



# NATIONAL STANDARDS COMMISSION

## WEIGHTS & MEASURES (PATTERNS OF INSTRUMENTS) REGULATIONS

### REGULATION 9

#### CERTIFICATE OF APPROVAL No 6/10A/4

This is to certify that an approval has been granted by the Commission that the pattern and variants of the

Hawke Non-self-indicating Weighing Instrument of 40 t capacity

submitted by Ultra Scales Pty Ltd,  
35 Judge Street,  
Sunshine, Victoria, 3020,

and manufactured by Hawke & Co. Pty Ltd,  
South Terrace,  
Kapunda, South Australia, 5373,

are suitable for use for trade.

The approval of the pattern and variants is subject to review on or after 1/8/82.

All instruments purporting to comply with this approval shall be marked NSC No 6/10A/4.

Relevant drawings and specifications are lodged with the Commission.

#### Conditions of Approval for Variant 17

1. This variant may only be applied to the baseworks approved in Certificate of Approval No 6/10A/4.
2. The steelyard of the original instrument, suitably graduated, is retained on the headwork.
3. The load cells to be used shall be subject to regular certification by the National Standards Commission.

Signed

Executive Director

#### Descriptive Advice

Pattern: approved 26/11/68

- Hawke non-self-indicating weighbridge of 40 t capacity, known as the Hawke Seven-levers Weighbridge.

Variants: 1 to 7 and 8 to 16 were approved on 26/11/68 and 13/7/71 respectively; portions of these approvals have been withdrawn.

Certificate of Approval No 6/10A/4 pages 3 to 7 dated 20/7/71, Figures 1 to 16 dated 27/7/70, and Figures 17 to 28 dated 20/7/71, describe the pattern and variants to 1 to 16.

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Variant: approved 10/7/81

17. The pattern and variants with an HBM (GDR) Z3H 500 kg load cell and Ultra 9000 Indicator with a maximum of 3000 scale intervals.

Technical Schedule No 6/10A/4 Variation No 1 dated 31/7/81 describes variant 17.

Filing Advice

The approval comprises:

Certificate of Approval No 6/10A/4 pages 3 to 7 and Figures 1 to 28  
Technical Schedule No 6/10A/4 Variation No 1 dated 31/7/81

(there is no Technical Schedule No 6/10A/4).

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\*DESCRIPTION OF PATTERN

The pattern is of a non-self-indicating weighbridge of 90 990 lb capacity, known as the Hawke Seven-lever Weighbridge.

The pattern consists of a platform which is supported directly through bearings on four second-order main levers at eight load knife-edges (see Figure 1). The two fulcrum knife-edges of each main lever are located on bearings mounted in links which are free to swing on the floor-mounted pedestals only in the longitudinal direction of the weighbridge (see Figure 2). The main levers are arranged as shown in Figure 3 with the nose-end knife-edges of each pair connected through a compound vertical link (see Figure 4) to two longitudinal first-order levers (see Figure 1).

Each knife-edge is machined on the back and side faces and fits into a machined groove in the lever. A bolt passes through the lever and screws into the back of the knife-edge and secures it in place. The bearing fits loosely in a recess and is held in place by clips. Friction plates are provided at each end of the bearing. The bearing can, therefore, align itself with the corresponding fixed knife-edge.

Each longitudinal lever is connected through a vertical link (see Figure 5) to a first-order transfer lever (see Figure 6) which is in turn connected through a pullrod and an intermediate lever in the headwork cabinet to a full-capacity steelyard (see Figure 7).

The steelyard is fitted with a ticket-printing poise which moves in steps of 1000 lb up to 90 000 lb. The steps consist of notches in the steelyard into which a nib on the poise fits, with a notch-protection bar mounted on the back of the steelyard. The major poise is fitted with two minor poises, one moving in steps of 100 lb to 900 lb and one in steps of 10 lb to 90 lb. The ticket is inserted in a carrier which can be moved to any of six positions to record the weight at the required position on the ticket. The ticket is marked with the total weight set on the major and two minor poises by means of a hand-operated lever beneath the poise. A ticket-printing poise of a different capacity is shown in Figure 8.

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\* Approval limited to 30th June, 1972, on 13th July, 1971, in respect of the ticket-printing poise.

20/7/71

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DESCRIPTION OF VARIANTS

- \*1. In other capacities up to 200 tons.
- \*2. With other lever systems with maximum capacities as shown:
  - (a) three-lever weighbridge (see Figure 9) - 150 tons;
  - (b) five-lever weighbridge (see Figure 10) - 150 tons;
  - (c) nine-lever weighbridge (see Figure 11) - 200 tons.
- 3. Having the steelyard fitted with a major poise, the nib of which fits into graduated notches in the steelyard and a separate minor poise which slides along a graduated bar (see Figure 12).
- 4. Having the non-self-indicating headwork replaced by a self-indicating headwork (see Figures 13 and 14). The headwork is made by E. & A. Ashworth Ltd., England, and consists of a unit-weight cabinet and a dial housing (see Figure 15). The cabinet contains intermediate levers and up to five unit weights which are manually deposited from a control handle on the side of the cabinet. A locking handle and a tool-operated zero balancing adjustment are provided. The dial housing contains a double-pendulum resistant mechanism which moves the indicator through a rack and pinion. The dial consists of a main graduated dial with a flash chart indicating the denominations of the major graduations and changing when the unit weights are changed.
- †5. Having the self-indicating headwork fitted with a dial and indicator on each side of the housing.
- 6. Having tare bars fitted to:
  - (a) the non-self-indicating headwork, as described in variant 3;
  - (b) the self-indicating headwork, provided a single dial and indicator are fitted only on the same side of the headwork as the tare bars.

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\* Approval limited to 30th June, 1972, on 13th July, 1971, in respect of the ticket-printing poise.

† Approval withdrawn 13th July, 1971.

\*7. Having the lever pedestal supports replaced by supports suspended from a steel frame surrounding the concrete pit (see Figure 16).

8. The self-indicating headwork with modified unit-weight mechanism in which up to four weights are arranged side by side and are deposited on a hanger suspended from the main headwork lever in various combinations to give up to five steps in increments of the dial capacity (see Figures 17 and 18). Each weight is fitted with a removable section containing an adjustment hole, the section being held in place by a self-locking peg.

A handle on the front of the cabinet, through a chain drive, rotates a shaft fitted with cams which, through pivoted arms, deposit the weights on the headwork lever.

The handle is fitted with a spring-loaded detent which, together with an indicator located on the top of the cabinet (see Figure 17) determines when a unit weight is selected.

A cable and pulley drive from the camshaft moves the flash dial in the dial housing to indicate the appropriate denominations of the main graduations for the range selected (see Figure 18).

9. The self-indicating headwork without intermediate levers.

10. The self-indicating headwork without a main-lever locking mechanism.

11. Having the self-indicating headwork fitted with a dial and indicator on each side of the housing, in which case tare bars are not fitted and the main-lever locking mechanism is not fitted.

12. Variants 3, 4, 6, or 8 to 11 having the basework replaced by a tubular lever basework arranged as shown in Figures 19, 20 and 21.

Each main lever (see Figures 22 and 23) is constructed from a steel tube cross-member to which one long and two short arms are welded. Each short arm (see Figure 24) consists of two side-plates which carry the load and fulcrum knife-edge holders.

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\* Approval limited to 30th June, 1972, on 13th July, 1971, in respect of the ticket-printing poise.

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The long arm consists of a rolled-steel section to which the nose-end knife-edge support is welded.

The fulcrum knife-edge holders (see Figure 24) are welded to the side-plates and the knife-edges are secured in their grooves in the holders by socket-headed set screws.

Each load knife-edge holder (see Figure 24) fits through adjustment slots in the side-plates and is bolted to a block welded to each side-plate; the knife-edges are secured in their holders by socket-headed set screws. Movement along the slots is controlled by adjusting screws with locknuts which are fitted to brackets welded to each end of the side-plates (see Figure 26).

The platform is supported on ball-bearing type support units, which comprise a pad piece and a main member, between which contact is made through two ball bearings (see Figures 25 and 26). The pad pieces are bolted to flanges welded to the platform girders (see Figure 27). The ball-bearing support allows universal lateral movement of the platform. The load bearings are located in the main members of the ball-bearing support units.

The fulcrum knife-edges of each main lever are located on self-aligning bearings on floor-mounted pedestals (see Figures 24 and 25).

Each nose-end knife-edge is carried between two side-plates (see Figure 28) which protrude past the ends of the long arm of each main lever. It has a cylindrical shank which is a push-fit in the mounting holes and has a flat at one end; each knife-edge is adjusted to within  $\pm 1/32$  inch of the vertical centre line of the shank. It is locked in position by means of two  $5/16$  inch diameter hardened square-headed cup-pointed set screws tightened to 20 lb ft torque.

13. Variants 3, 4, 6, or 8 to 12 with a self-contained basework, in which case the fulcrum pedestals are mounted in a steel framework.
14. Variants 3, 4, 6, or 8 to 13 having the headwork located in any reasonable position in relation to the basework, in which case one

or more transfer levers may be used, provided they are fully protected.

15. The non-self-indicating headwork as described in variants 3 or 6, or the self-indicating headwork replacing any headwork in a State-approved pattern\* or Commission-approved pattern.
16. Any one of the baseworks replacing the basework in any State-approved pattern\* or Commission-approved pattern.

#### GENERAL NOTES

The limitation of the approval of the pattern and variants 1, 2 and 7 to 30th June, 1972, means that new instruments fitted with a ticket-printing poise should not be verified after this date. Variant 3 refers to instruments made in accordance with the pattern and variants 1, 2 and 7, but without the ticket-printing poise.

Variant 5 has been withdrawn and replaced by variant 11, because two dials are not permitted to have a locking device on one side only.

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\* Approved pursuant to regulation 12.



# NATIONAL STANDARDS COMMISSION

## TECHNICAL SCHEDULE No 6/10A/4

### VARIATION No 1

Pattern: Hawke Non-self-indicating Weighing Instrument of 40 t capacity

Submitter: Ultra Scales Pty Ltd,  
35 Judge Street,  
Sunshine, Victoria, 3020.

Manufacturer: Hawke & Co. Pty Ltd,  
South Terrace,  
Kapunda, South Australia, 5373.

#### 1. Description of Variant

##### 1.1 Variant 17

An HBM (GDR) Z3H load cell of 500 kg capacity is connected to a suitably shortened headwork lever, a typical example of which is illustrated in Figure 29. The U links which support the load cell may be replaced with prefabricated links as in Figure 30.

The load cell output cable is connected to an Ultra 9000 indicator which displays up to 3000 scale intervals.

Transfer lever ratios are varied to allow the use of this load cell in instruments up to 200 t capacity.



## TEST PROCEDURE 6/10A/4

### VARIATION No 1

#### 1. Zero balance

Check by means of the Commission's digital zero test (Design Manual No 1, Document 104, Testing Procedure for the Elimination of Rounding Error for Weighing Instruments with Digital Indication) that, when the ZERO light is illuminated, zero is set within 0.25e of zero.

#### 2. Zero range

The maximum range of operation of the zero device should not exceed 4% of the capacity of the instrument ( $\pm 2\%$  approximately).

#### 3. Load tests

Test loads are to be applied to the instrument up to maximum capacity with the first load equal to the minimum capacity, then in not less than 5 approximately equal steps to maximum capacity followed by decreasing loads in not less than 5 approximately equal steps to zero load.

All load applications to the instrument should be in accordance with the Commission's recommended testing procedure for elimination of rounding error as set out in Document 104.

