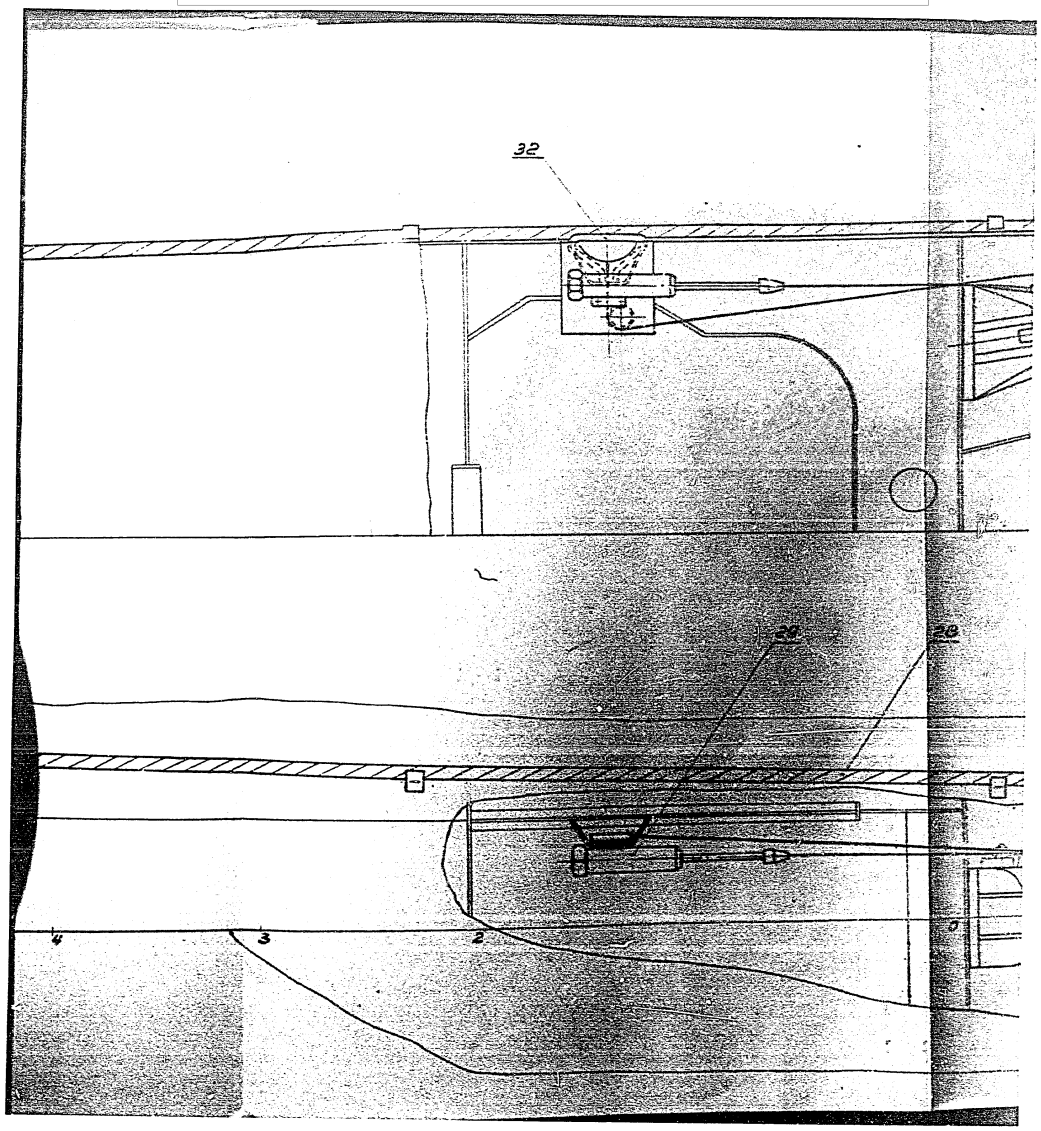


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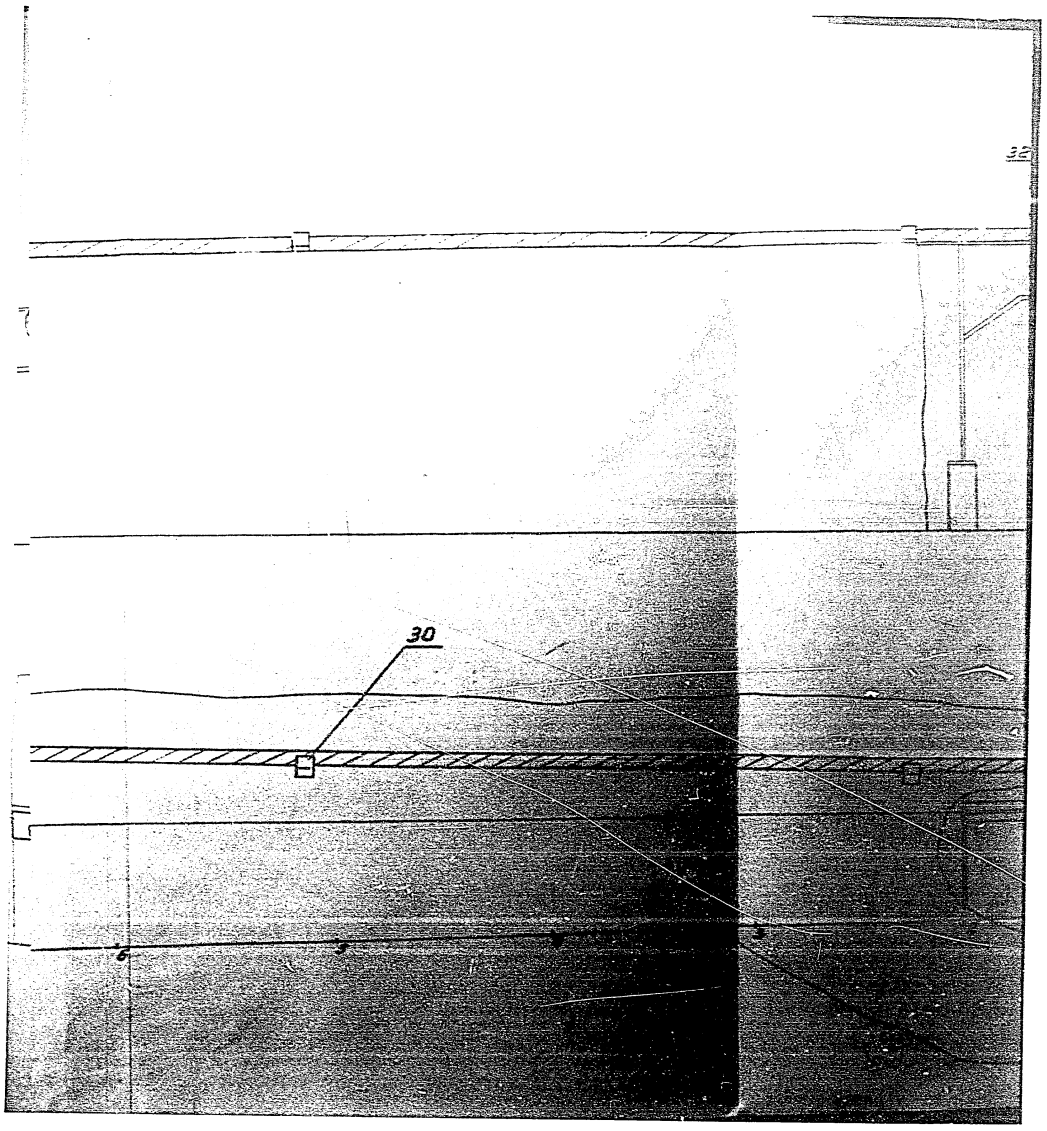


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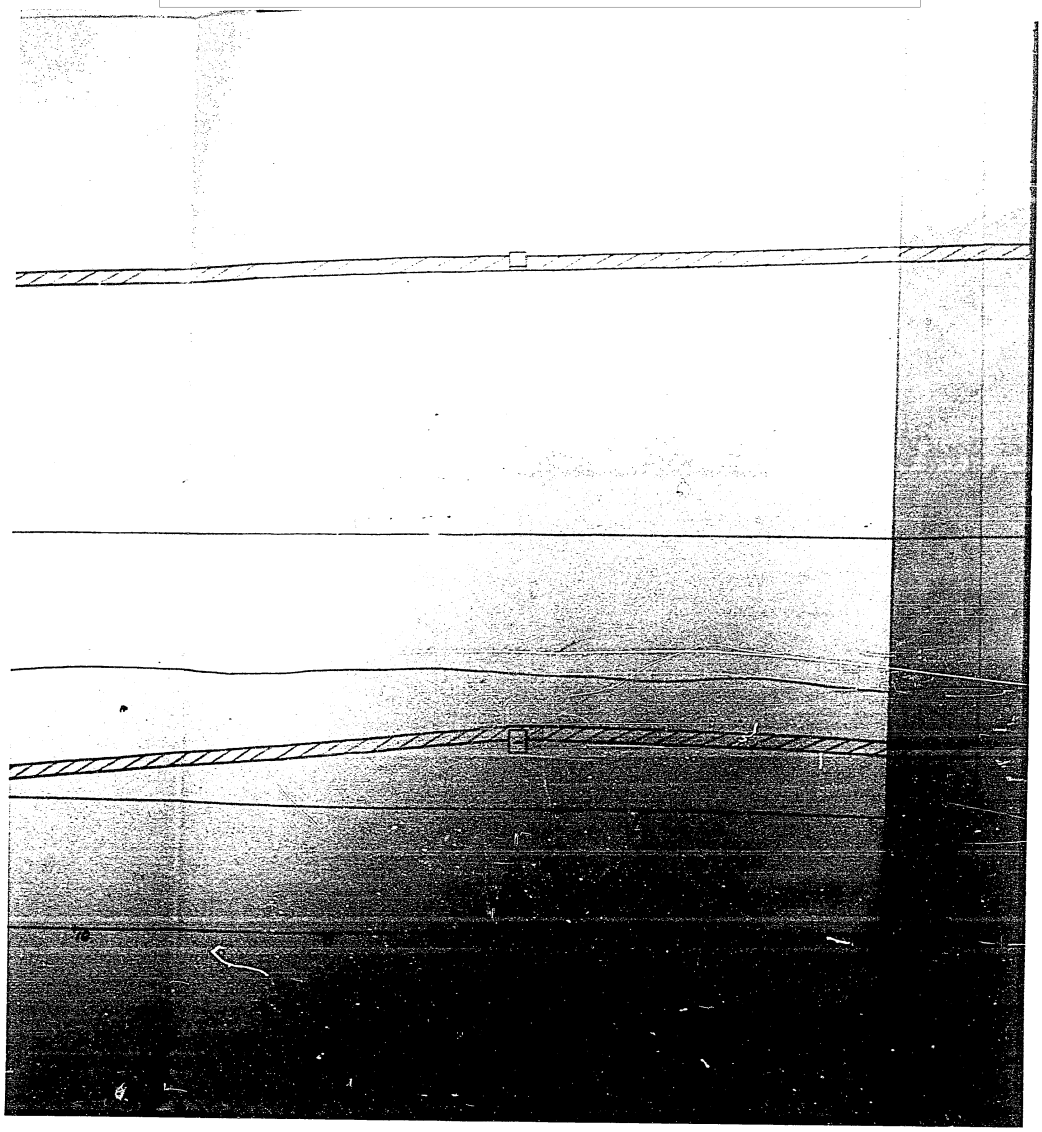

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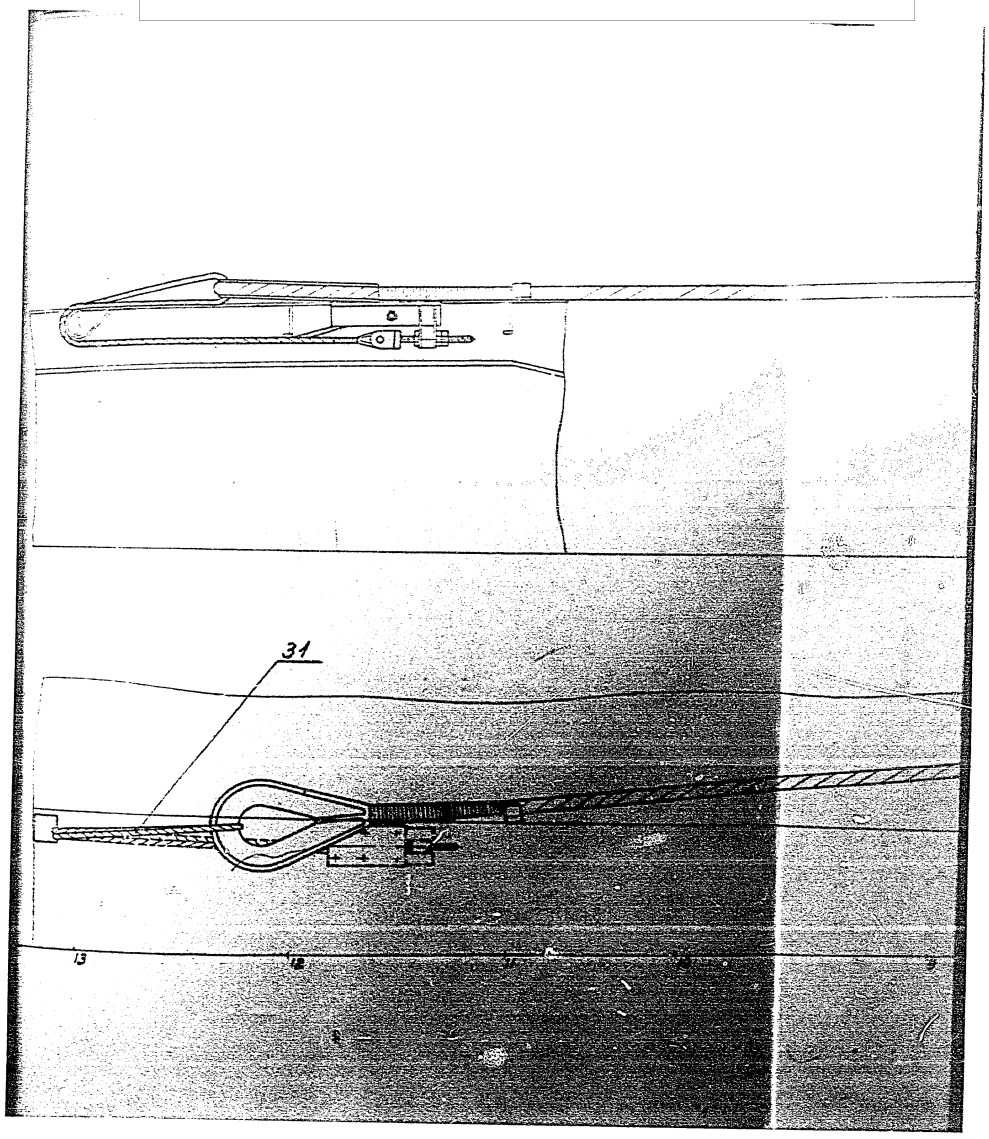




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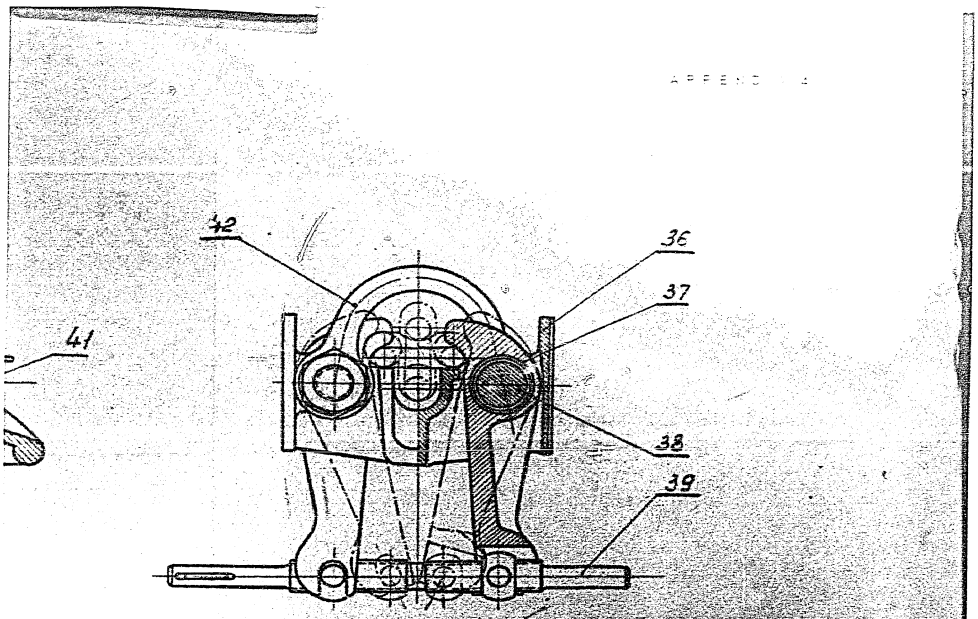


IR CHAIN SCREW STOPPER

| Nos | Description |
|---|---|
| 36 | Stopper block |
| 37 | Grip |
| 38 | Grip pin |
| 39 | Shaft |
| 40 | Sliding nut |
| 41 | Lubricator |
| 42 | Clamp |



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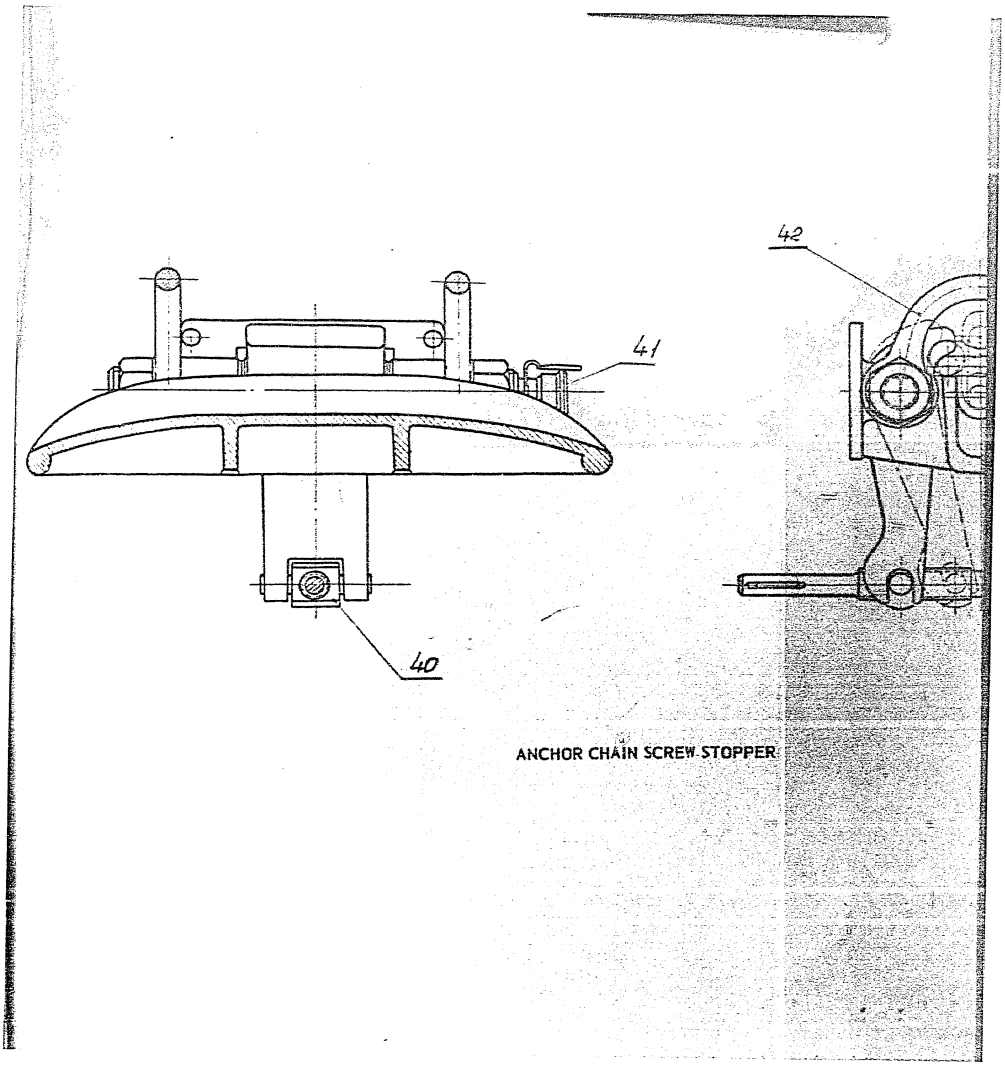


ANCHOR CHAIN SCREW STOPPER

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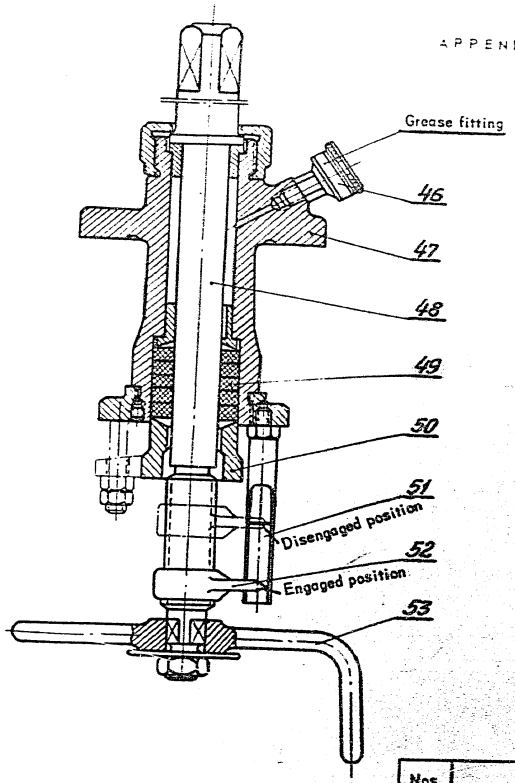
APPENDIX 5




SCREW STOPPER HAND DRIVE

| Nos | Description |
|---|---|
| 46 | Lubricator |
| 47 | Body |
| 48 | Shaft |
| 49 | Gland packing |
| 50 | Bush |
| 51 | Indicator column |
| 52 | Indicator nut |
| 53 | Handle |



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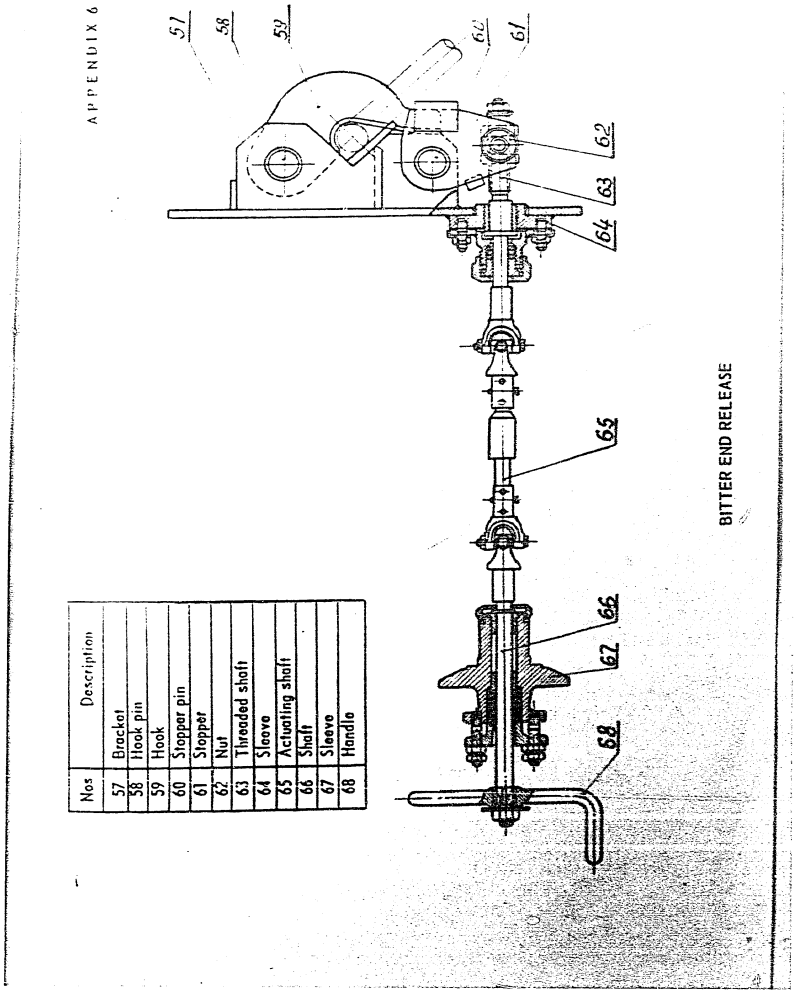
APPENDIX 6




| Nos | Description |
|---|---|
| 57 | Bracket |
| 58 | Hook pin |
| 59 | Hook |
| 60 | Stopper pin |
| 61 | Stopper |
| 62 | Nut |
| 63 | Threaded shaft |
| 64 | Sleeve |
| 65 | Actuating shaft |
| 66 | Shaft |
| 67 | Sleeve |
| 68 | Handle |

BITTER END RELEASE



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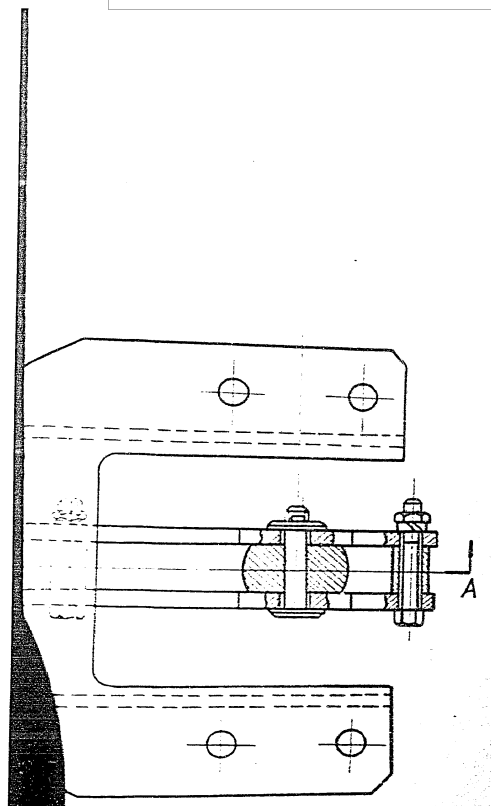


ROMAGNETIC BRAKE

| Nos | Description |
|---|---|
| 72 | Shaft |
| 73 | Bush |
| 74 | Body |
| 75 | Bevel gear wheel |
| 76 | Ratchet |
| 77 | Driven half-clutch |
| 78 | Spring |
| 79 | Electromagnet |
| 80 | Chain wheel |
| 81 | Axle |
| 82 | Rod |
| 83 | Forked lever |
| 84 | Case |
| 85 | Spring |



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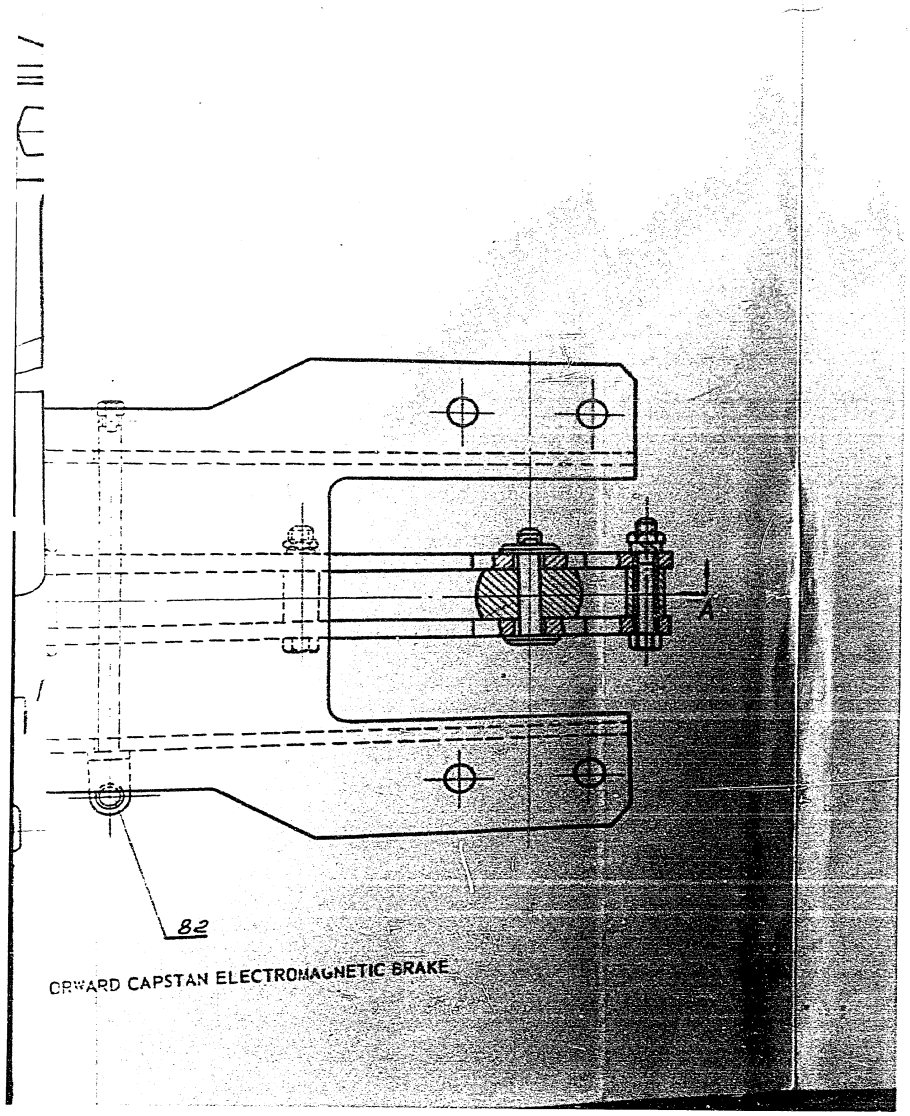


FORWARD CAPSTAN ELECTROMAGNETIC BRAKE

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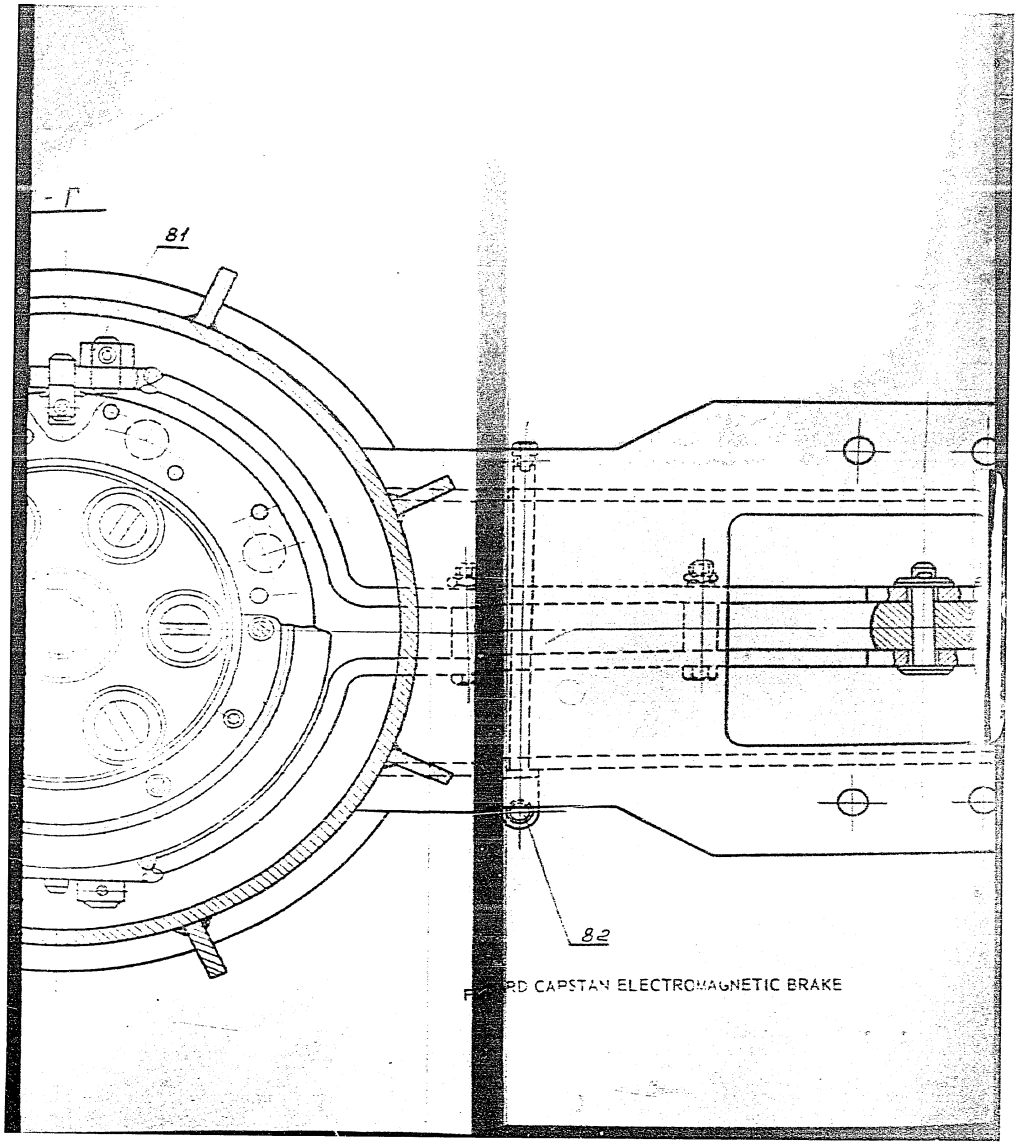