The instrument should display these loads within the applicable tolerance.

#### 4. Range of indication

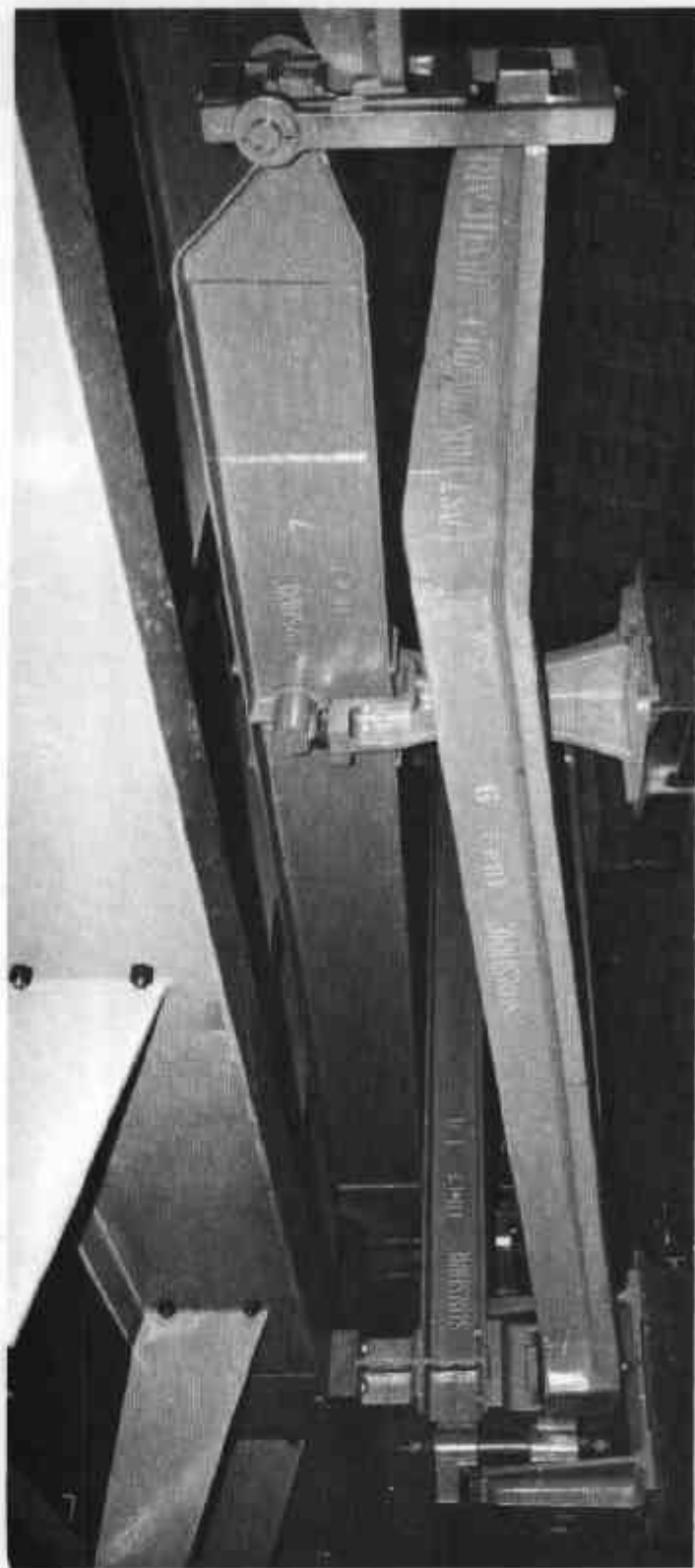
- (a) The maximum mass indicated should not exceed the maximum capacity (Max) by more than 10e; above this indicated weight the indicator should be blank.
- (b) The minimum mass indicated should be zero; below this indicated mass the indicator should be blank or display the mass prefixed by a minus sign.