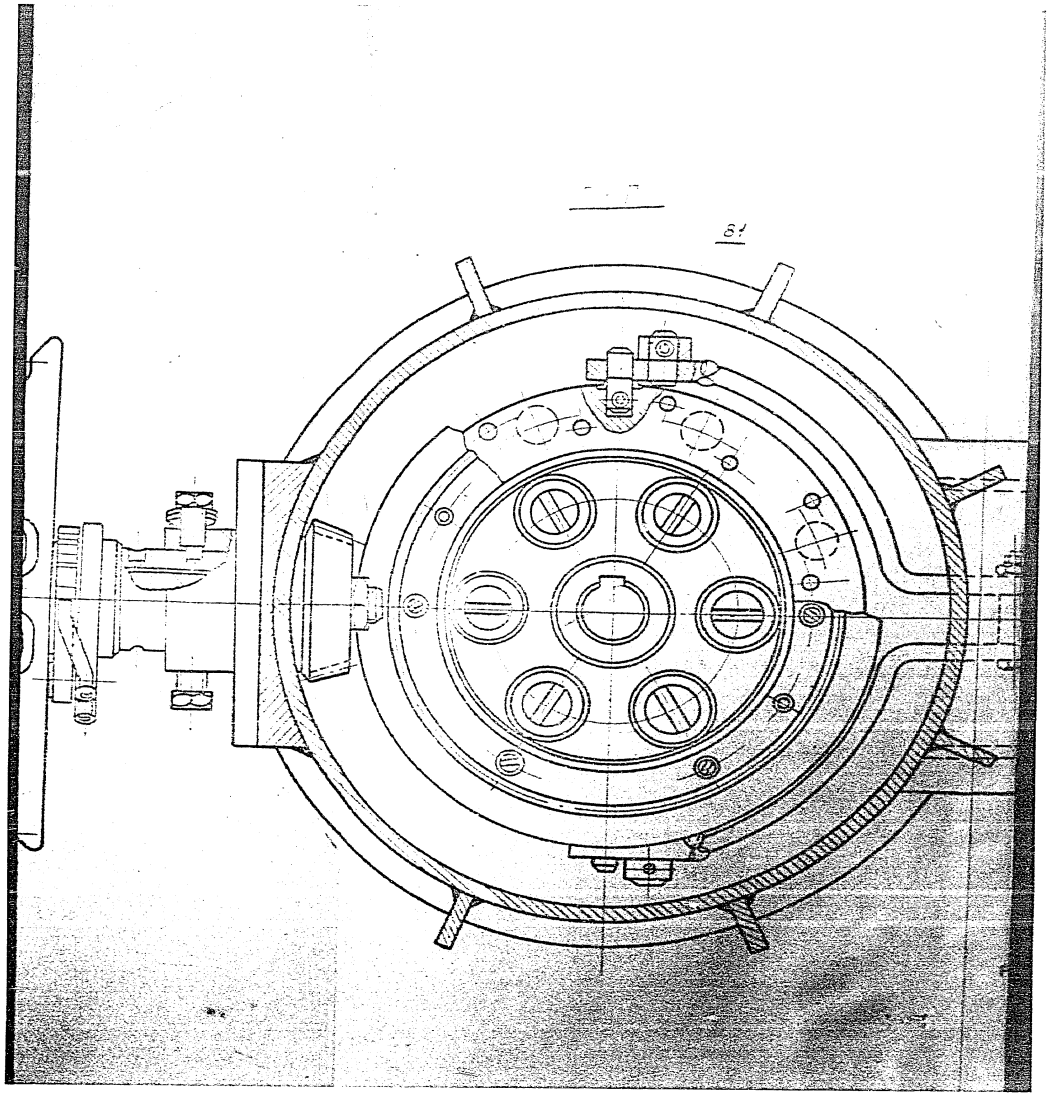

RD CAPSTAN ELECTROMAGNETIC BRAKE



50X1-HUM

SECRET

50X1-HUM




SECRET

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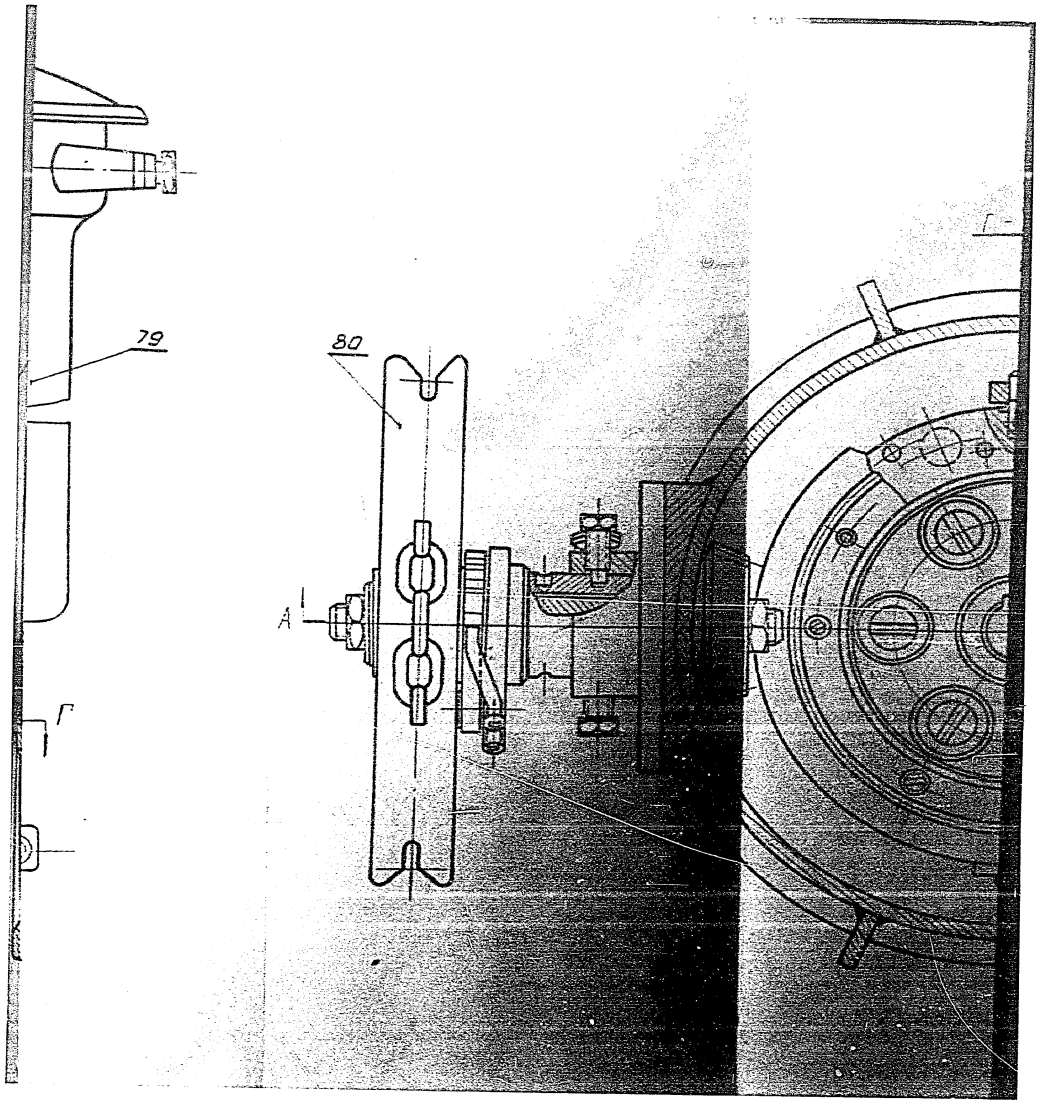
50X1-HUM



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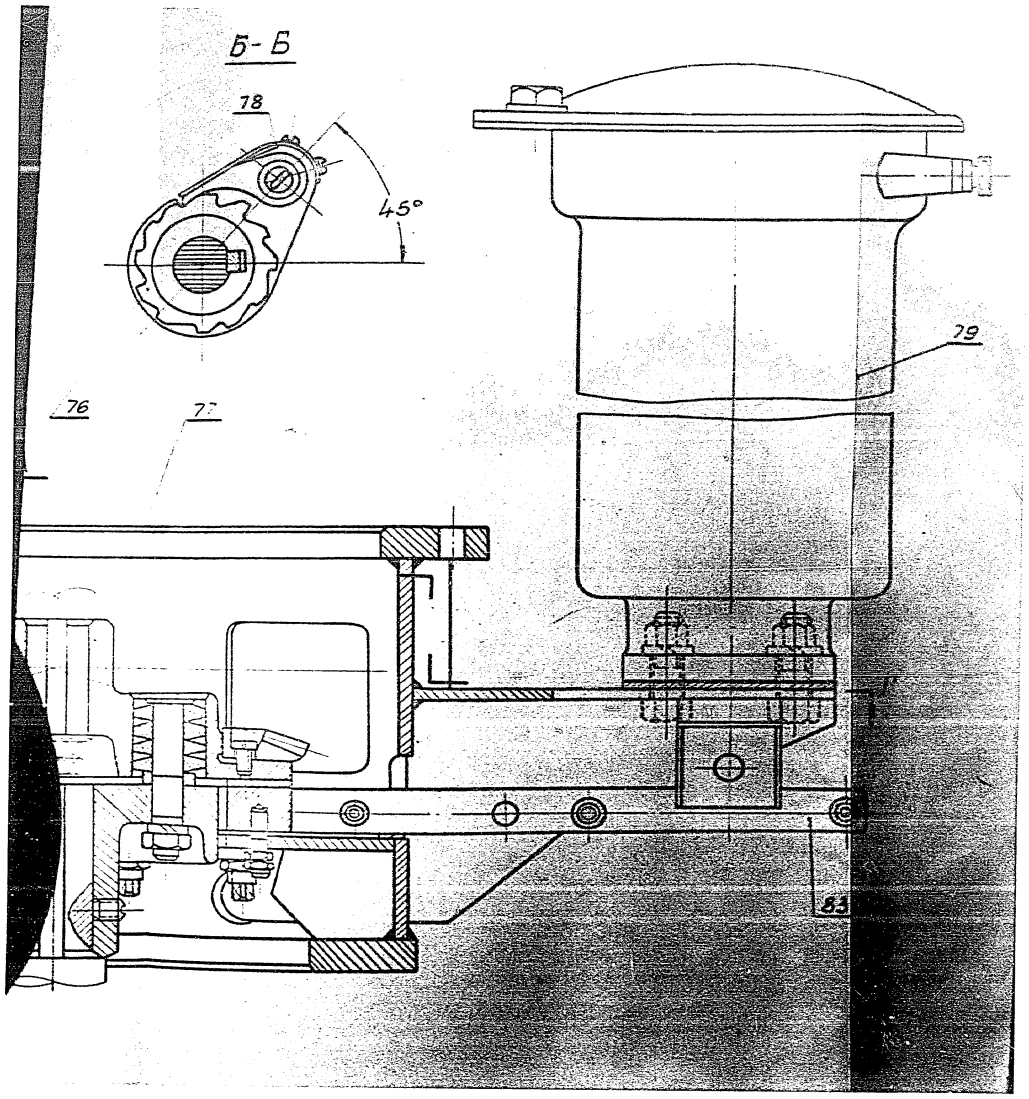

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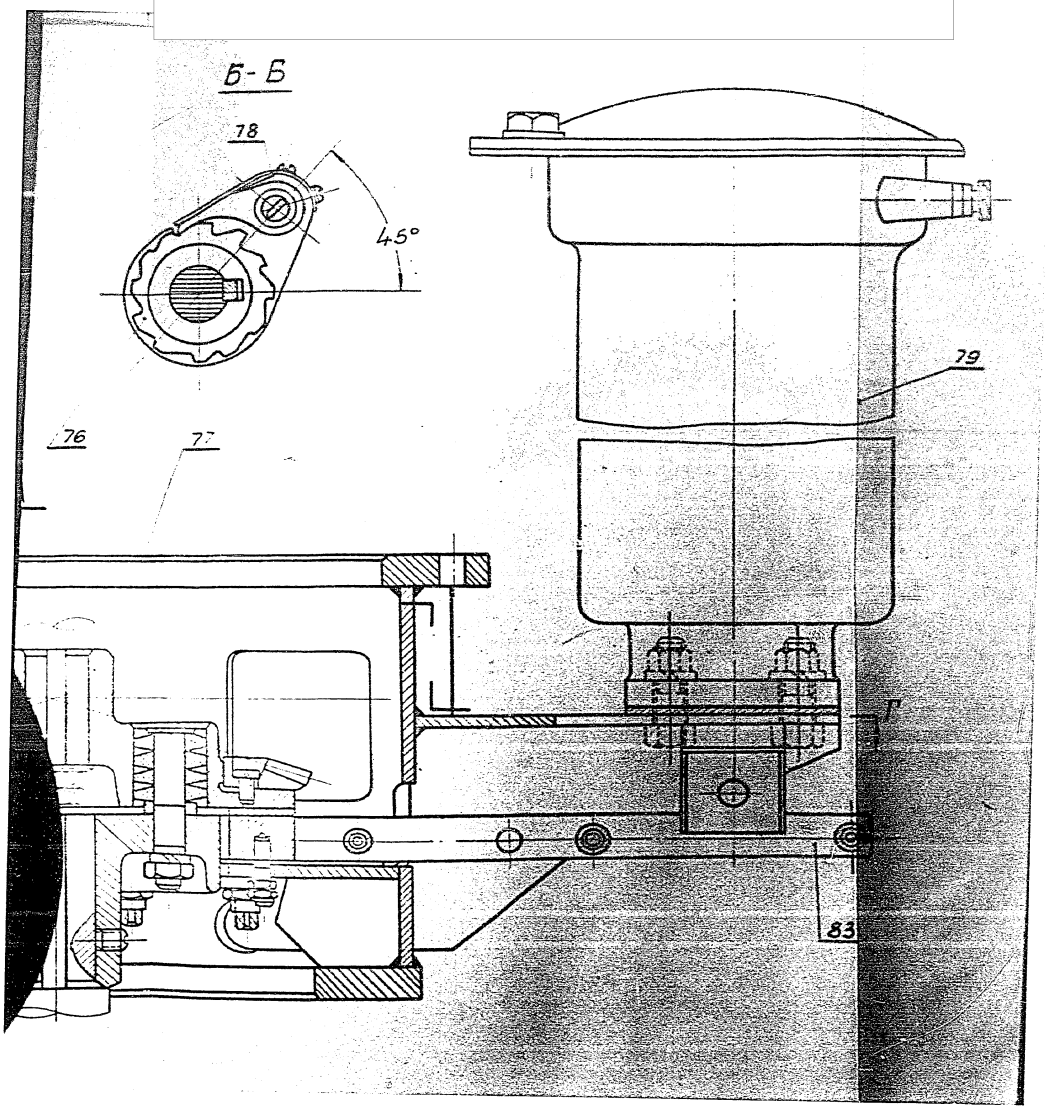




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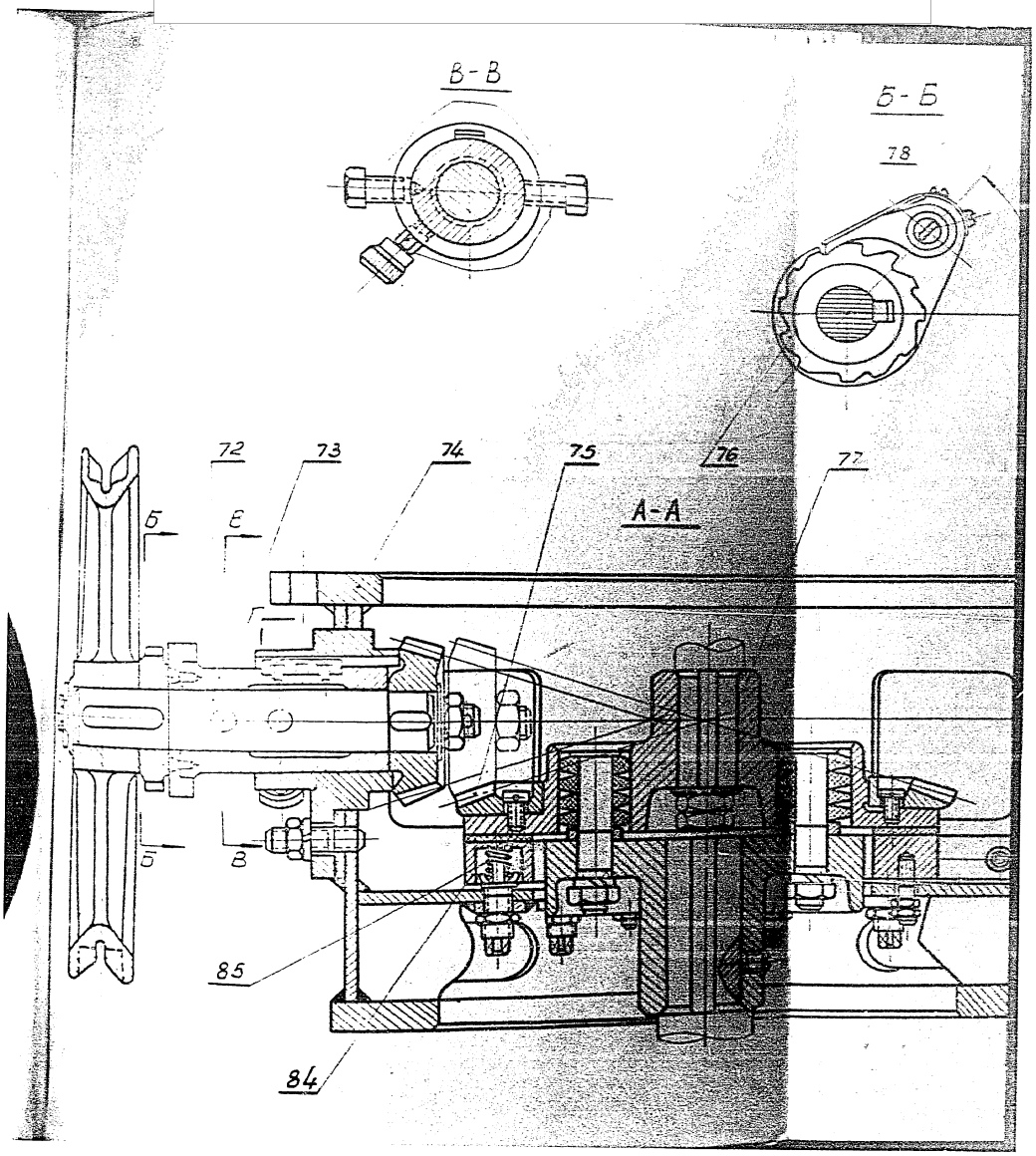
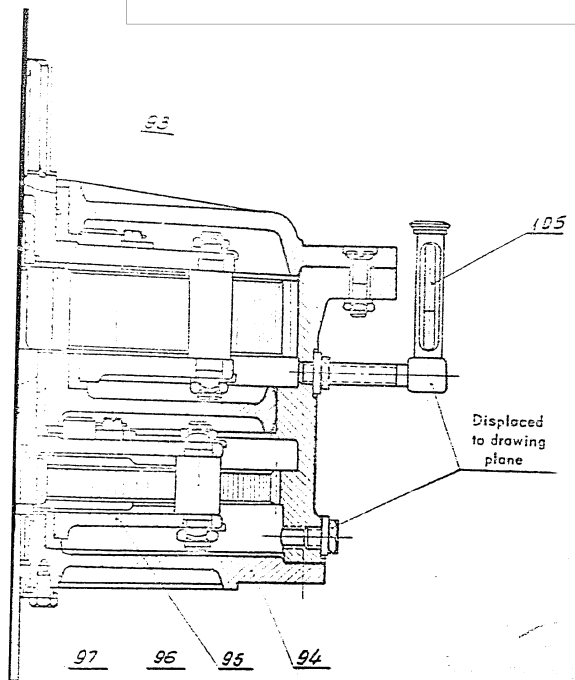


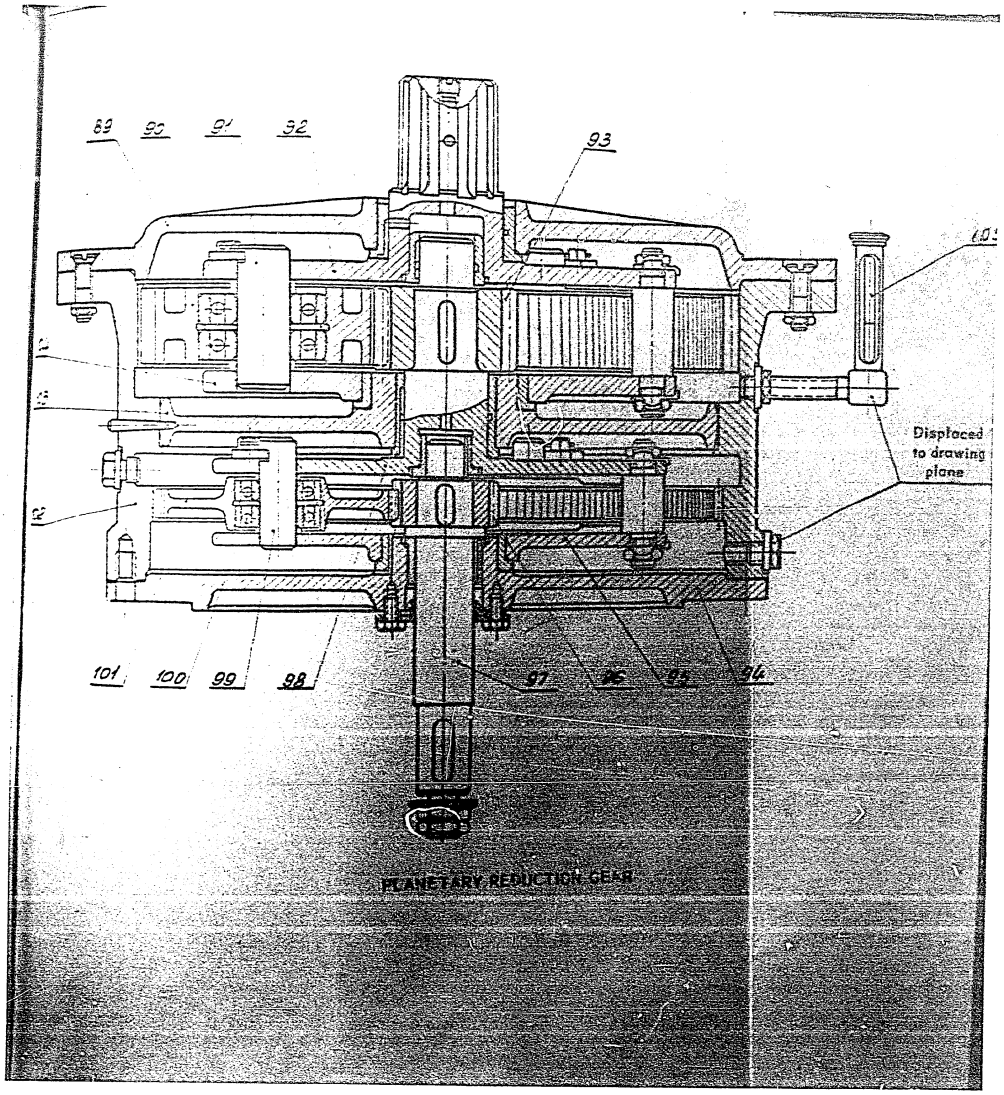



RY REDUCTION GEAR

| Nos | Description |
|---|---|
| 89 | Cover |
| 90 | Satellite |
| 91 | Pin |
| 92 | Carrier body, stage II |
| 93 | Central gear |
| 94 | Cover |
| 95 | Carrier cover, stage I |
| 96 | Gear |
| 97 | Shaft |
| 98 | Carrier body, stage I |
| 99 | Pin |
| 100 | Ball bearing |
| 101 | Satellite |
| 102 | Body |
| 103 | Distance pin |
| 104 | Carrier cover, stage II |
| 105 | Oil level indicator |

SECRET

50X1-HUM

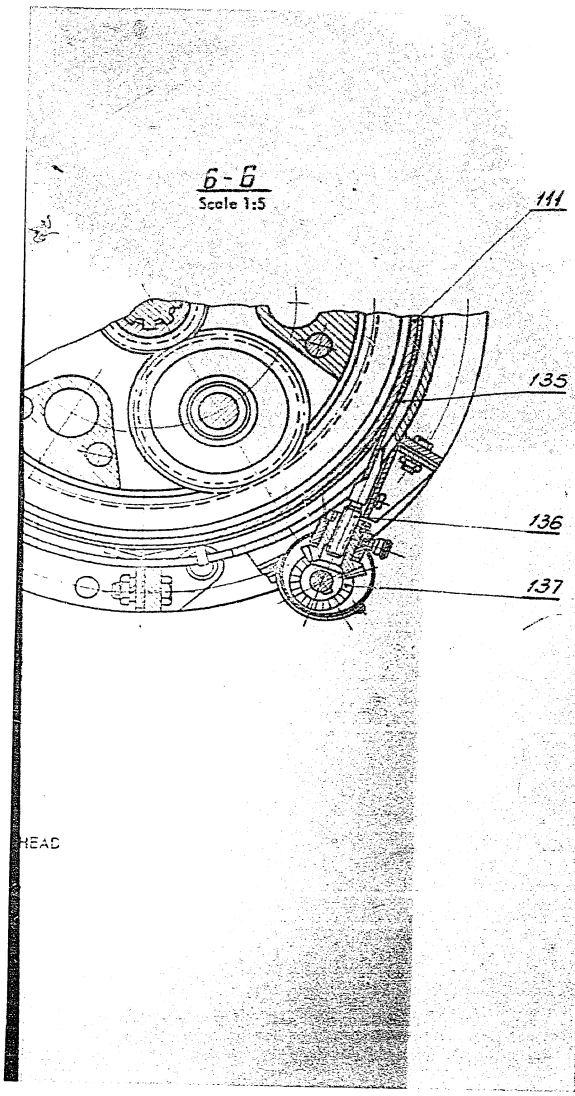





50X1-HUM

50X1-HUM

APPENDIX




| Nos | Description |
|---|---|
| 108 | Central gear |
| 109 | Supporting bush |
| 110 | Base |
| 111 | Brake drum |
| 112 | Carrier cover |
| 113 | Pin |
| 114 | Splitline |
| 115 | Wheel with internal teeth |
| 116 | Cylinder body |
| 117 | Bearing |
| 118 | Chain drive shaft |
| 119 | Pedestal |
| 120 | Chain gear |
| 121 | Bracket |
| 122 | Shaft |
| 123 | Coupling gear |
| 124 | Shaft |
| 125 | Small brake pulley |
| 126 | Bearing and shaft |
| 127 | Conical gear |
| 128 | Gear wheel |
| 129 | Actuation shaft |
| 130 | Chain sleeve |
| 131 | Hand wheel |
| 132 | Scale |
| 133 | Nut |
| 134 | Elastic clutch |
| 135 | Band |
| 136 | Threaded rod |
| 137 | Bevel drive |
| 138 | Band stopper |