CANCELLATION CERTIFICATE OF APPROVAL No 6/10A/4

**Executive Director**

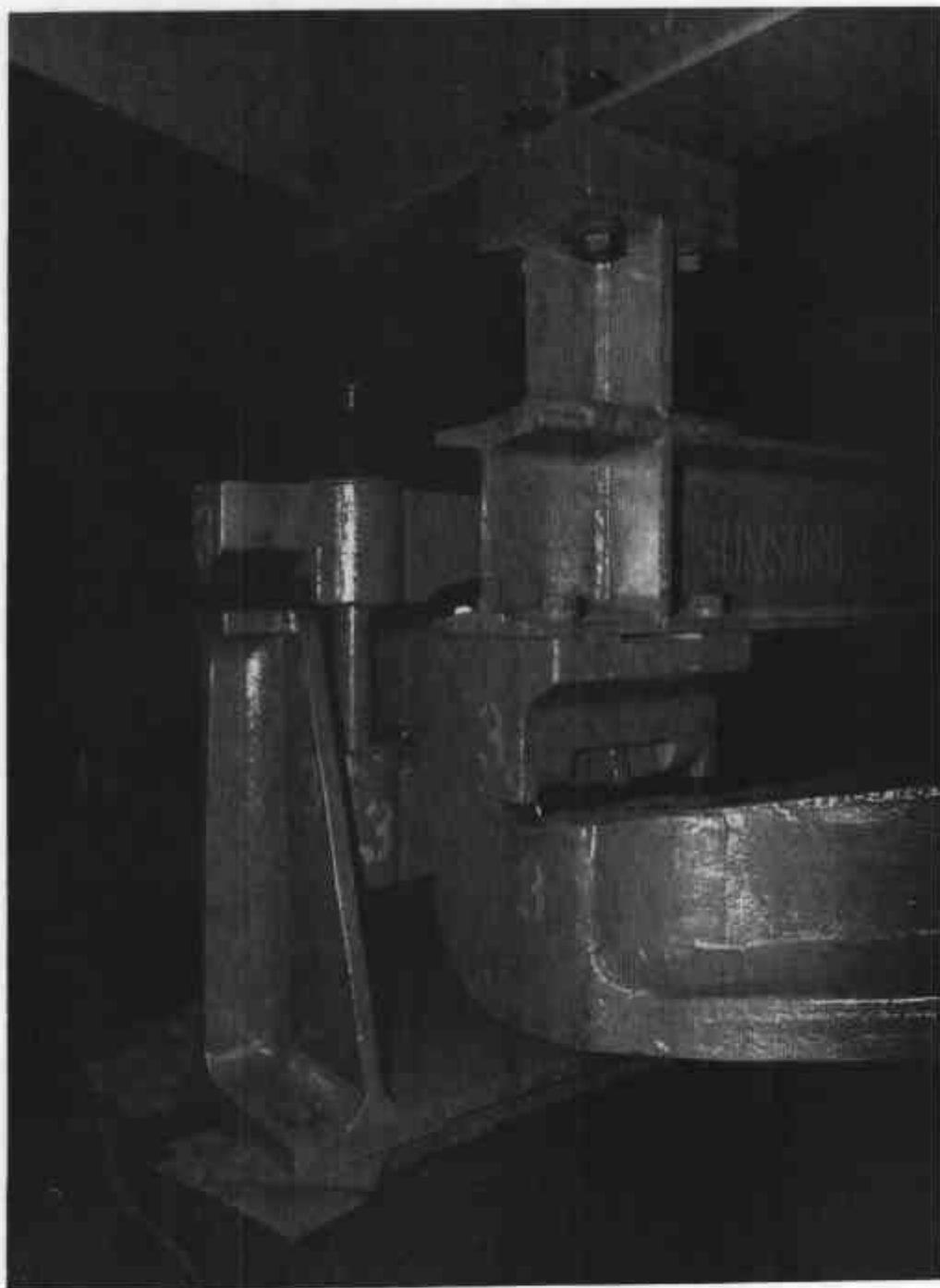
FIGURE 6/10A/4 - 1



Platform, Main Lever, Longitudinal Lever and Pedestals

27/7/70

FIGURE 6/10A/4 - 2

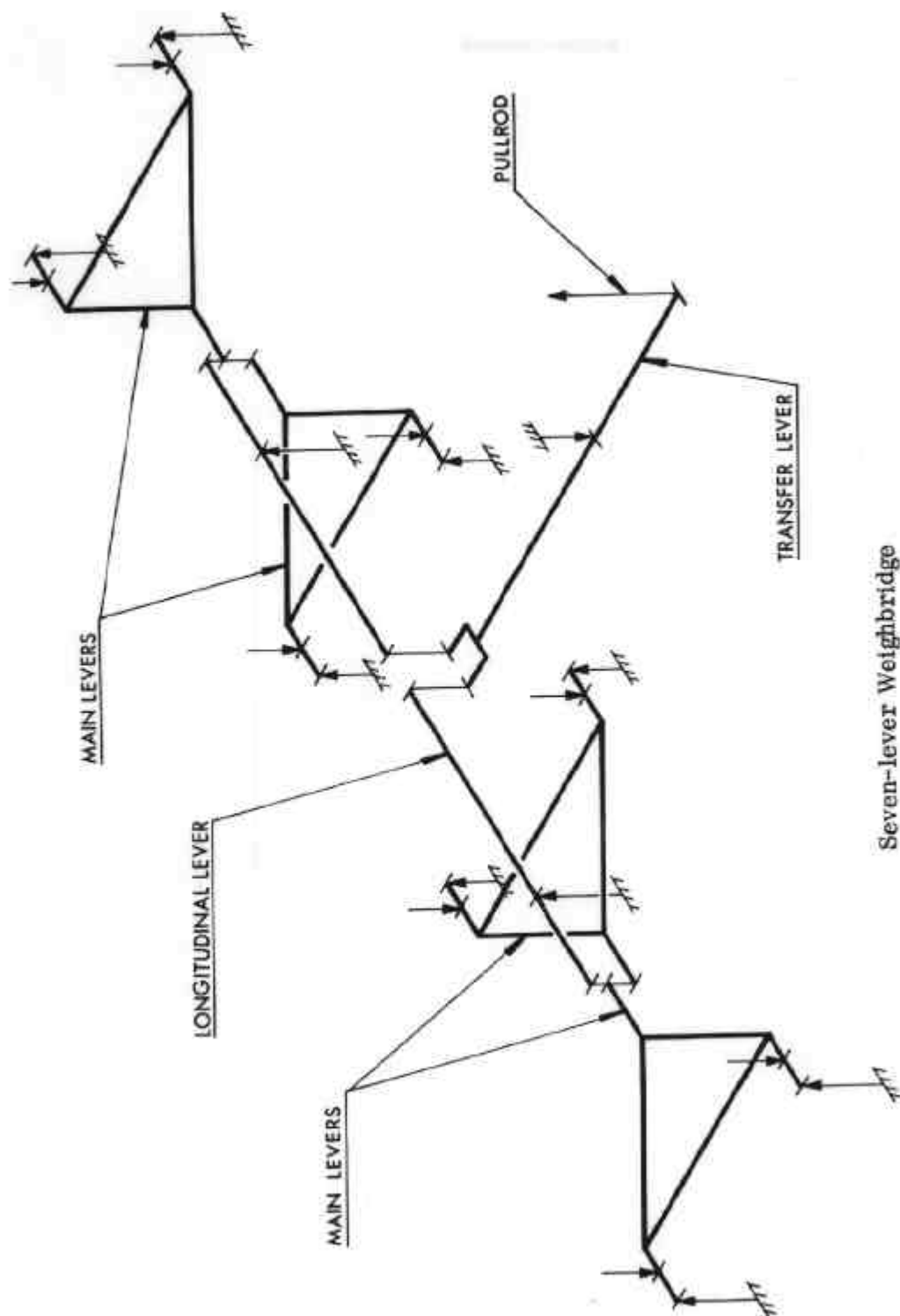


Main Lever Load Knife-edge and Fulcrum Knife-edge  
Pedestal Support

27/7/70



FIGURE 6/10A/4 - 3



Seven-lever Weighbridge

27/7/70

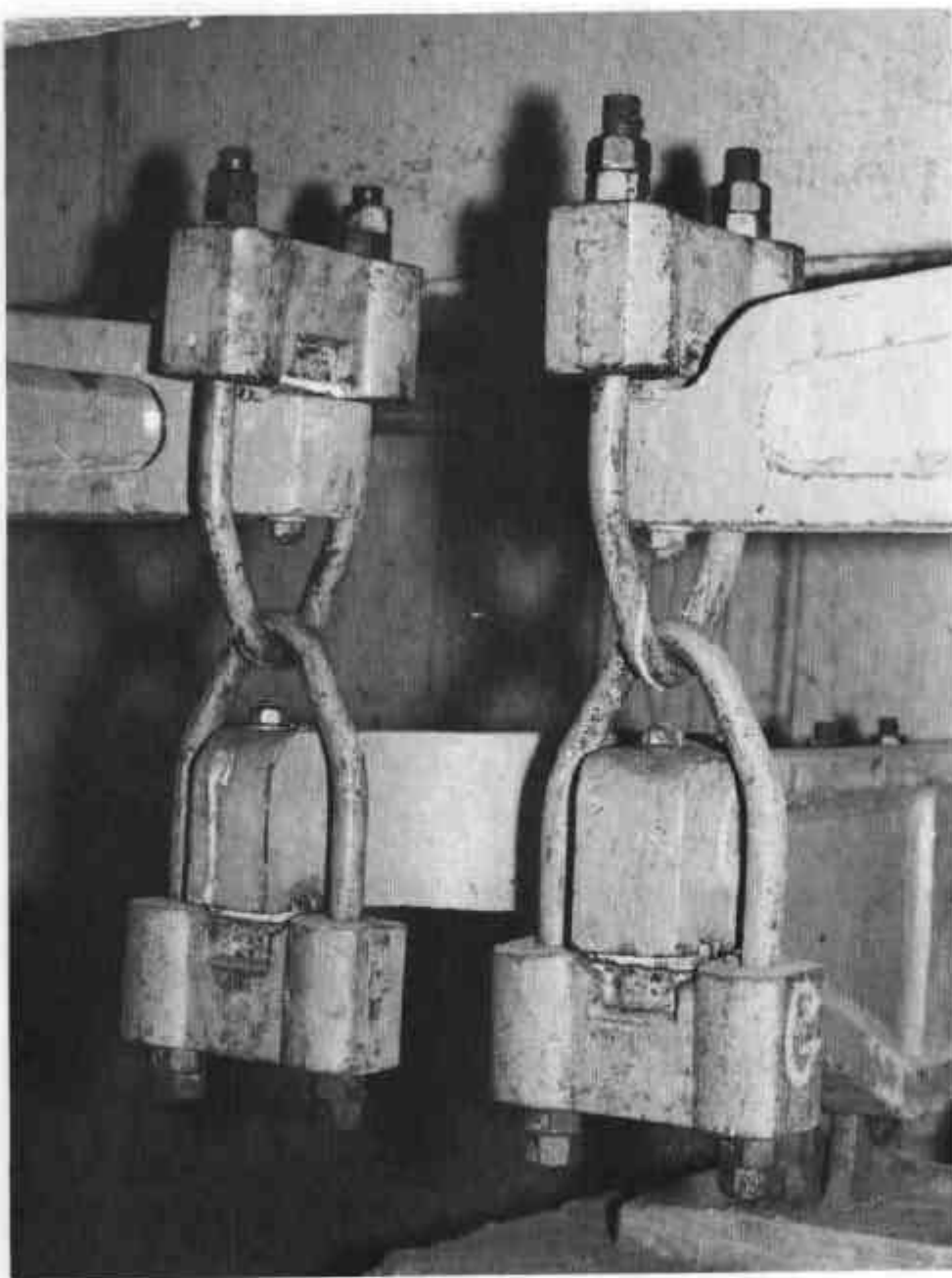
FIGURE 6/10A/4 - 4



Compound Vertical Link, Main Levers to Longitudinal Lever  