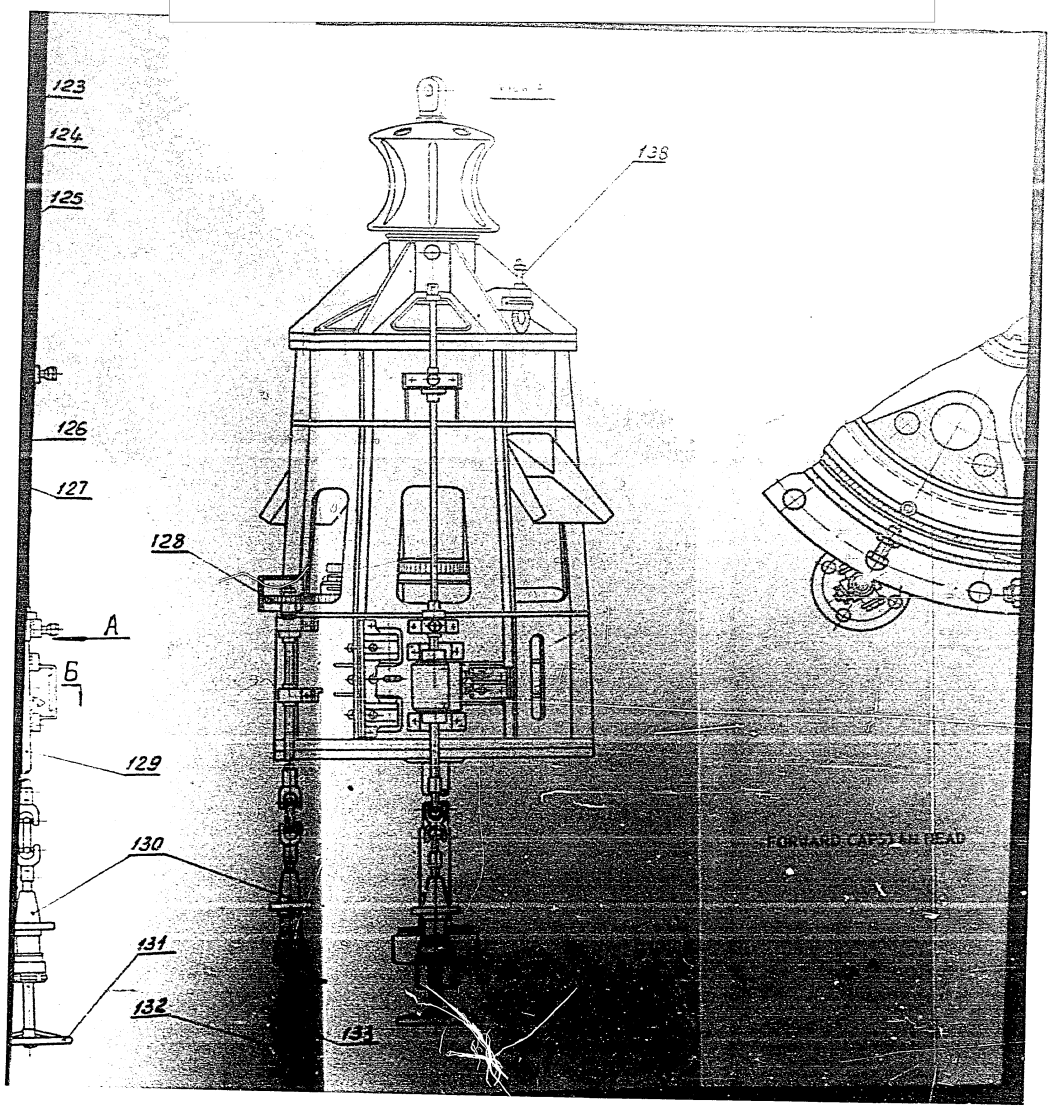
HEAD



50X1-HUM

SECRET

50X1-HUM

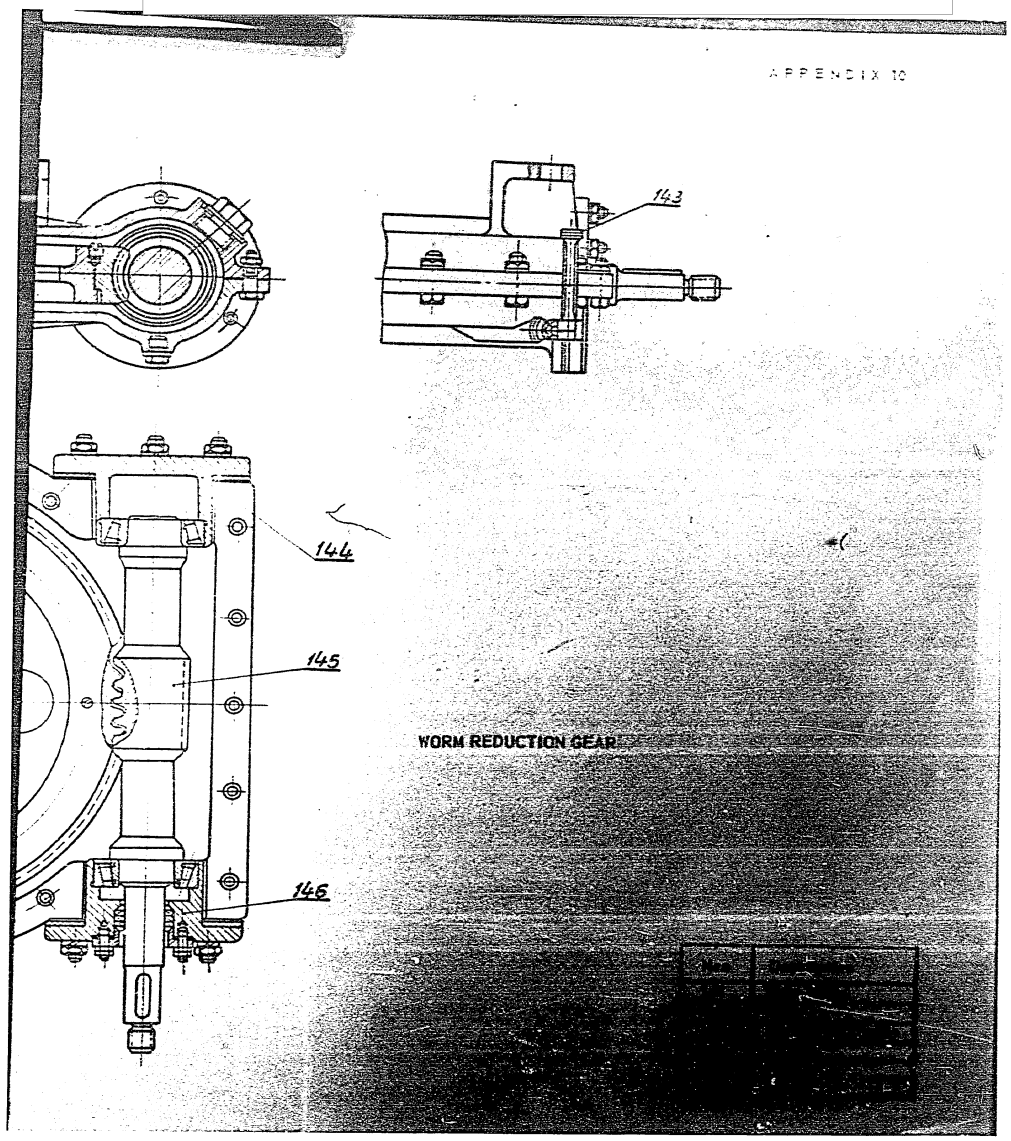



SECRET

50X1-HUM

50X1-HUM

APPENDIX 10

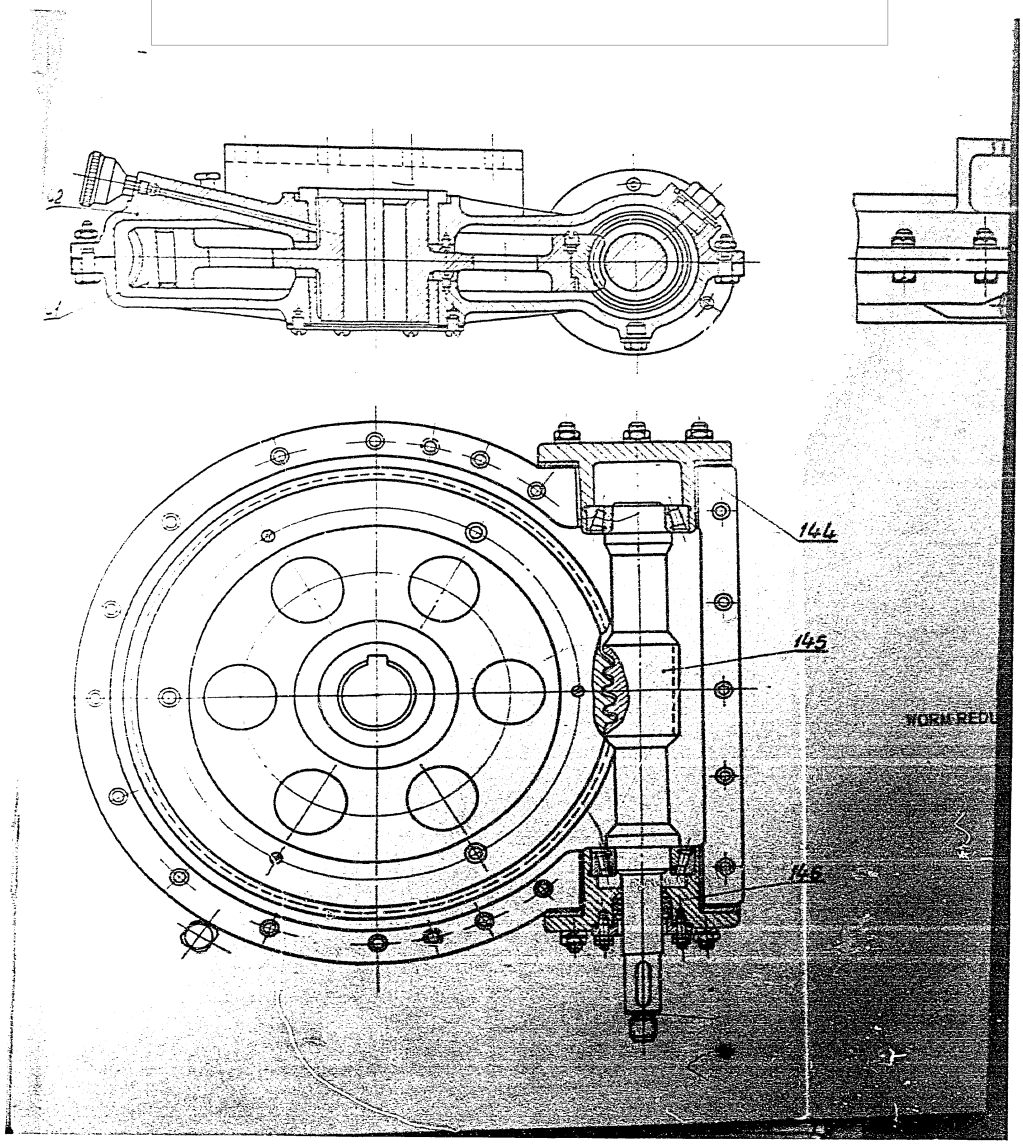



WORM REDUCTION GEAR



50X1-HUM

50X1-HUM

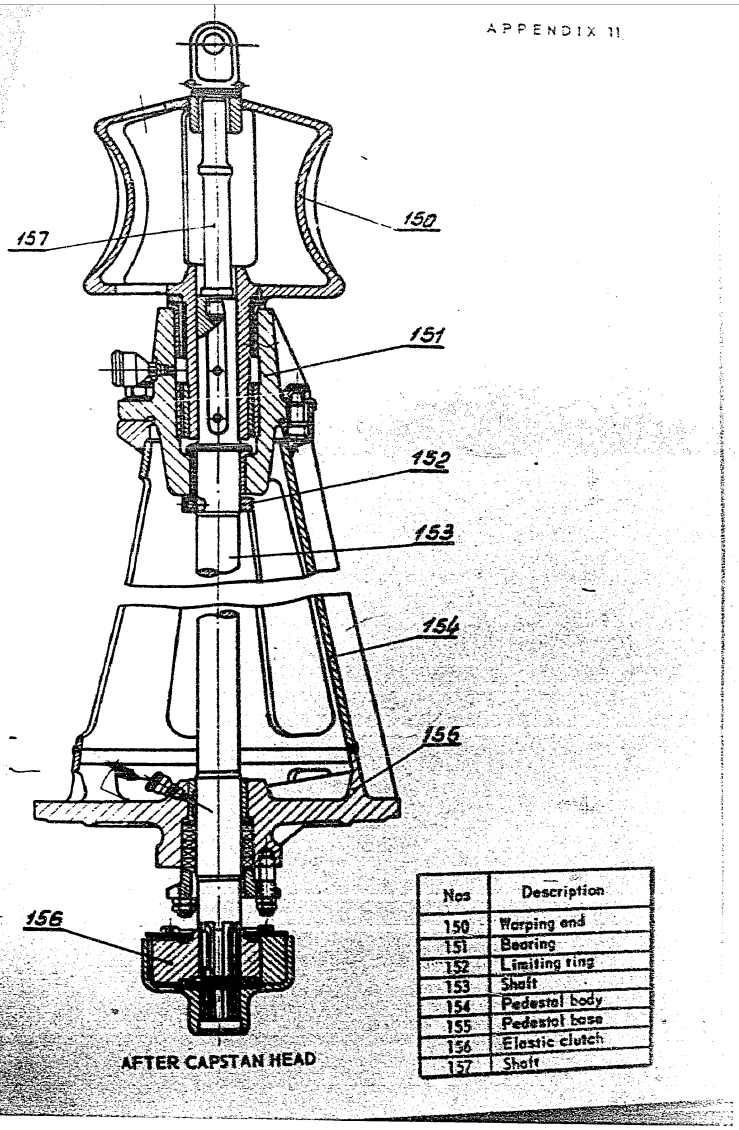





50X1-HUM

50X1-HUM

APPENDIX 11




AFTER CAPSTAN HEAD

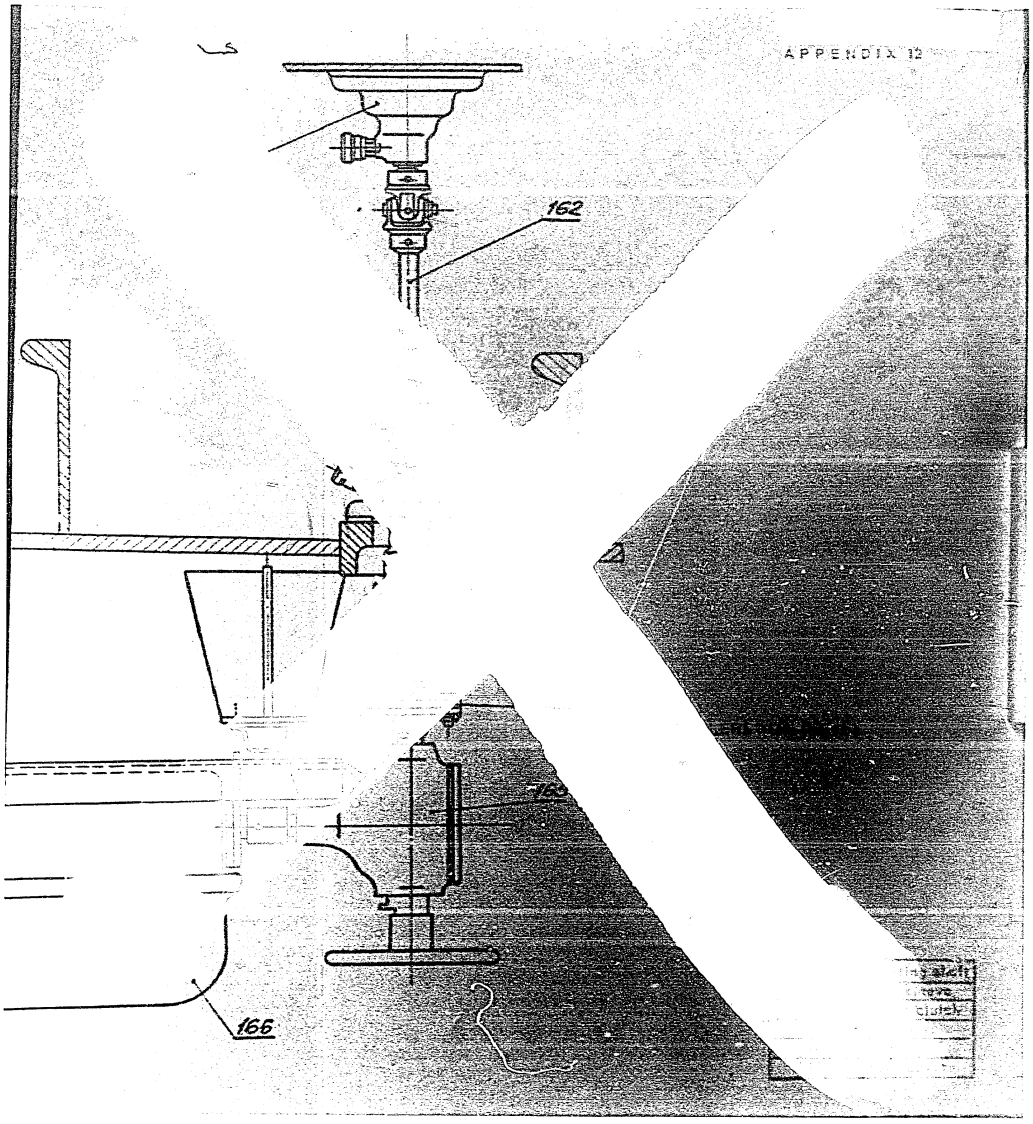
| Nos | Description |
|---|---|
| 150 | Warping end |
| 151 | Bearing |
| 152 | Limiting ring |
| 153 | Shaft |
| 154 | Pedestal body |
| 155 | Pedestal base |
| 156 | Elastic clutch |
| 157 | Shaft |



50X1-HUM

50X1-HUM

APPENDIX 12

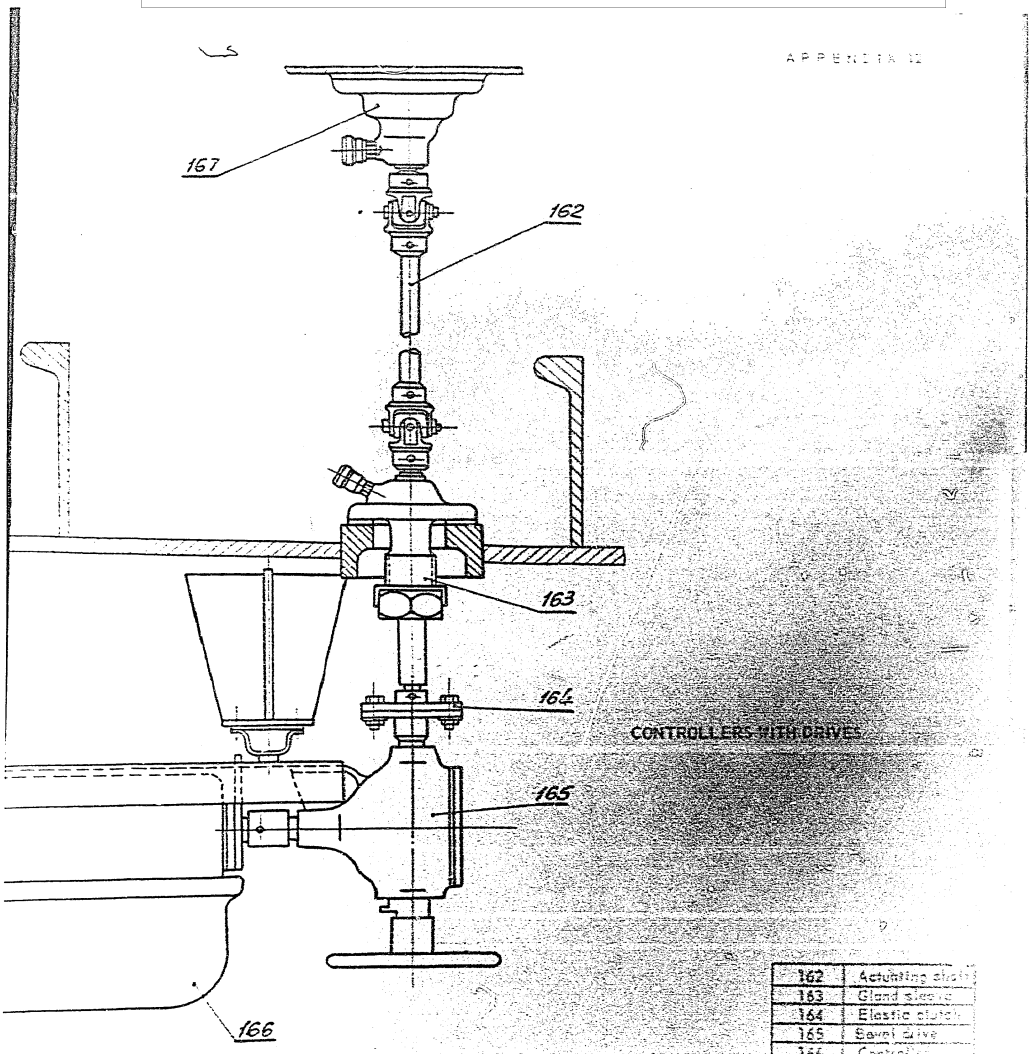





50X1-HUM

50X1-HUM

APPENDIX II



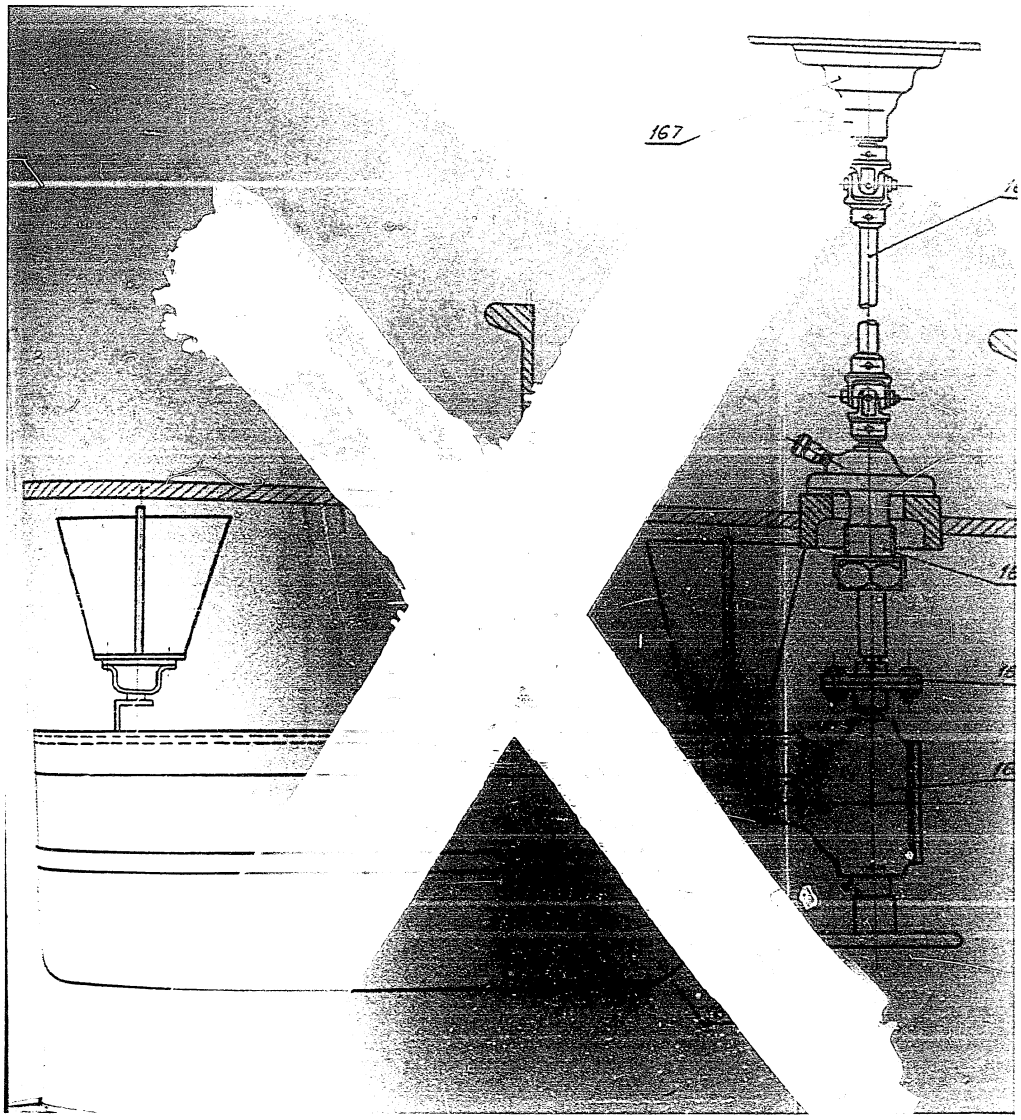

CONTROLLERS WITH DRIVES

| | |
|---|---|
| 162 | Actuating shaft |
| 163 | Gland sleeve |
| 164 | Elastic clutch |
| 165 | Bevel drive |
| 166 | Controller |
| 167 | Drive motor |

SECRET

50X1-HUM

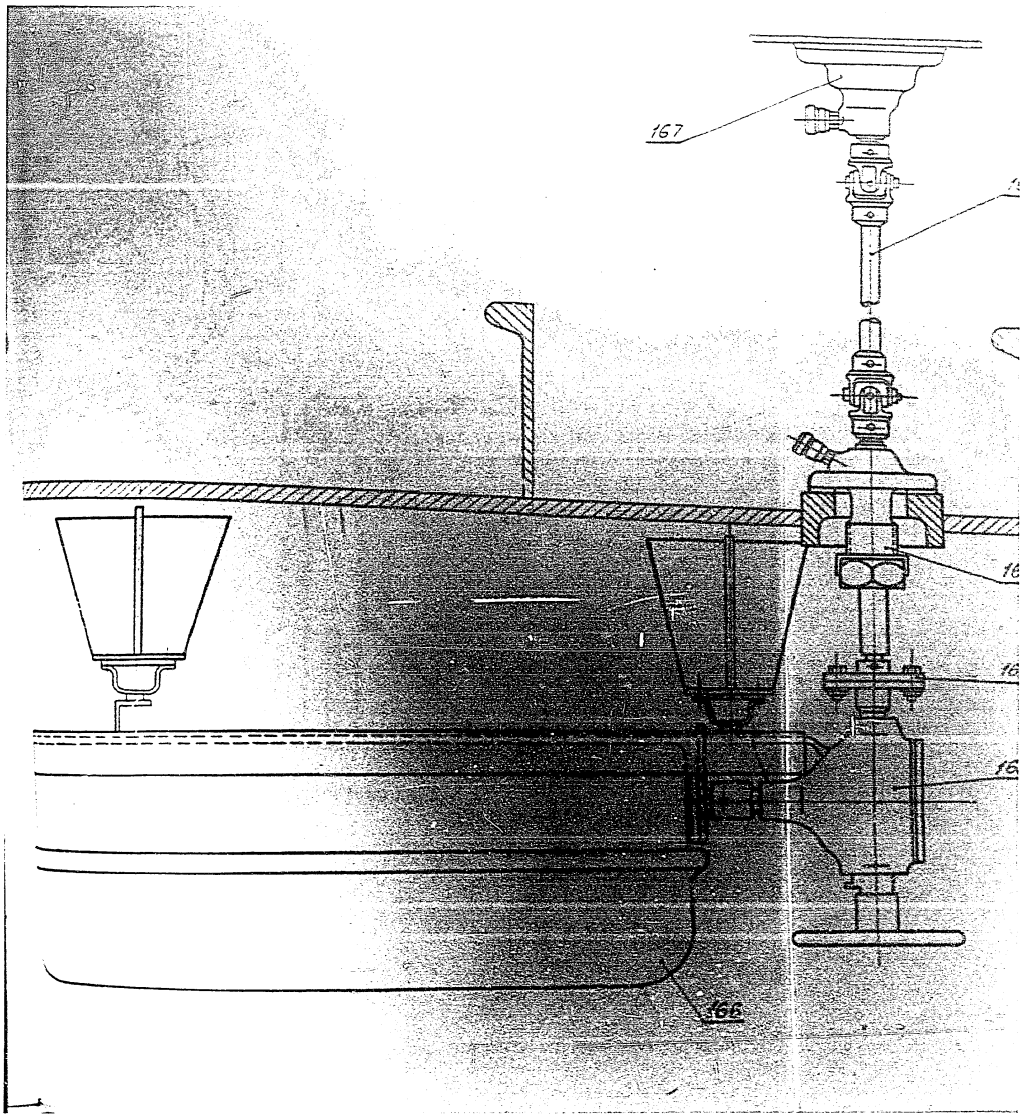
50X1-HUM




SECRET

50X1-HUM

50X1-HUM

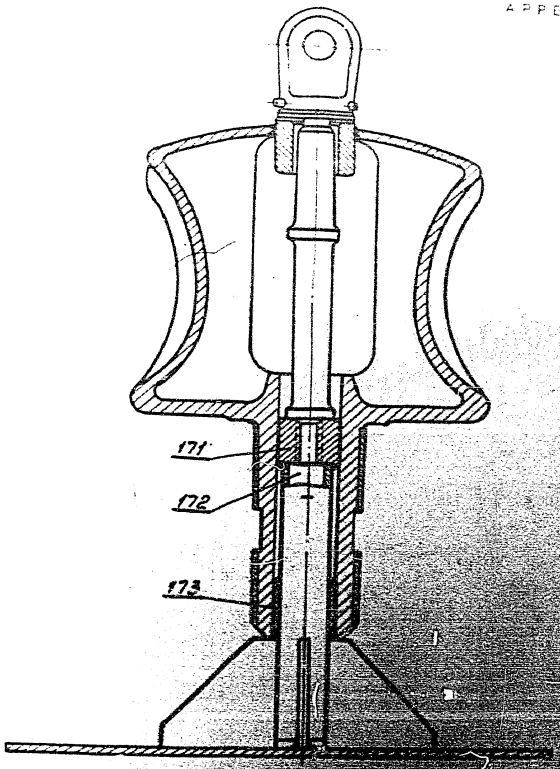



SECRET

50X1-HUM

50X1-HUM

APPENDIX 10




SUPPORT FOR WARMING DISH

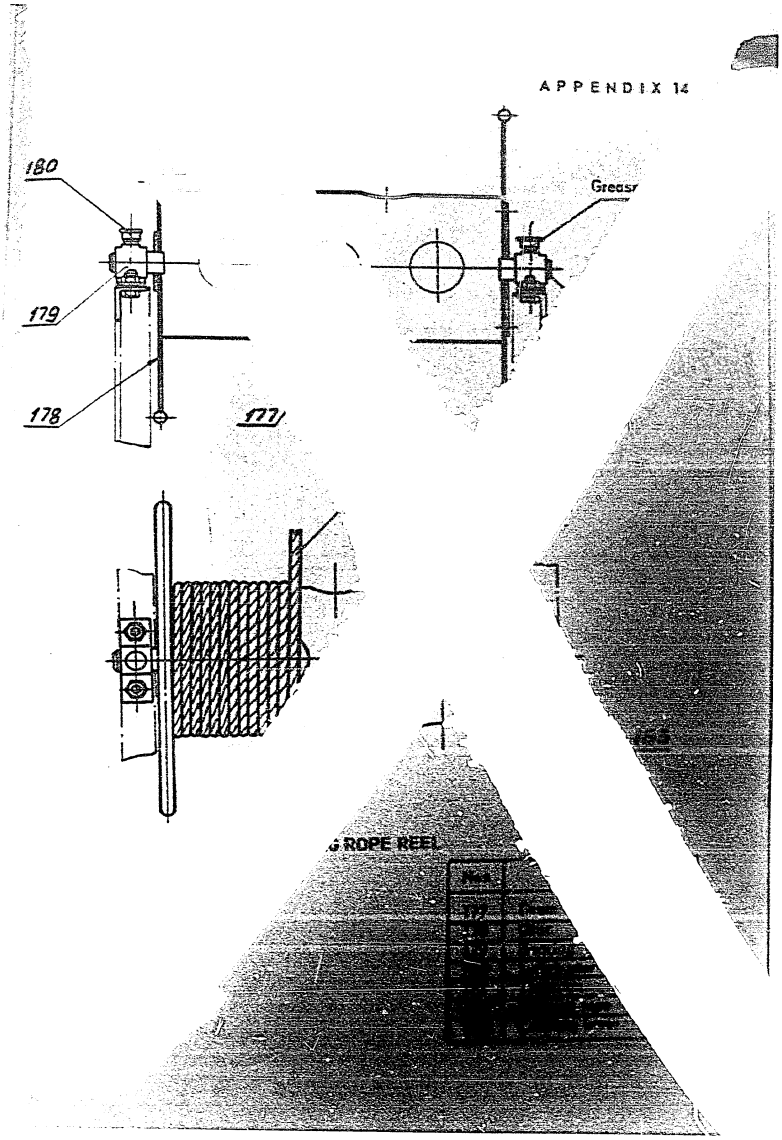
| Item | Description |
|---|---|
| 171 | Rod |
| 172 | Support |
| 173 | Bar |



50X1-HUM

50X1-HUM

APPENDIX 14

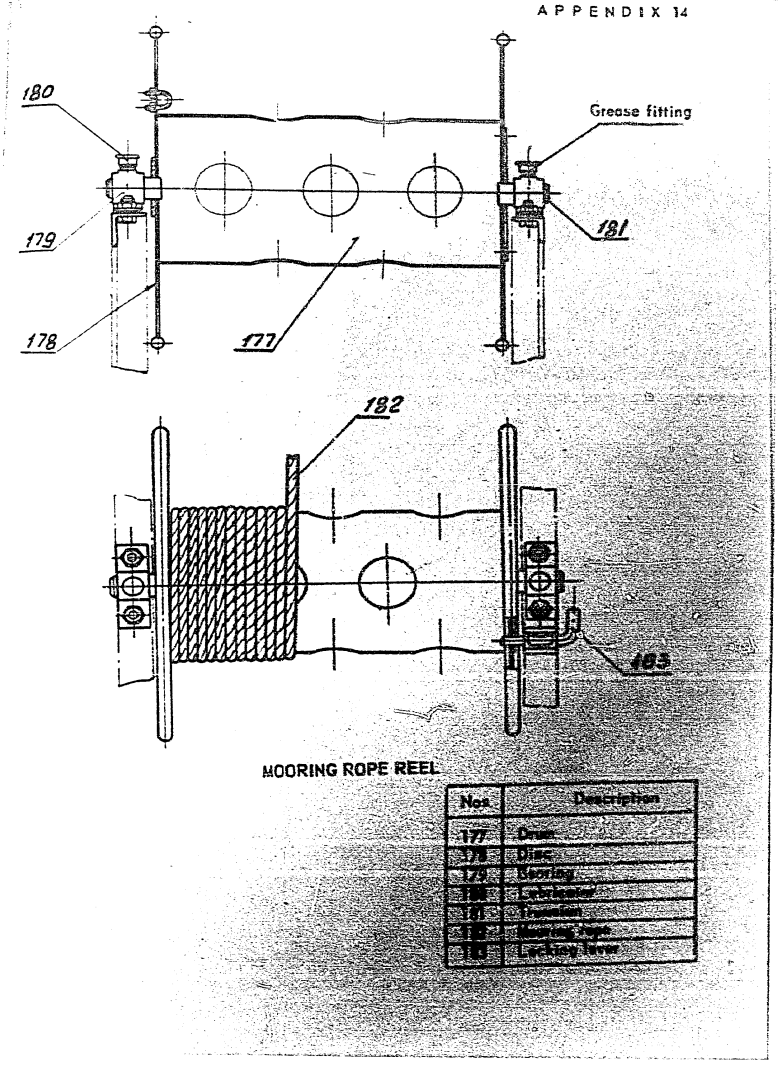





50X1-HUM

50X1-HUM

APPENDIX 14




MOORING ROPE REEL

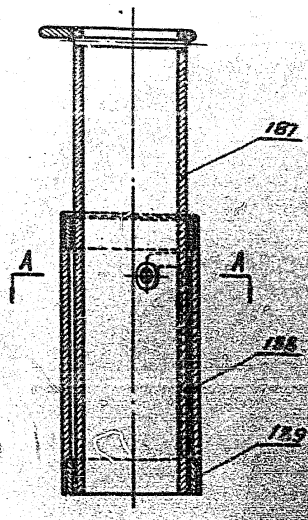
| Nos | Description |
|---|---|
| 177 | Drum |
| 178 | Disc |
| 179 | Bearing |
| 180 | Lock lever |
| 181 | Pawl |
| 182 | Mooring rope |
| 183 | Locking lever |

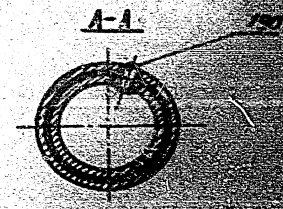
SECRET

50X1-HUM

50X1-HUM

APPENDIX 15




TELESCOPIC BOLLARD

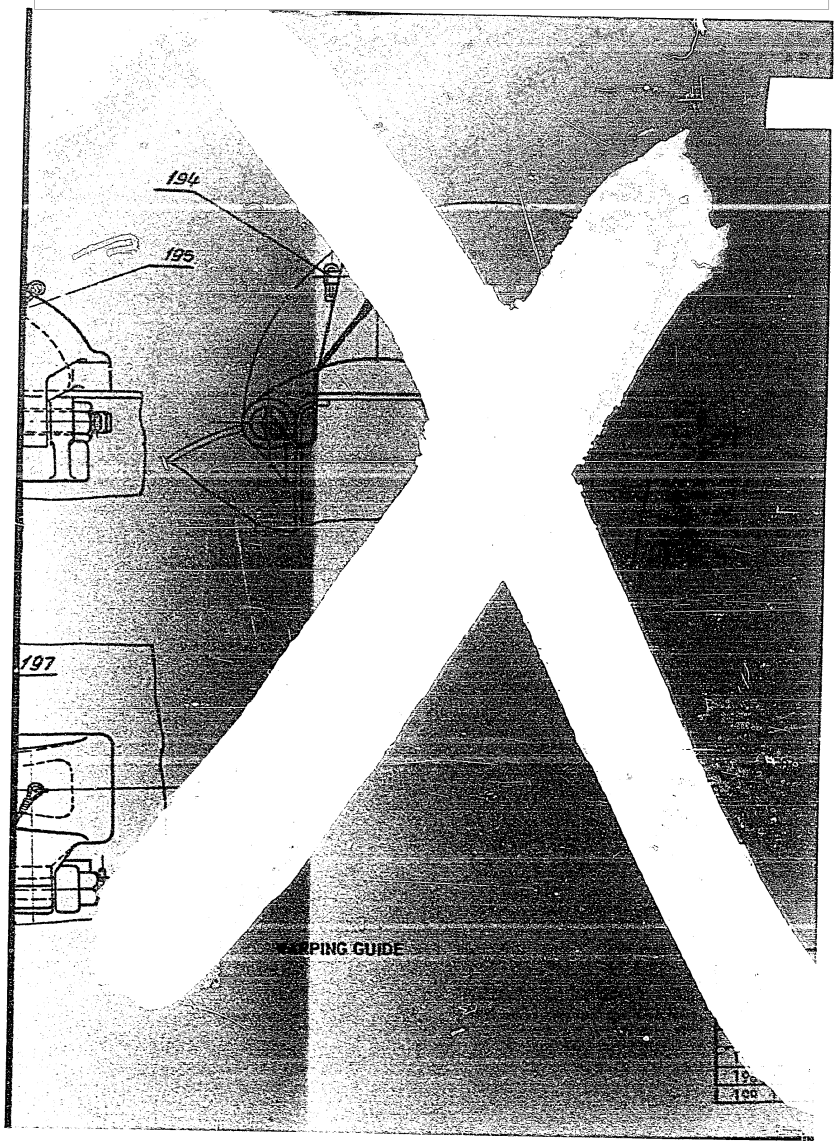
| Item | Description |
|---|---|
| 187 | Inner tube |
| 188 | Outer tube |
| 189 | Bush |
| 199 | Screw |



50X1-HUM

SECRET

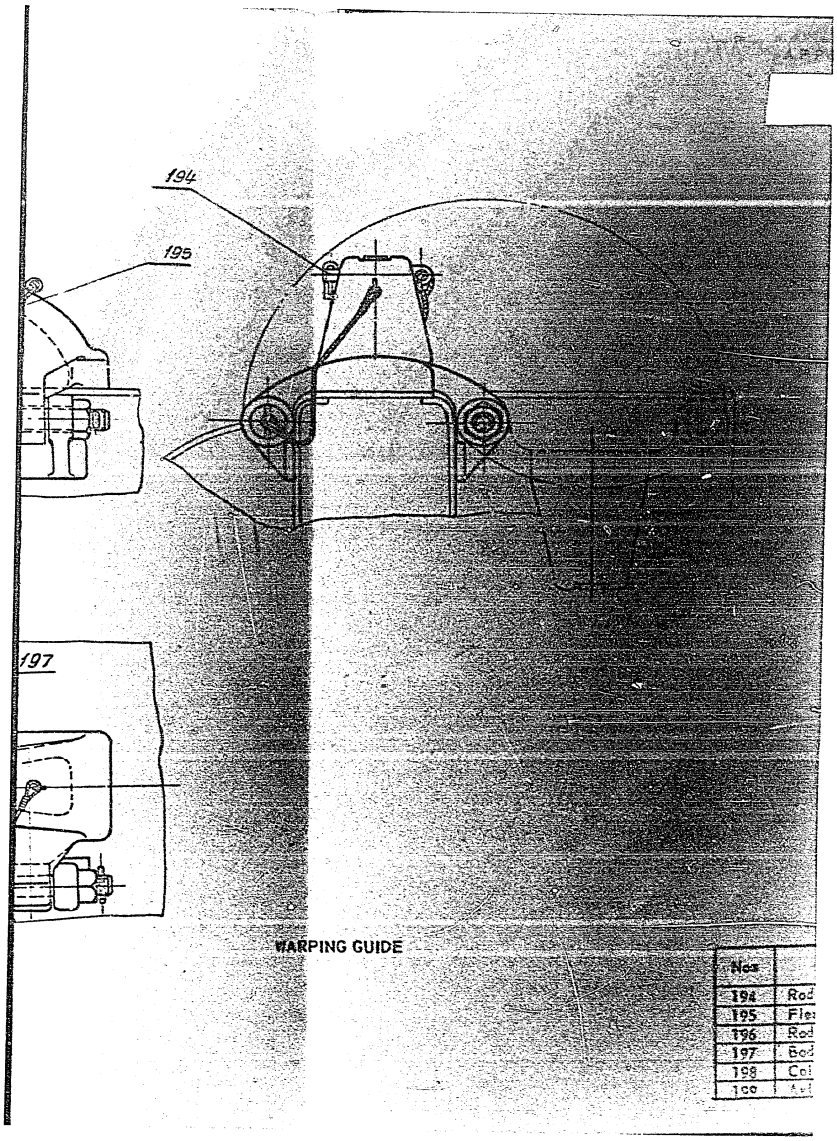
50X1-HUM




SECRET

50X1-HUM

50X1-HUM



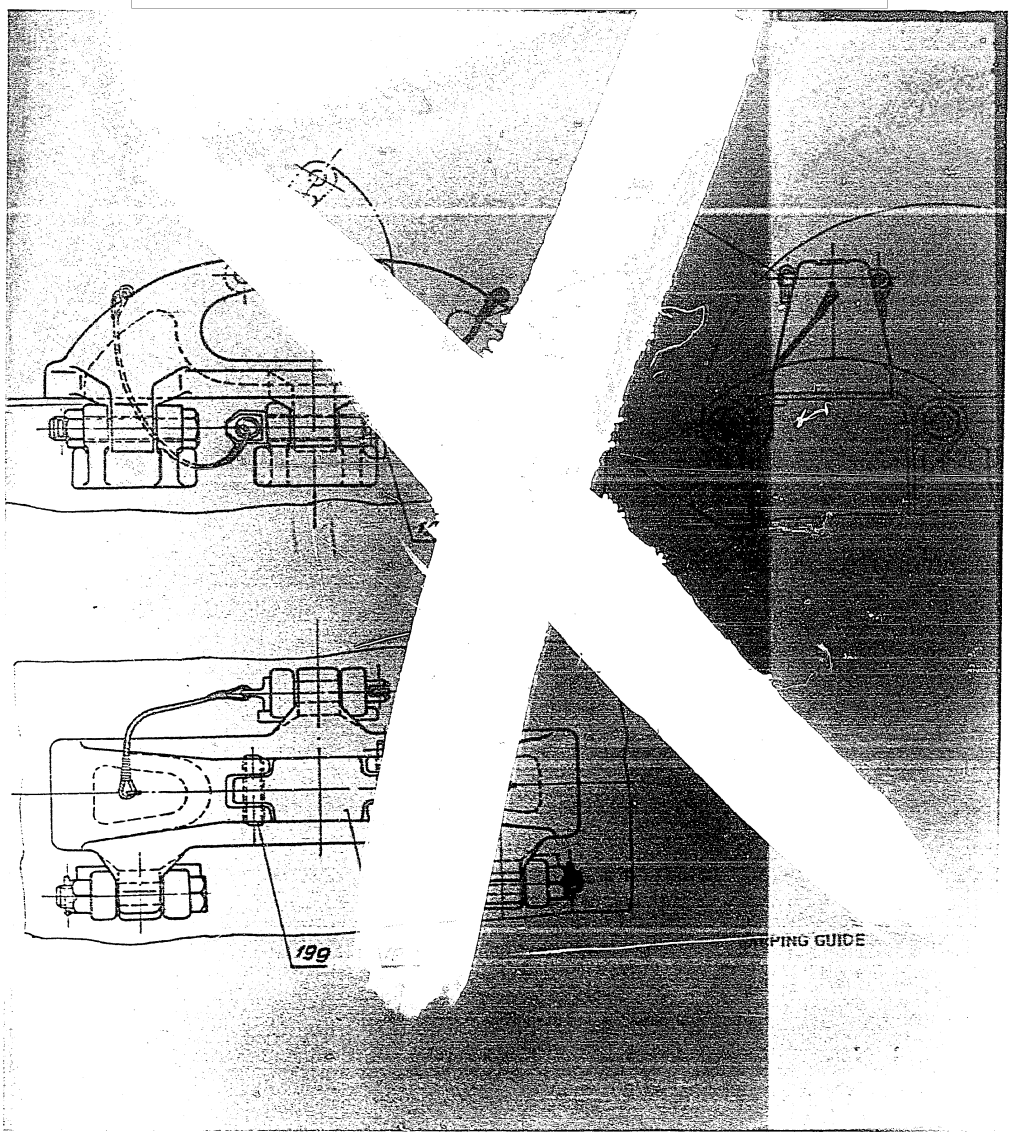

WARPING GUIDE

| Nos | |
|---|---|
| 194 | Rod |
| 195 | Fle |
| 196 | Rod |
| 197 | Rod |
| 198 | Col |
| 199 | Ad |