27/7/70

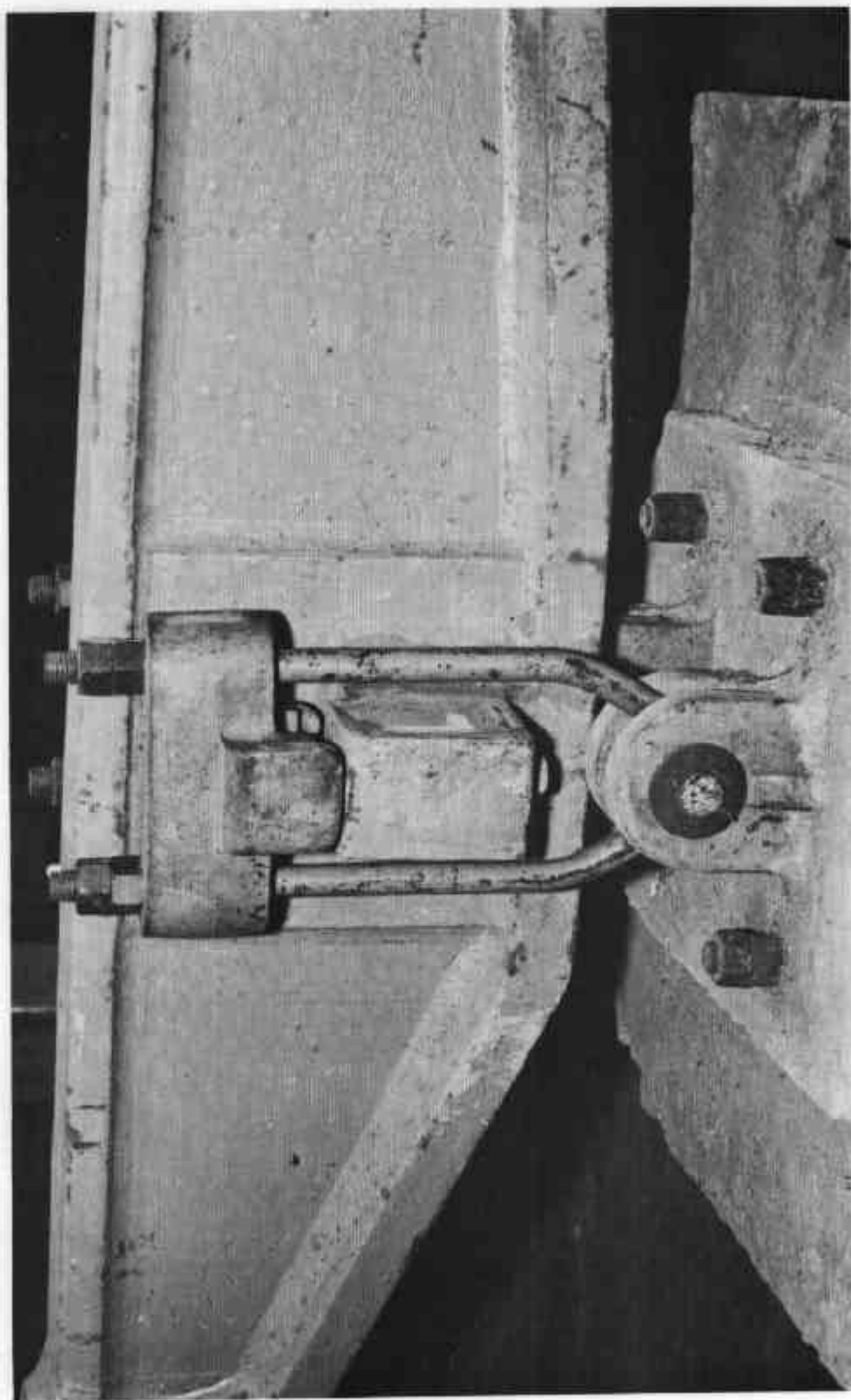


FIGURE 6/10A/4 - 5



Vertical Links Longitudinal Levers to Transfer Lever  
27/7/70

FIGURE 6/10A/4 - 6

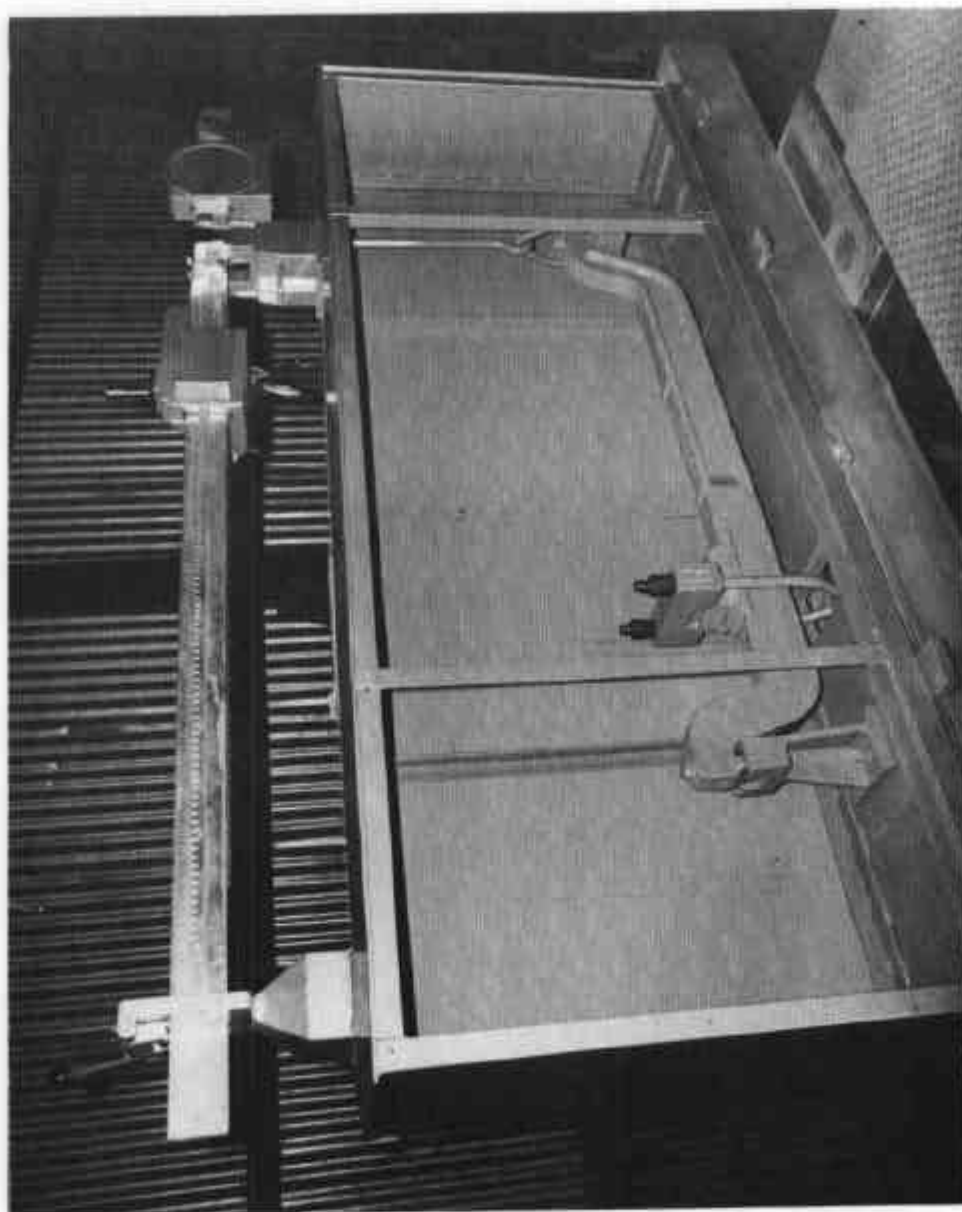


Transfer Lever and Fulcrum

27/7/70



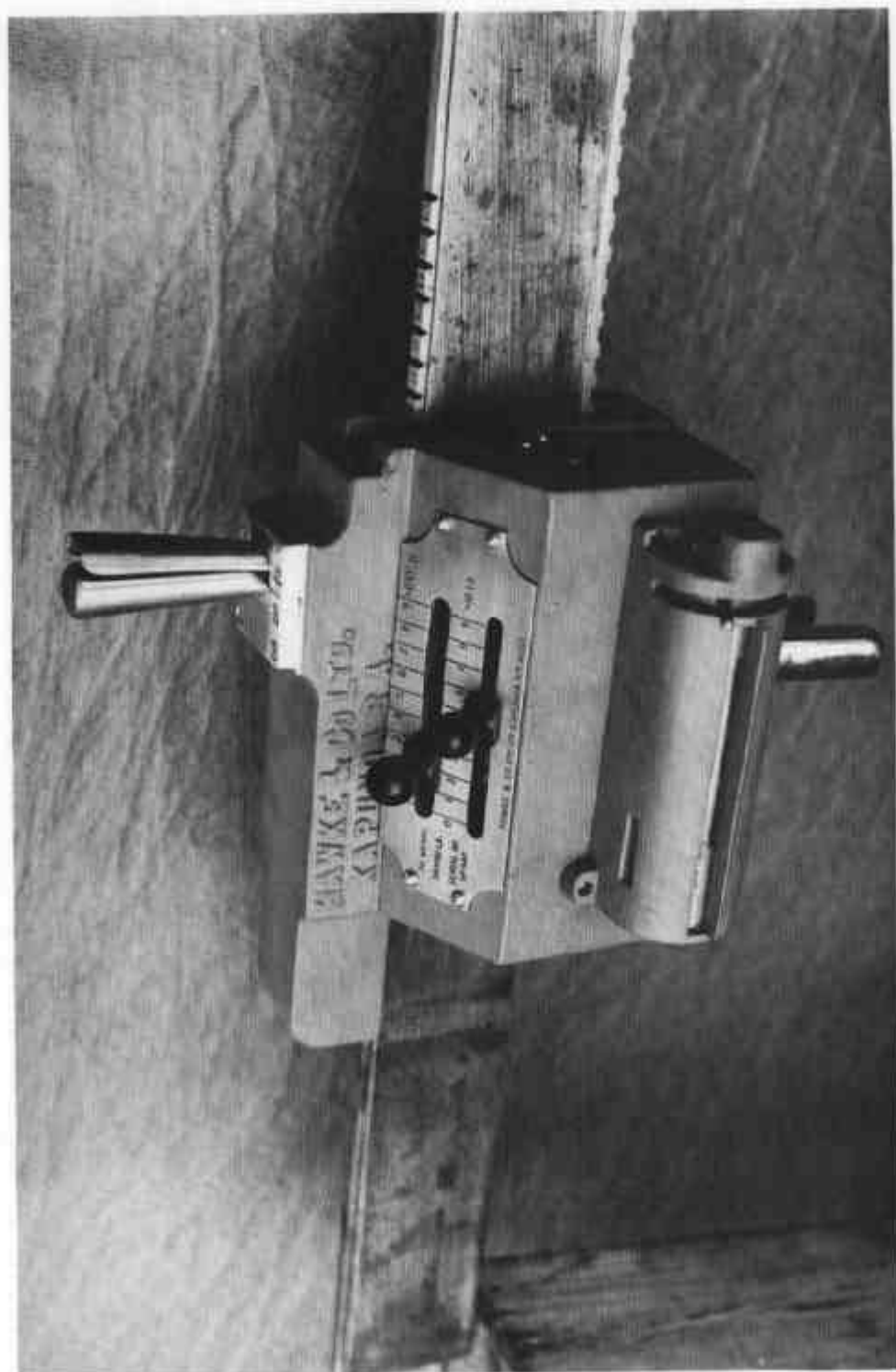
FIGURE 6/10A/4 - 7



Headwork

27/7/70

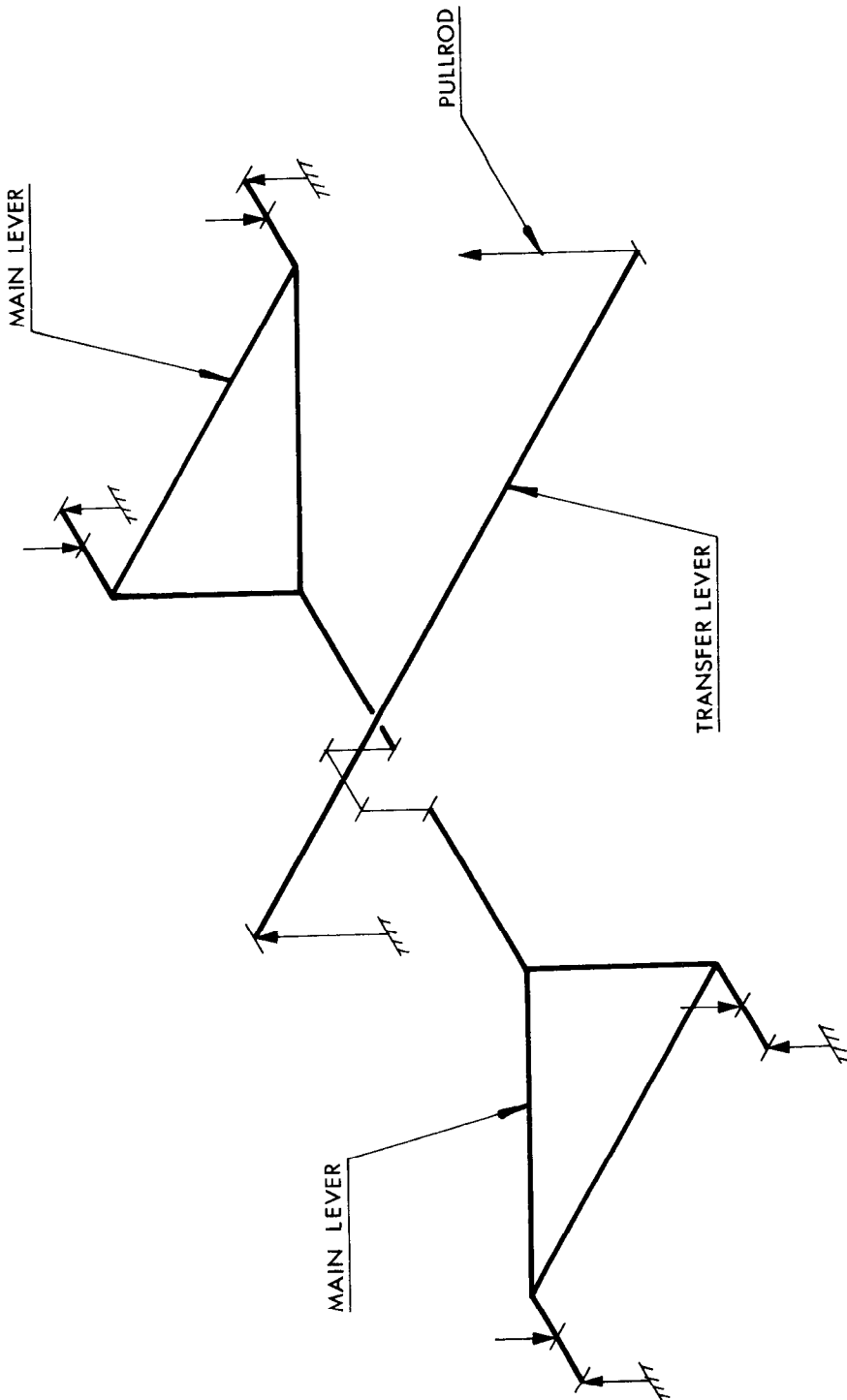
FIGURE 6/10A/4 - 8



Ticket-printing Poise

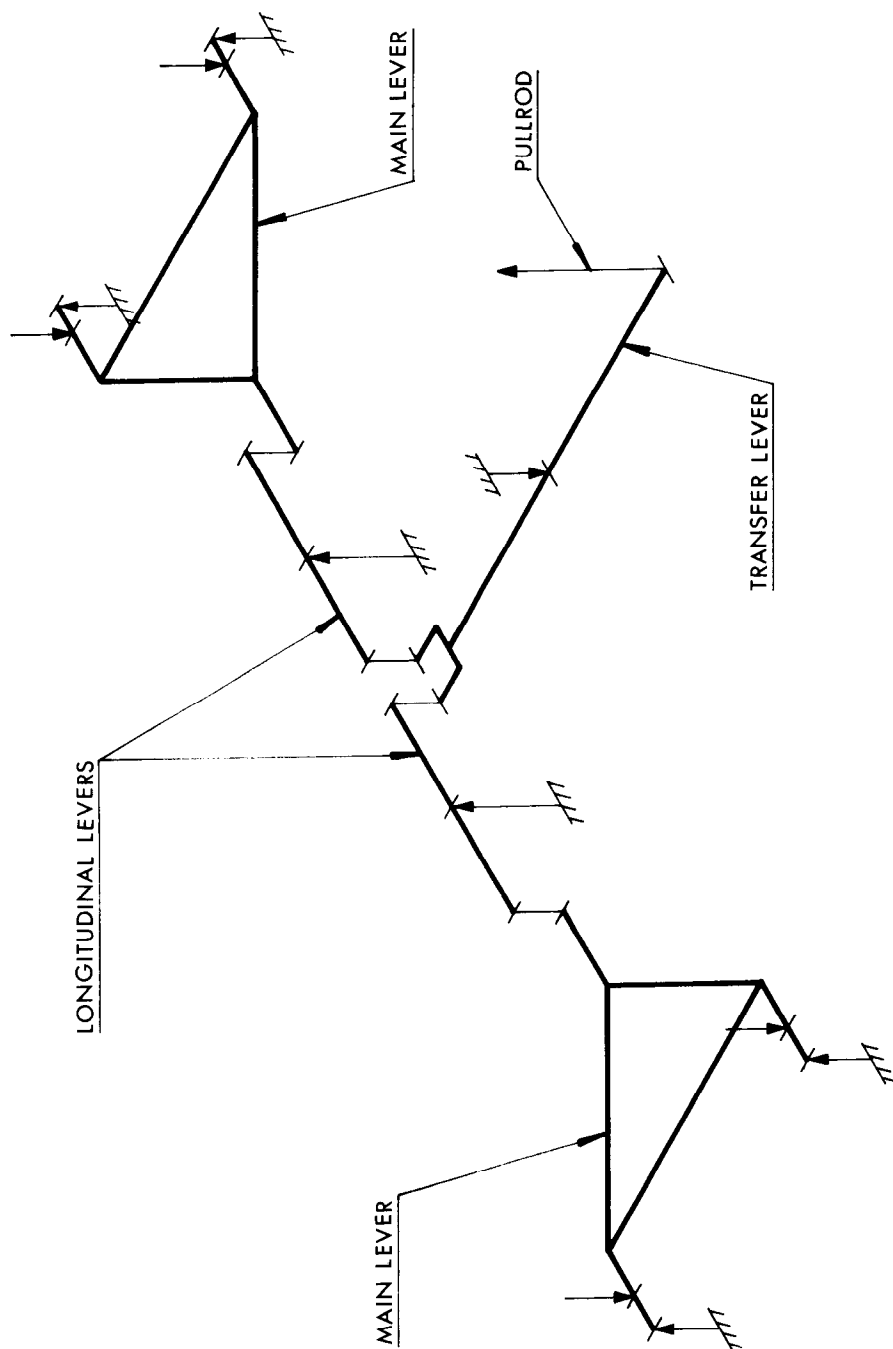
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FIGURE 6/10A/4 - 9



Three-lever Weighbridge

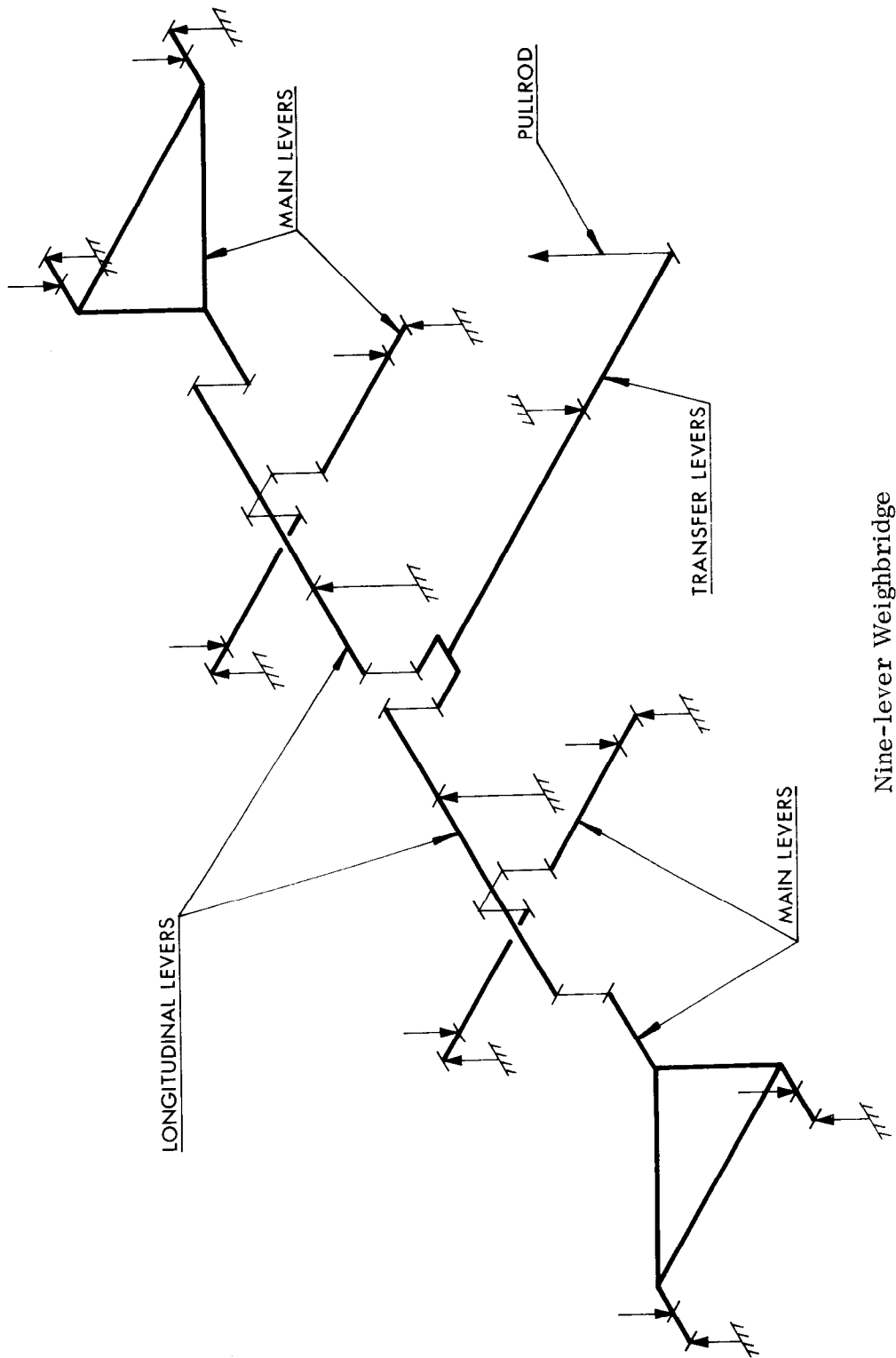
FIGURE 6/10A/4 - 10



Five-lever Weighbridge

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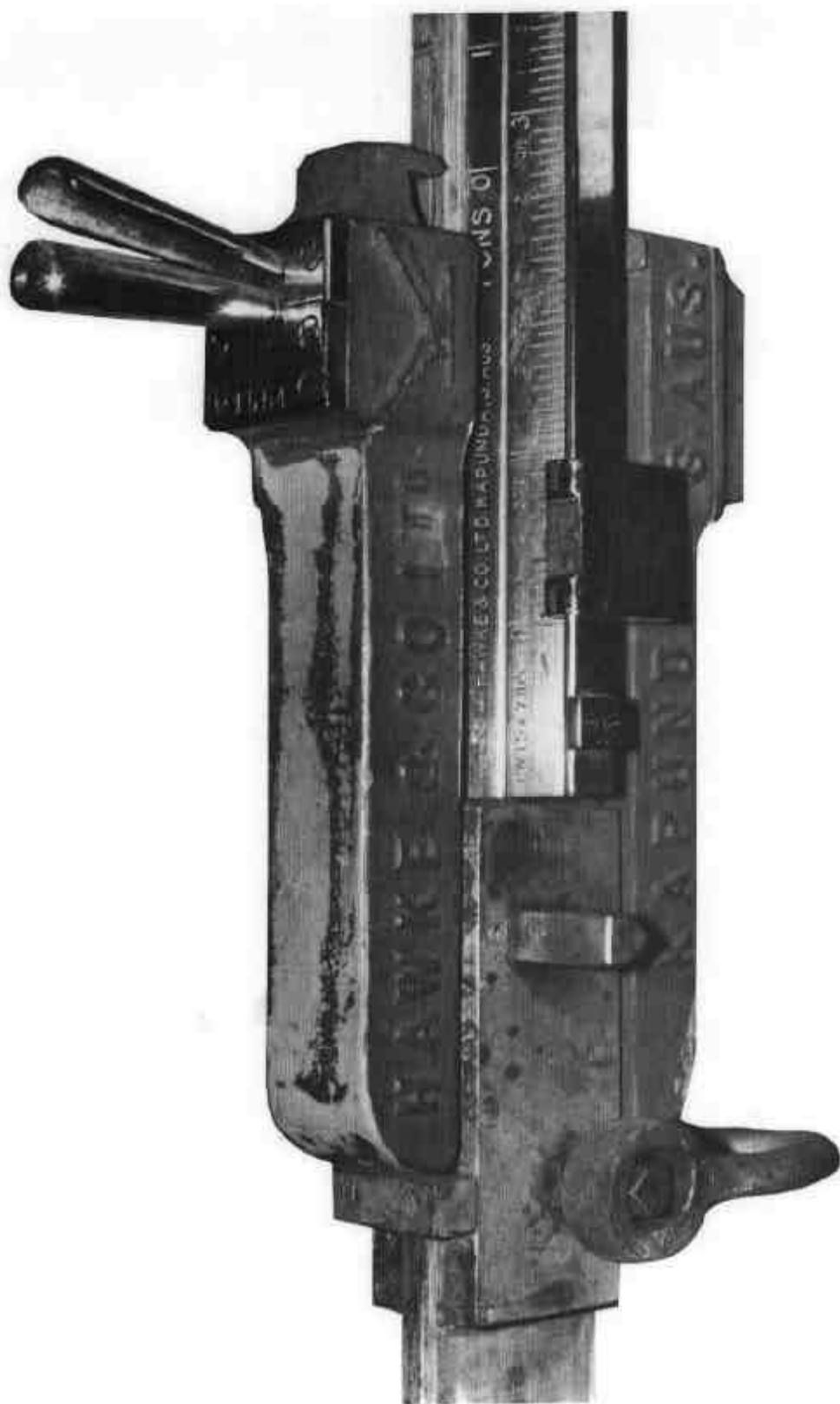
FIGURE 6/10A/4 - 11