50X1-HUM

50X1-HUM

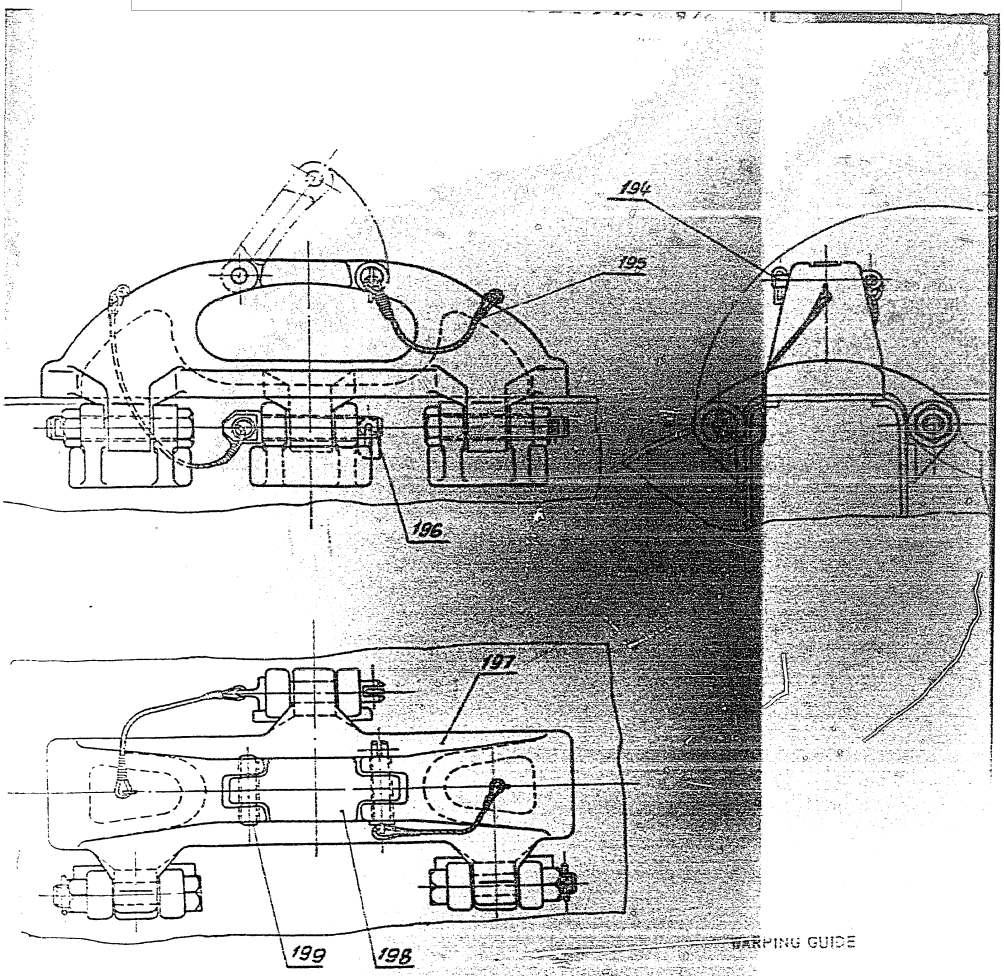





50X1-HUM

SECRET

50X1-HUM

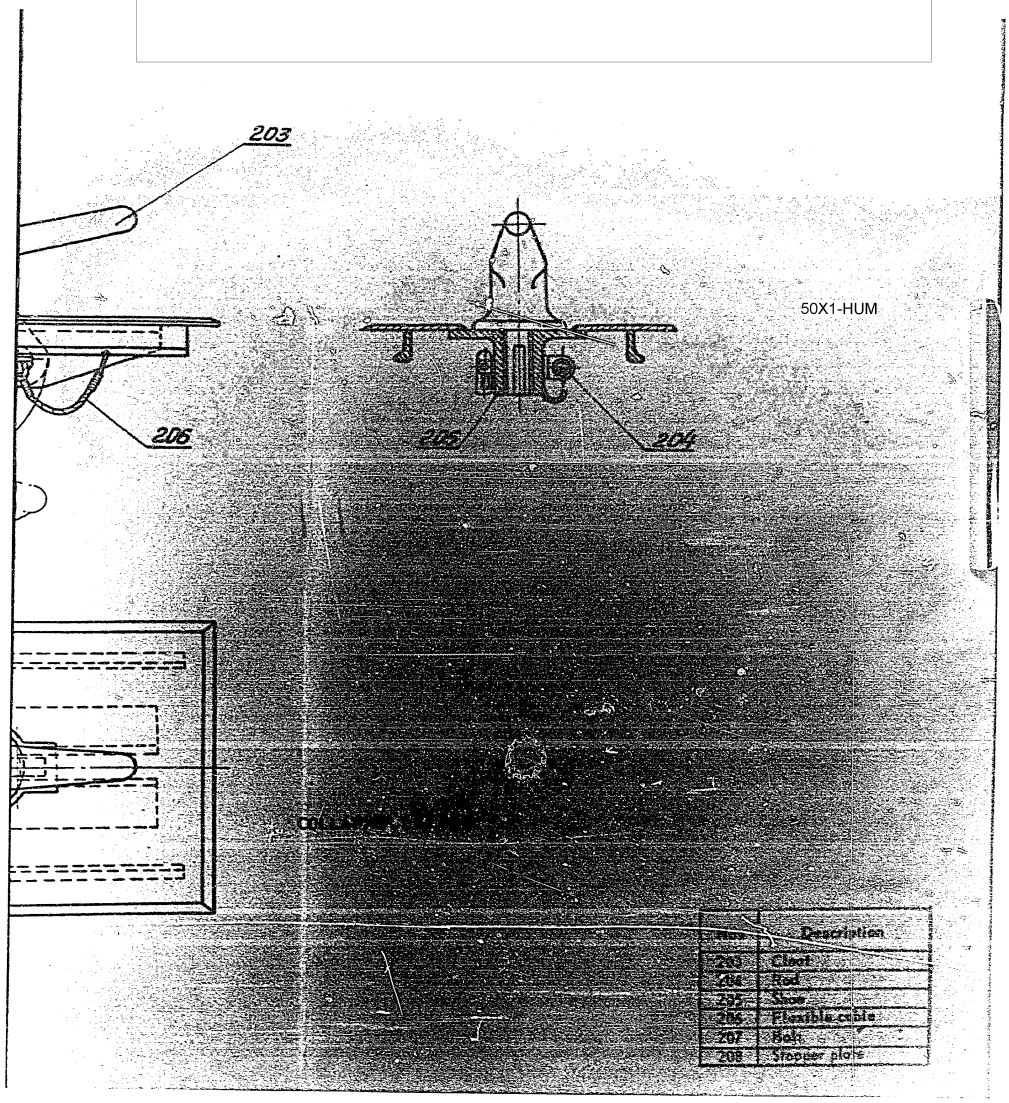



WARPING GUIDE

SECRET

50X1-HUM

50X1-HUM

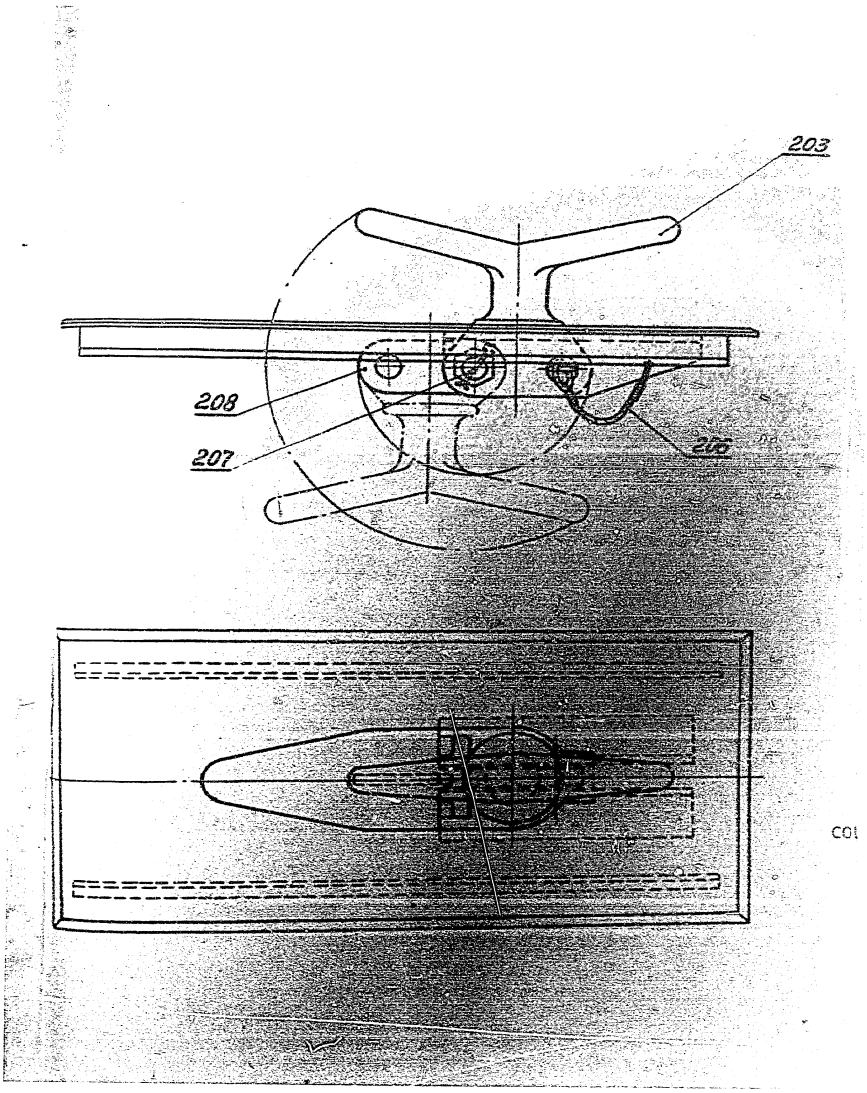



50X1-HUM

| Item | Description |
|---|---|
| 203 | Chest |
| 204 | Rod |
| 205 | Shoe |
| 206 | Flexible cable |
| 207 | Bolt |
| 208 | Stopper plate |