Nine-lever Weighbridge

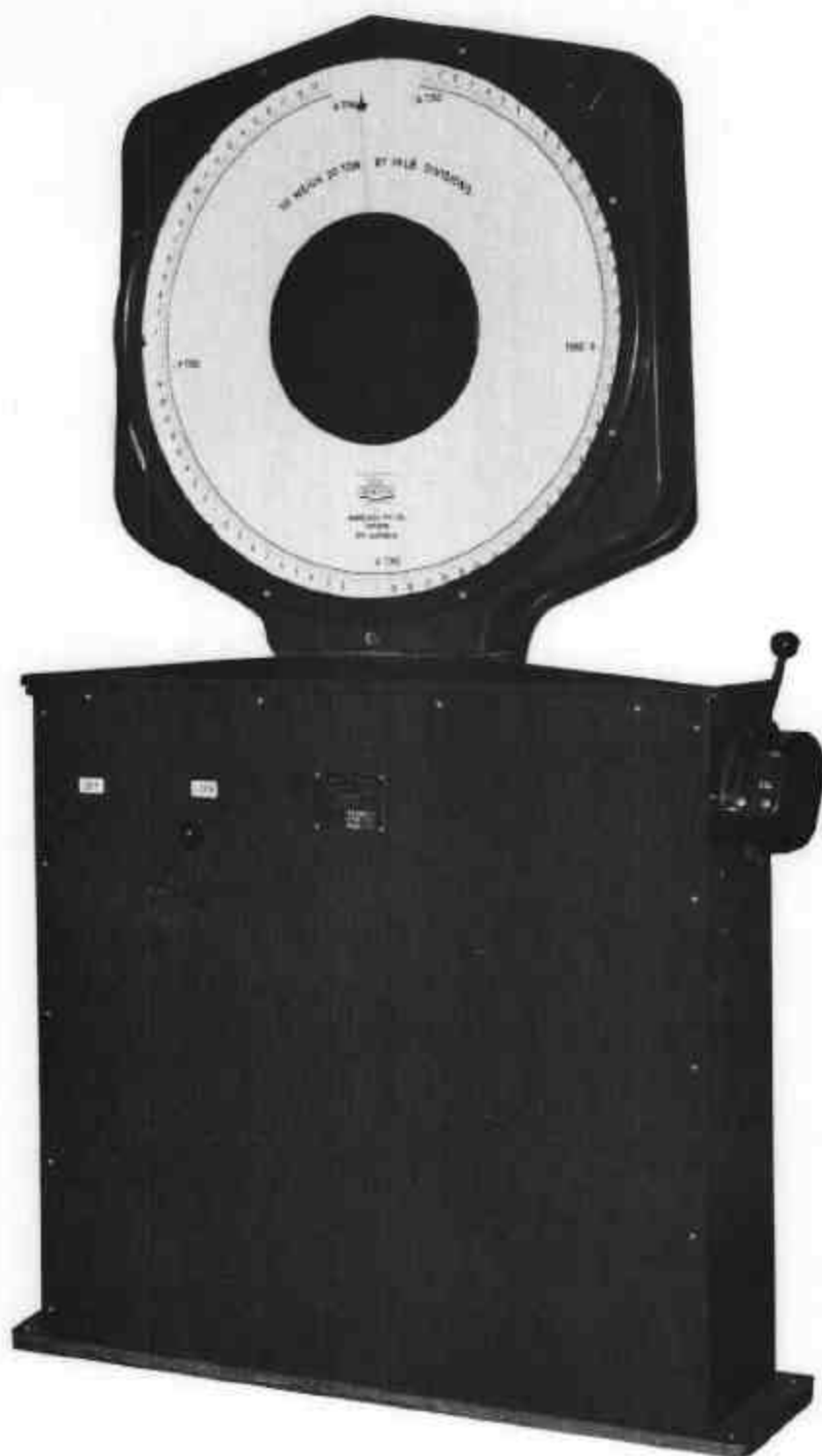
27/7/70

FIGURE 6/10A/4 - 12



Non-ticket-printing Major and Minor Poise

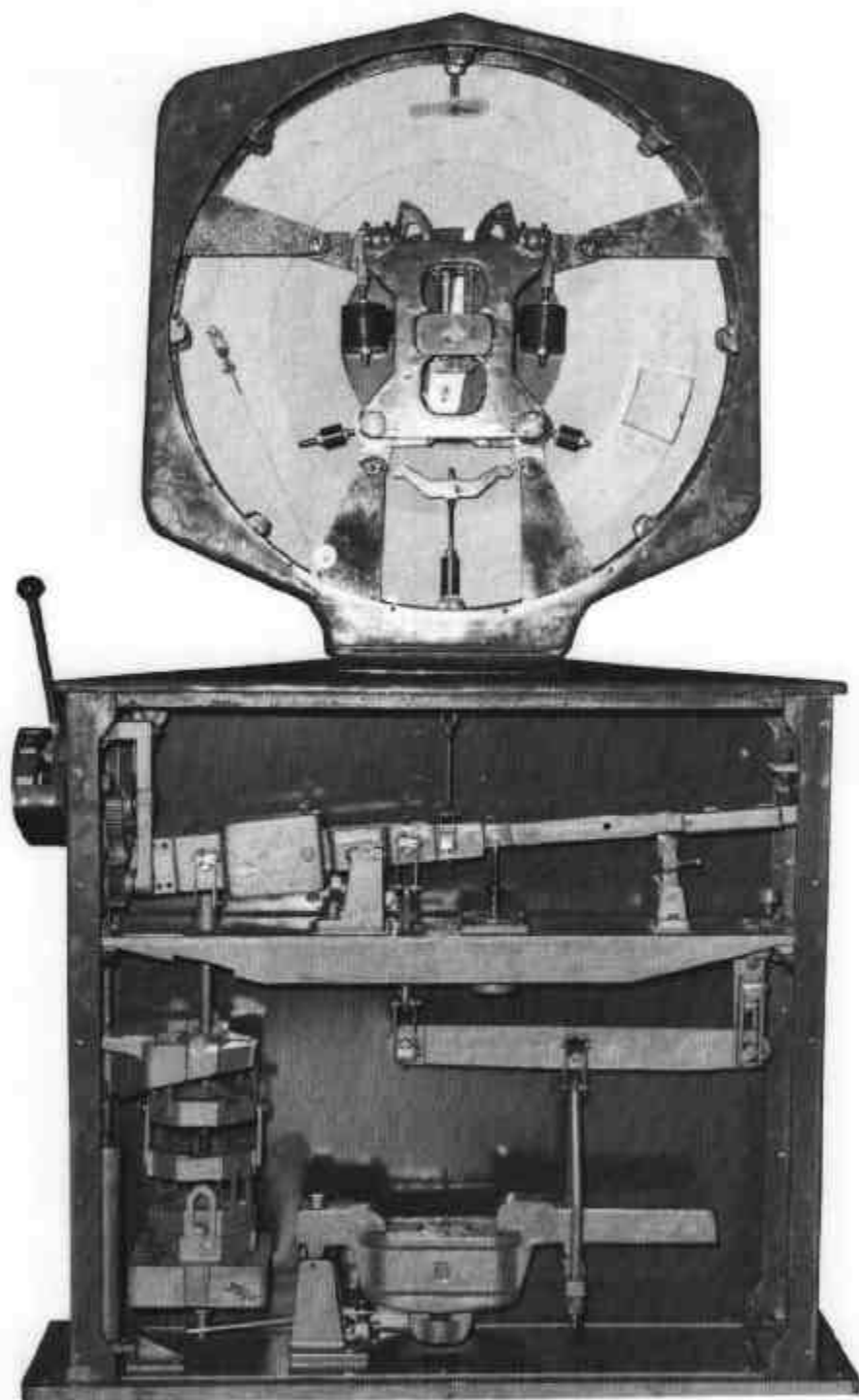
FIGURE 6/10A/4 - 13



Self-indicating Headwork

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FIGURE 6/10A/4 - 14

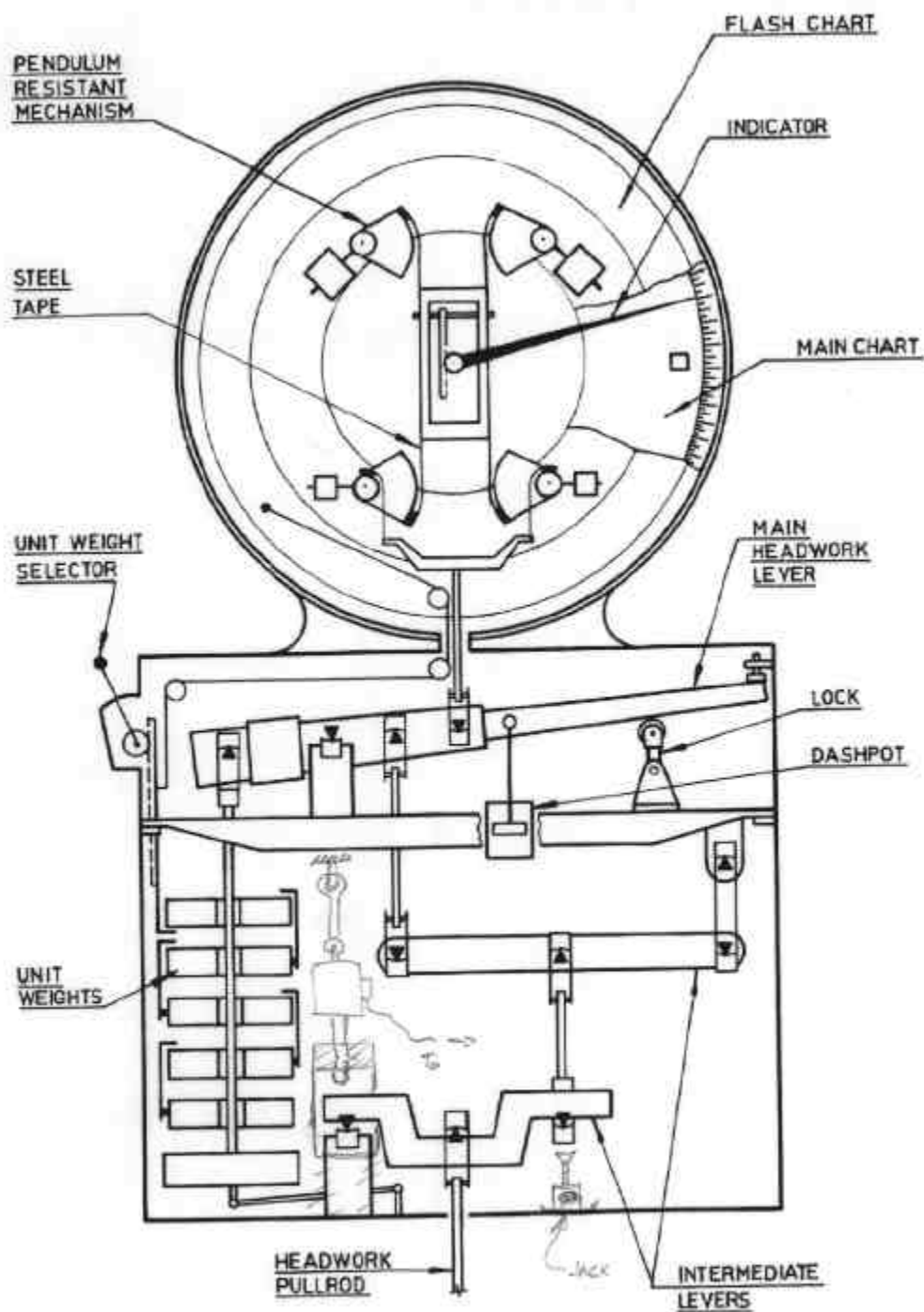


Self-indicating Headwork

27/7/70



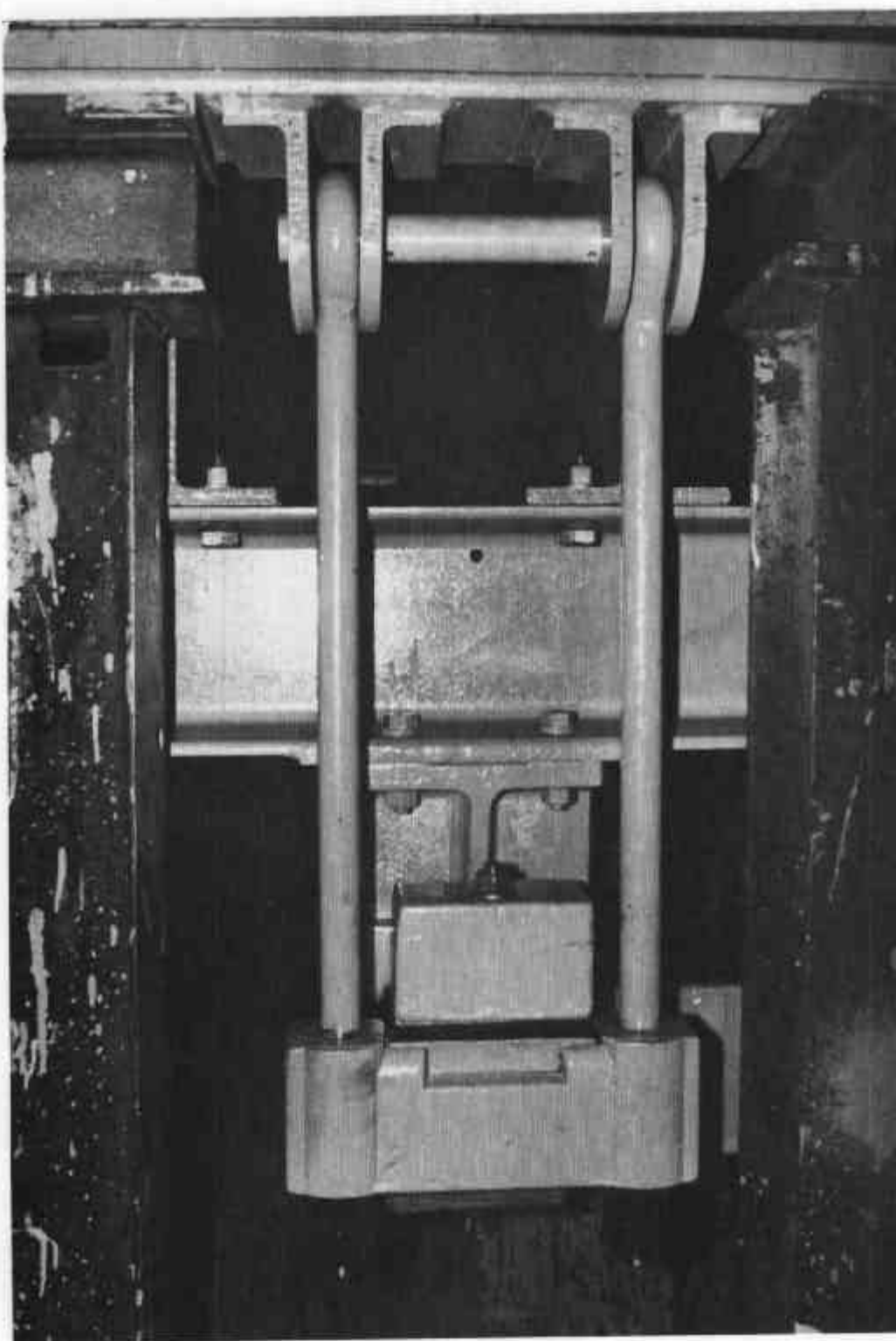
FIGURE 6/10A/4 - 15



Self-indicating Headwork

27/7/70

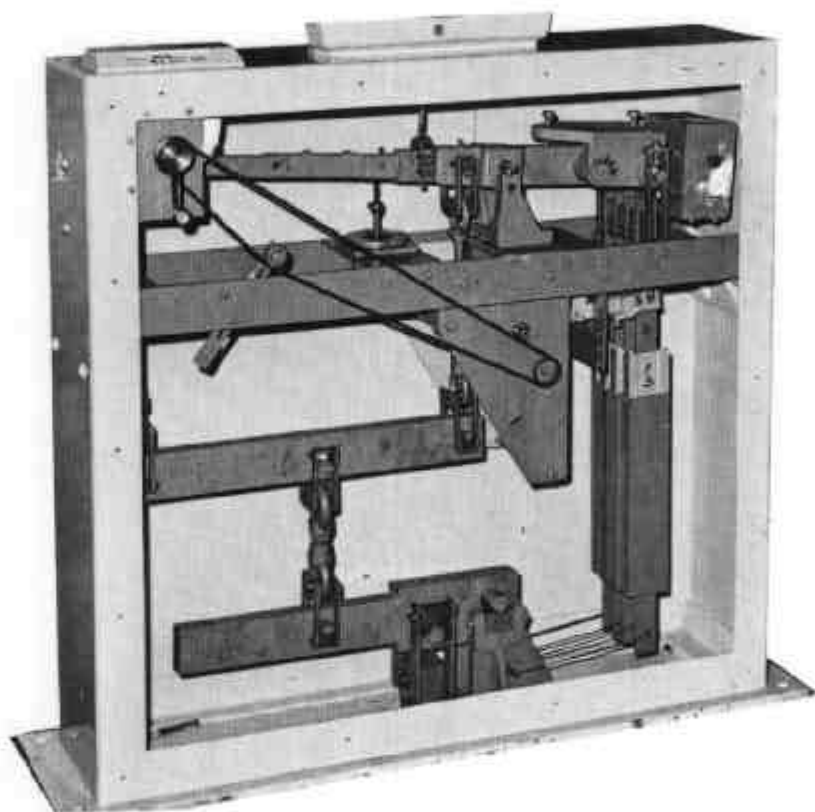
FIGURE 6/10A/4 - 16



Main Lever Fulcrum Knife-edge Suspension Support

27/7/70

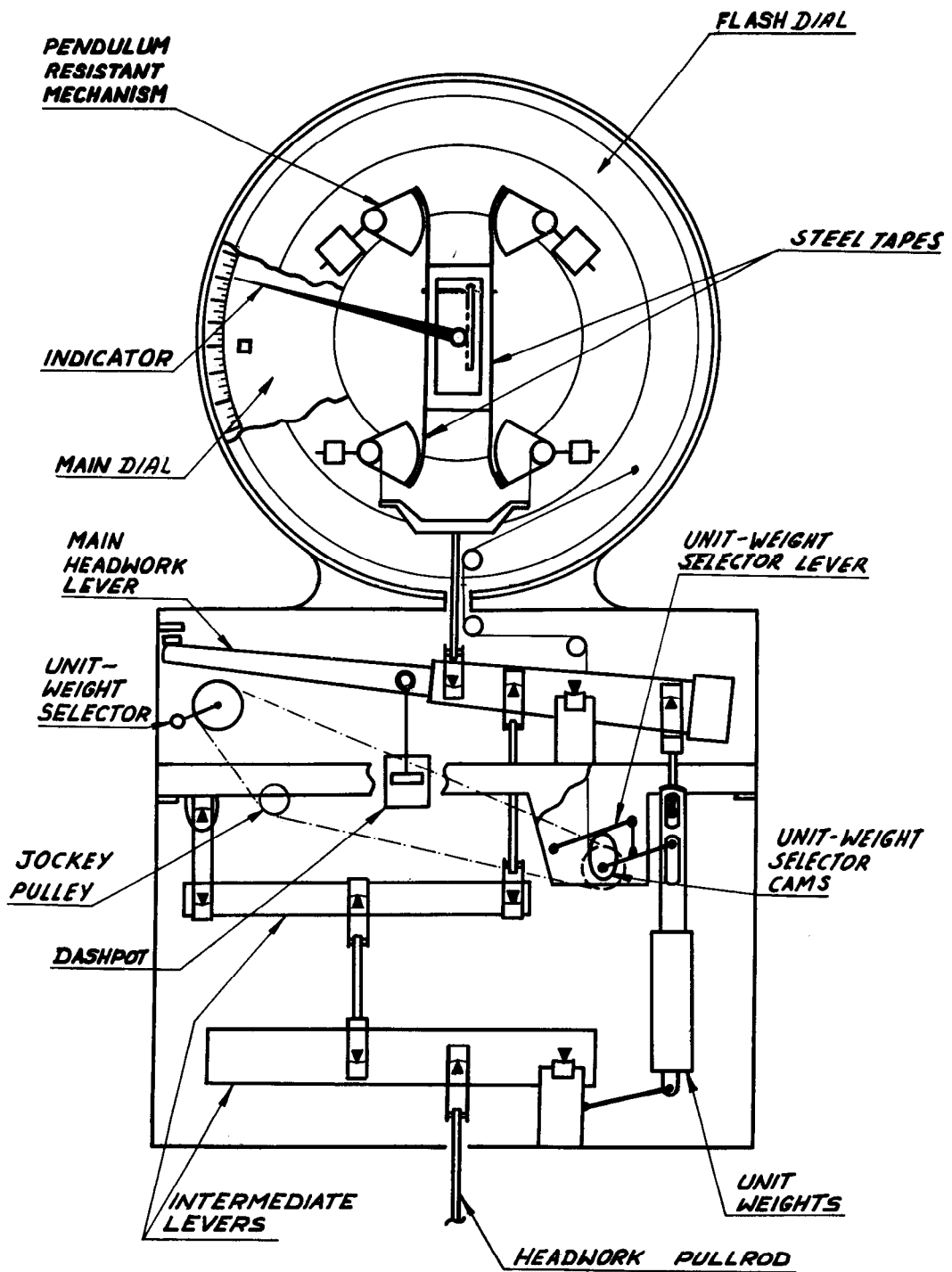
FIGURE 6/10A/4 - 17



Self-indicating Headwork with Unit Weights

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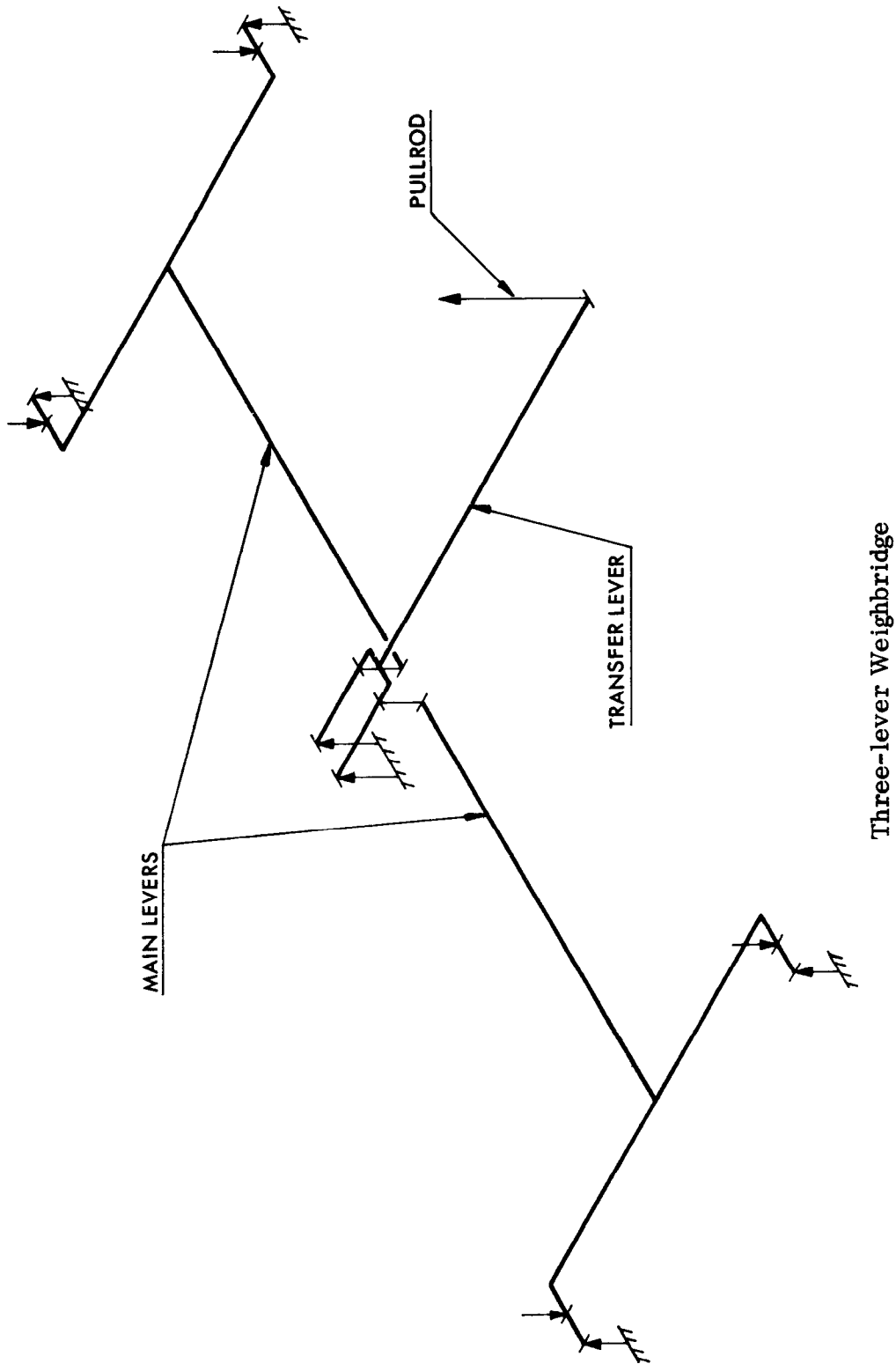
FIGURE 6/10A/4 - 18