SECRET

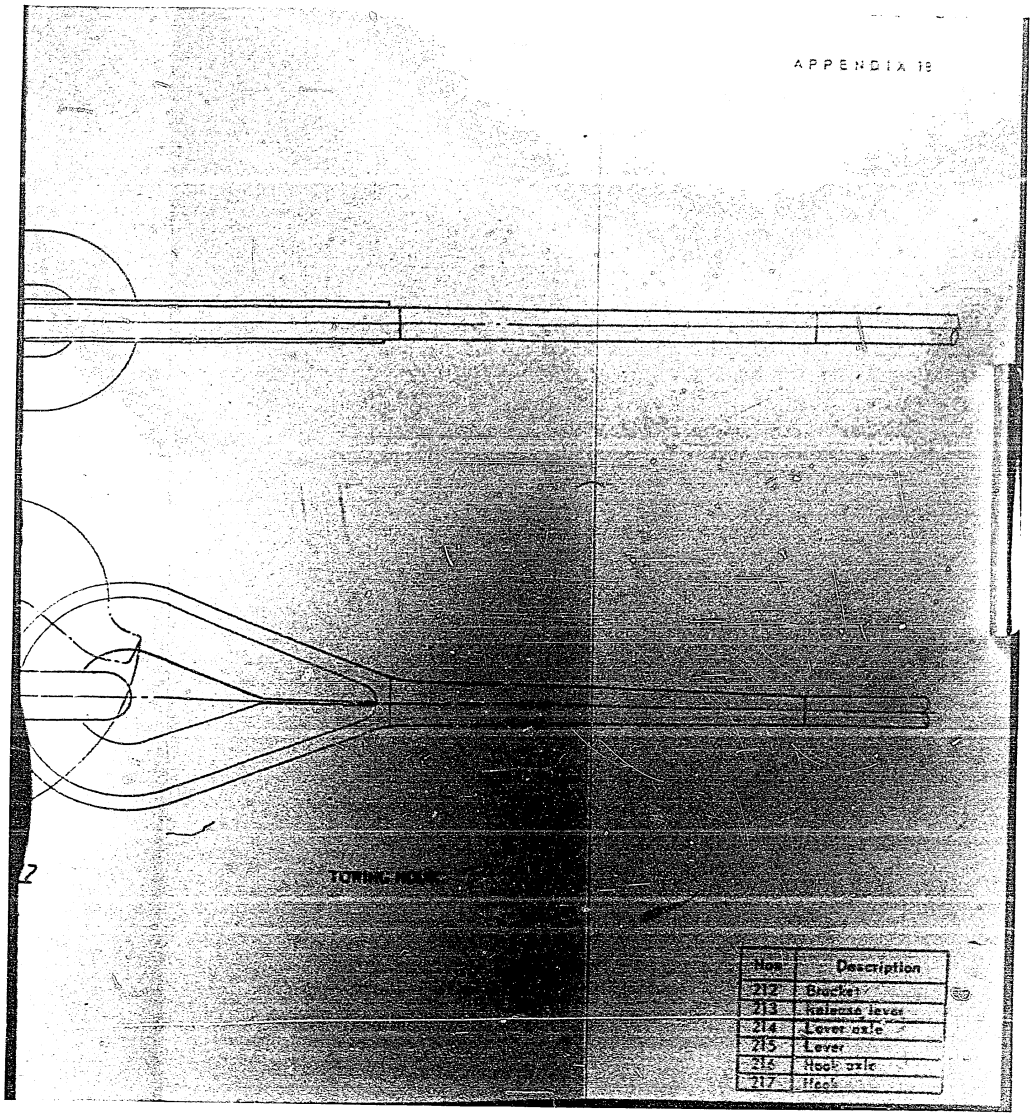
50X1-HUM




C01

SECRET

50X1-HUM

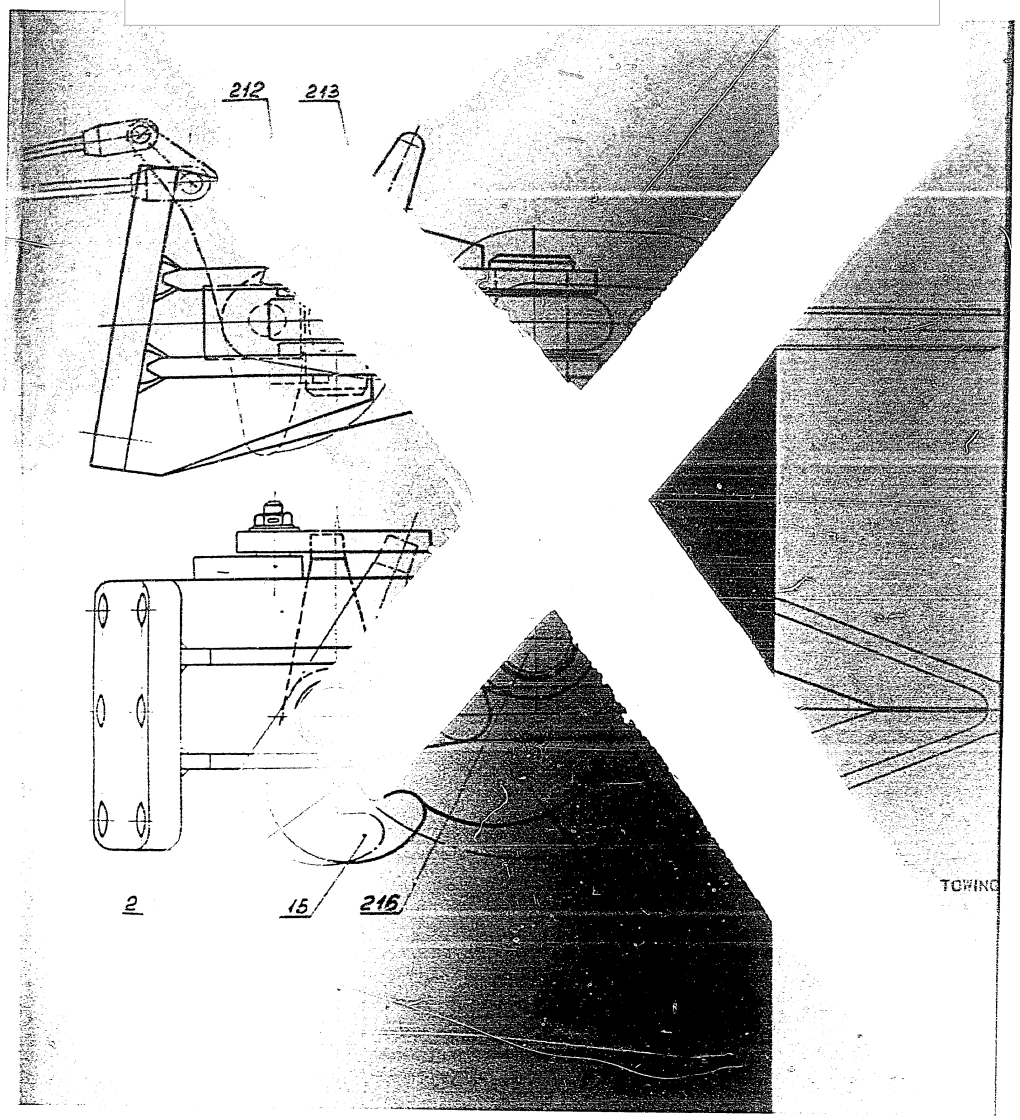





50X1-HUM

SECRET

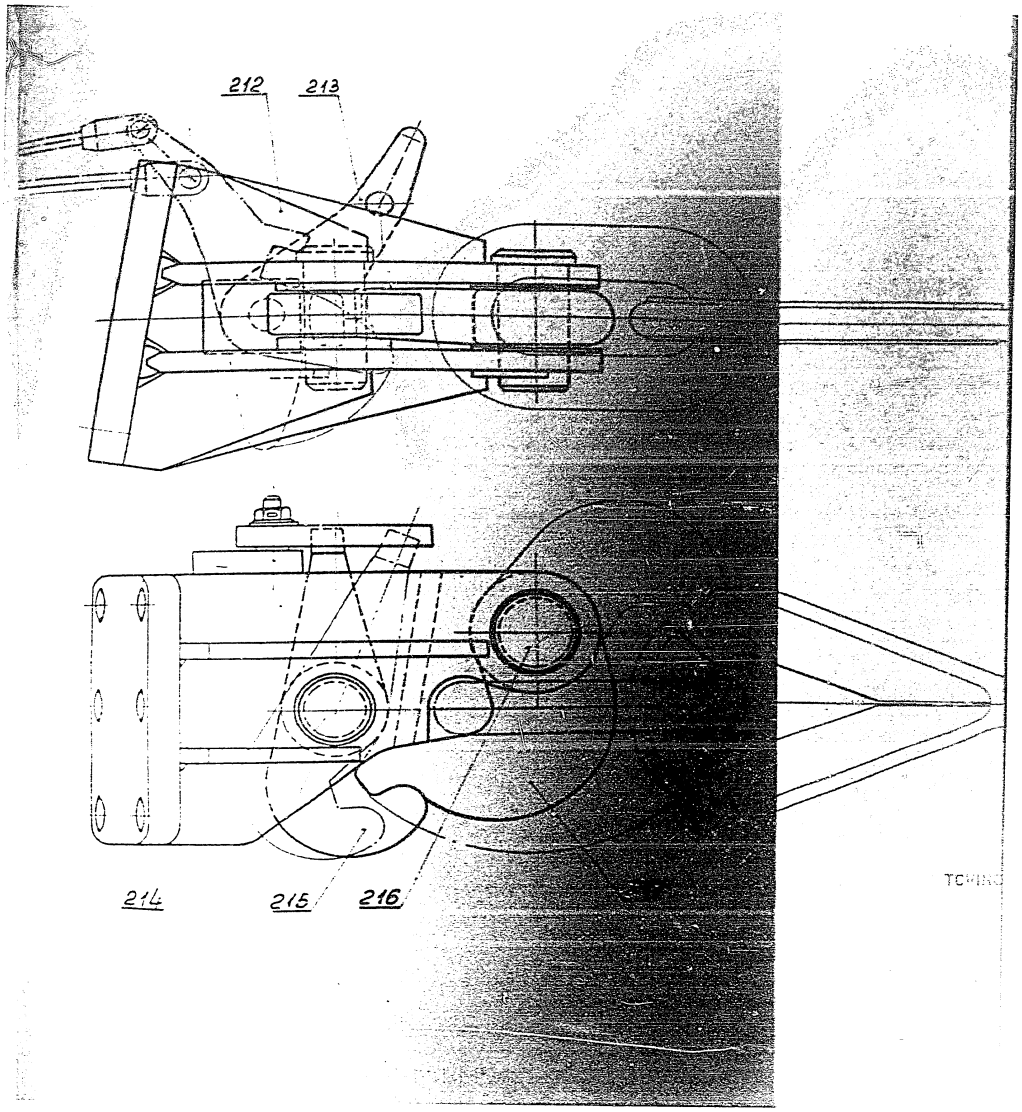
50X1-HUM




SECRET

50X1-HUM

50X1-HUM

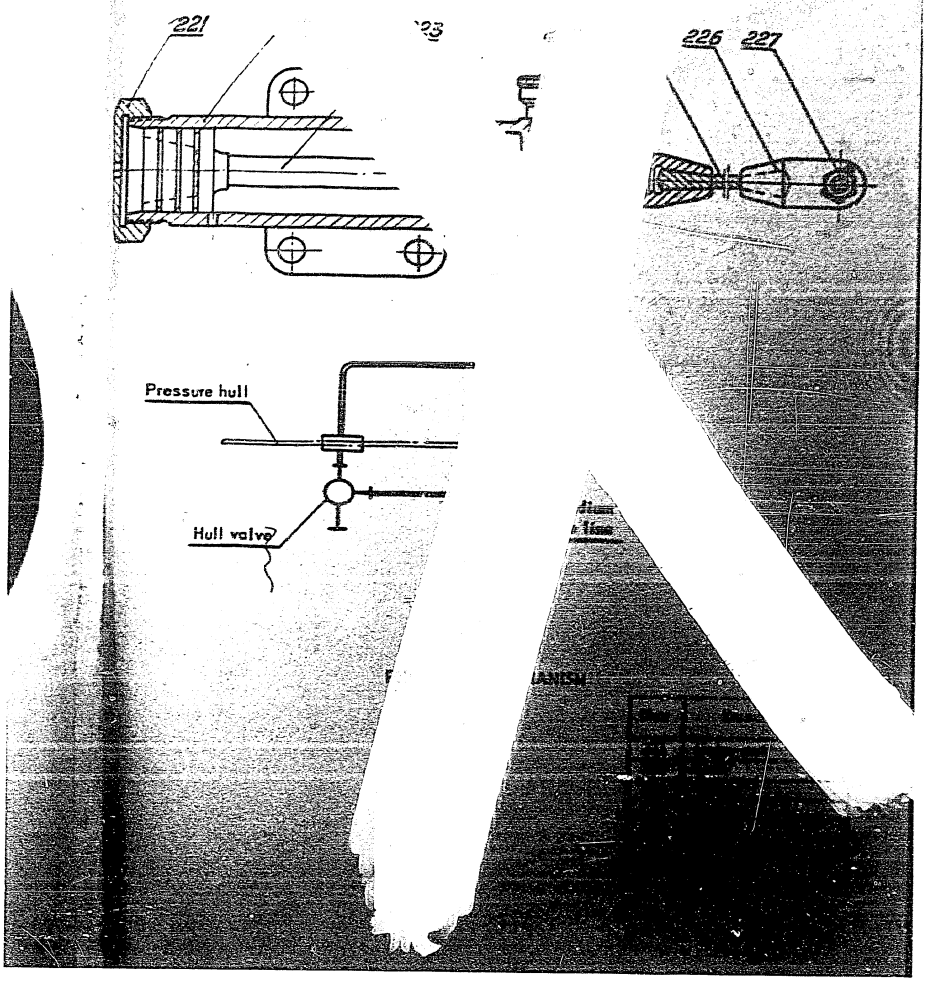





50X1-HUM

50X1-HUM

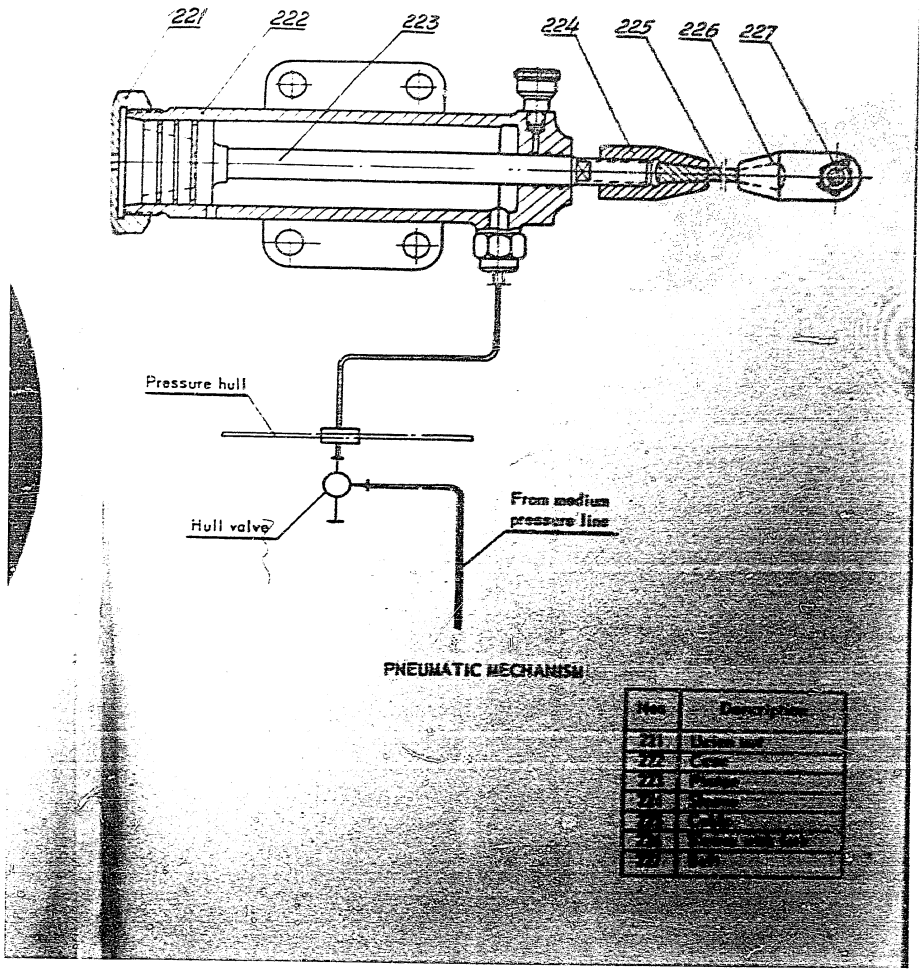
APPENDIX 19





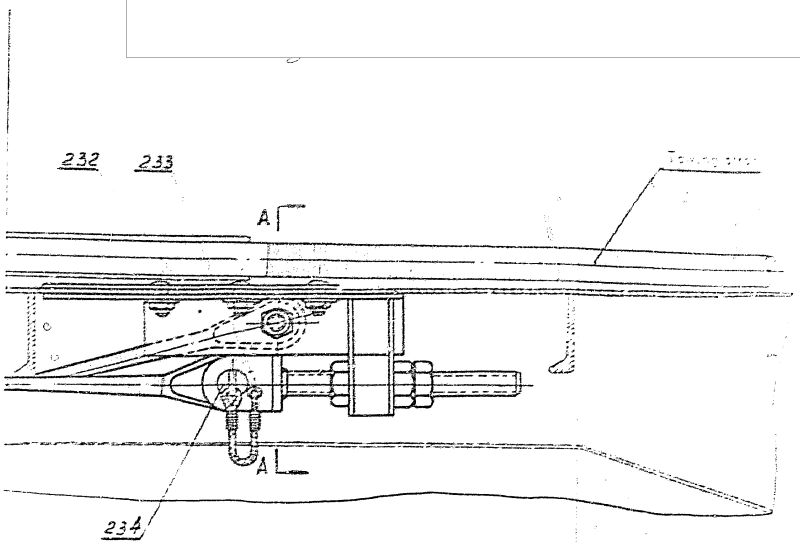

50X1-HUM

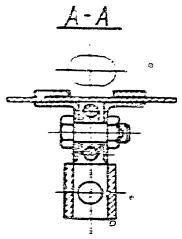
APPENDIX 19




PNEUMATIC MECHANISM

| Nos. | Description |
|---|---|
| 221 | Bottom seal |
| 222 | Cover |
| 223 | Piston |
| 224 | Packing |
| 225 | Guide |
| 226 | Valve seat |
| 227 | Rod |

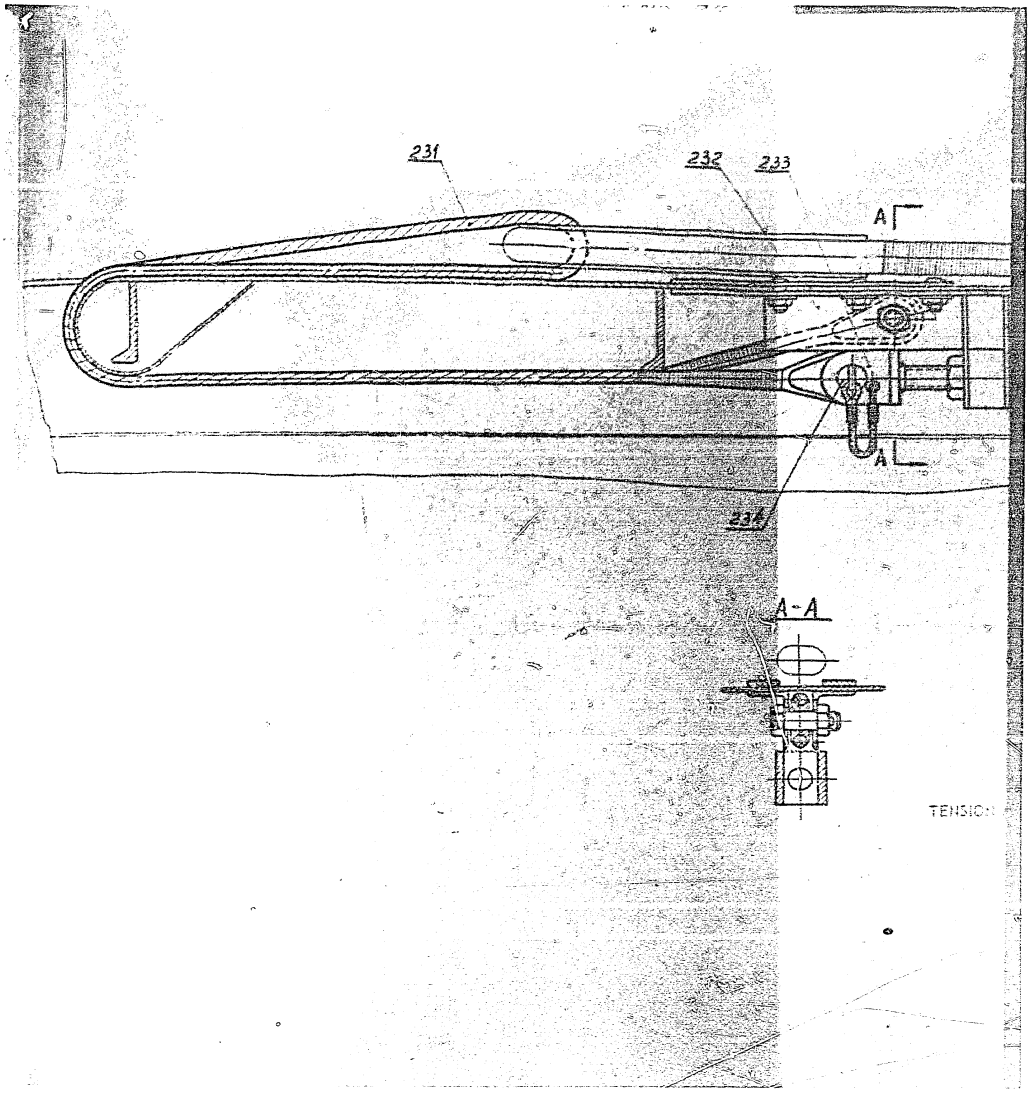



TENSION ADJUSTING GEAR

| Nos | Description |
|---|---|
| 231 | Rope |
| 232 | Base |
| 233 | Tension fork |
| 234 | Rod |

50X1-HUM

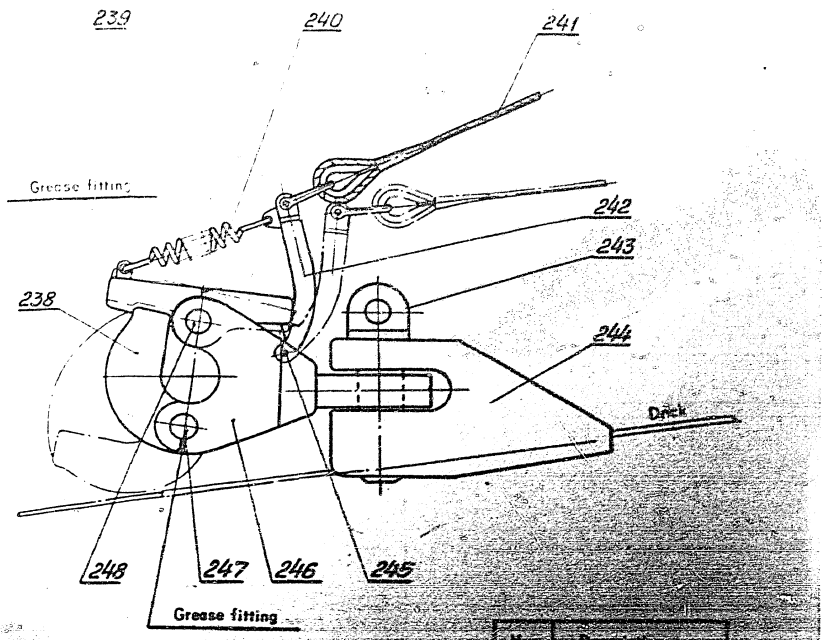





50X1-HUM

50X1-HUM

APPENDIX 21




AFTER TOWING HOOK

| Item | Description |
|---|---|
| 238 | Shaft |
| 239 | Lever |
| 240 | Bracket |
| 241 | Hook release rope |
| 242 | Handle |
| 243 | Pin |
| 244 | Towing clamp |
| 245 | Handle pin |
| 246 | Bracket |
| 247 | Hook pin |
| 248 | Lever pin |



50X1-HUM

50X1-HUM