Self-indicating Headwork with Unit Weights

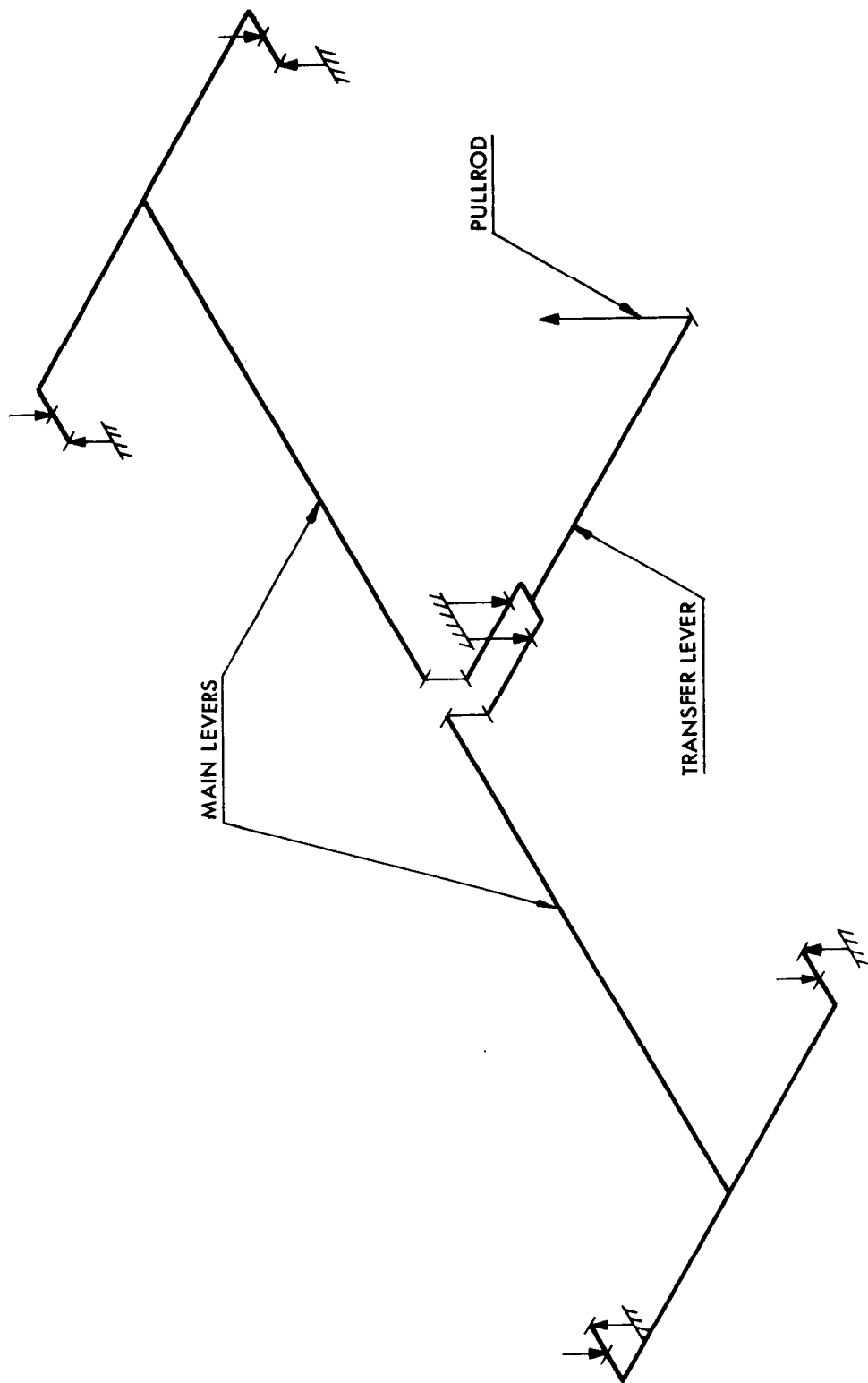
20/7/71

FIGURE 6/10A/4 - 19



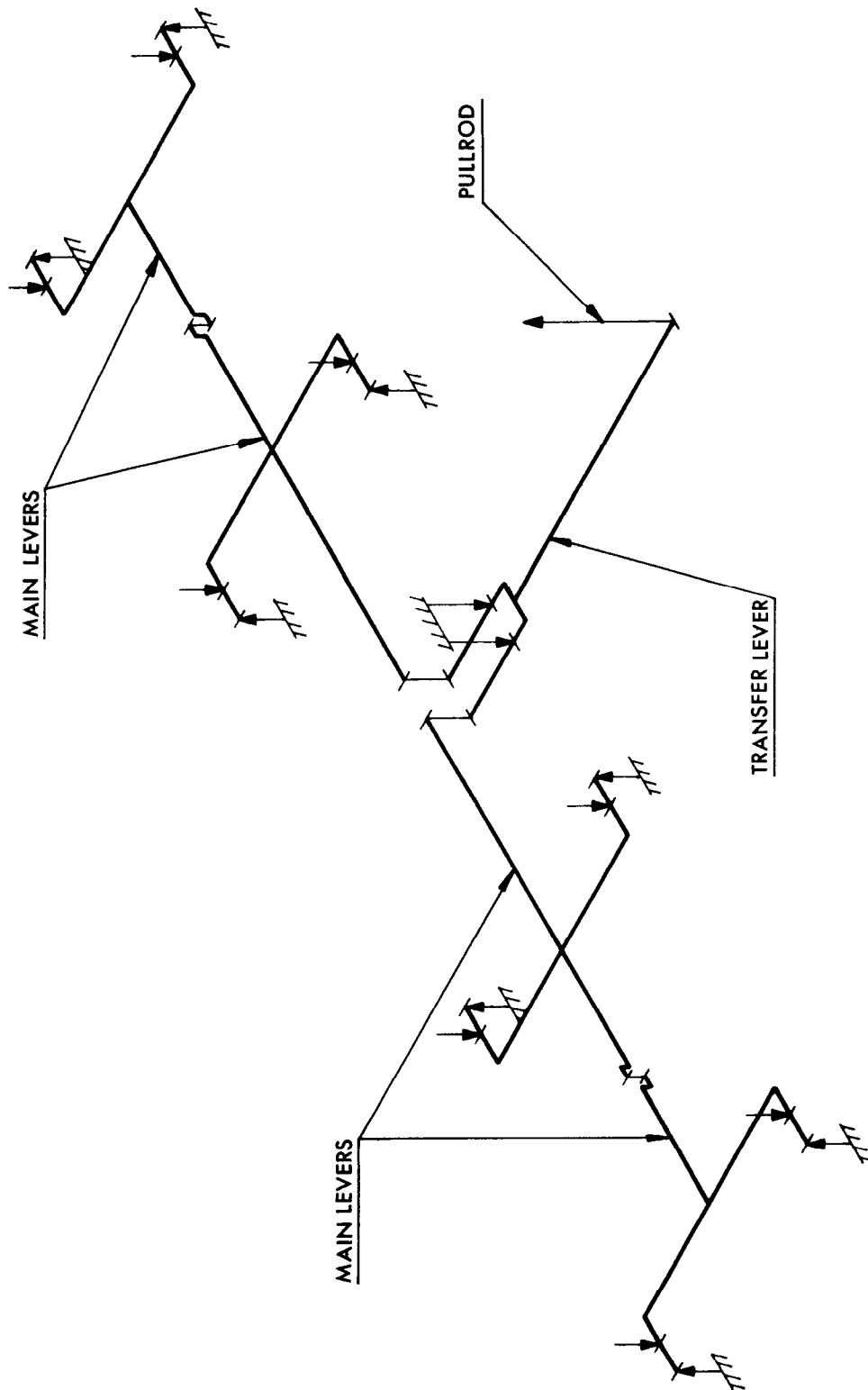
20/7/71

FIGURE 6/10A/4 - 20



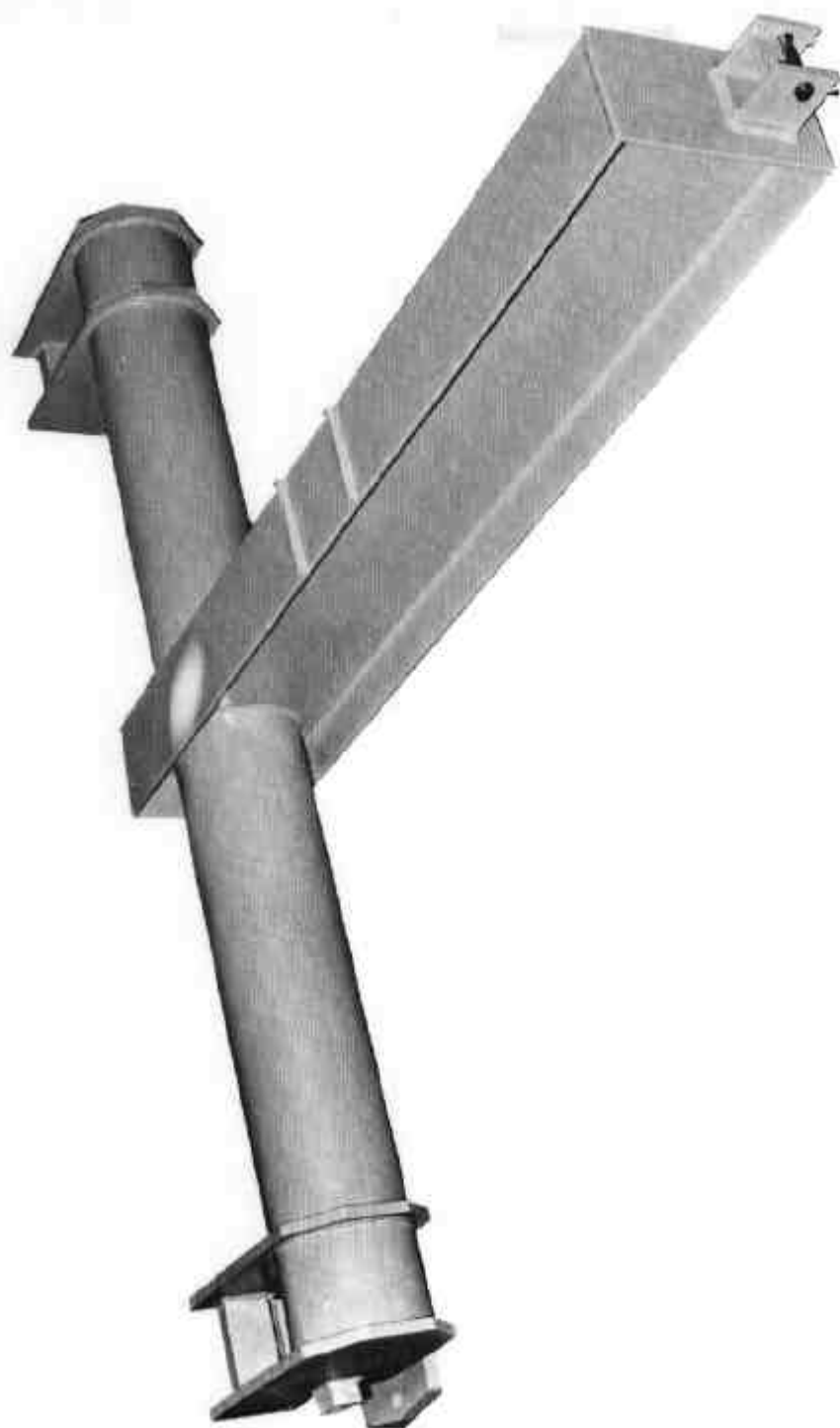
Three-lever Weighbridge

FIGURE 6/10A/4 - 21



Five-lever Weighbridge

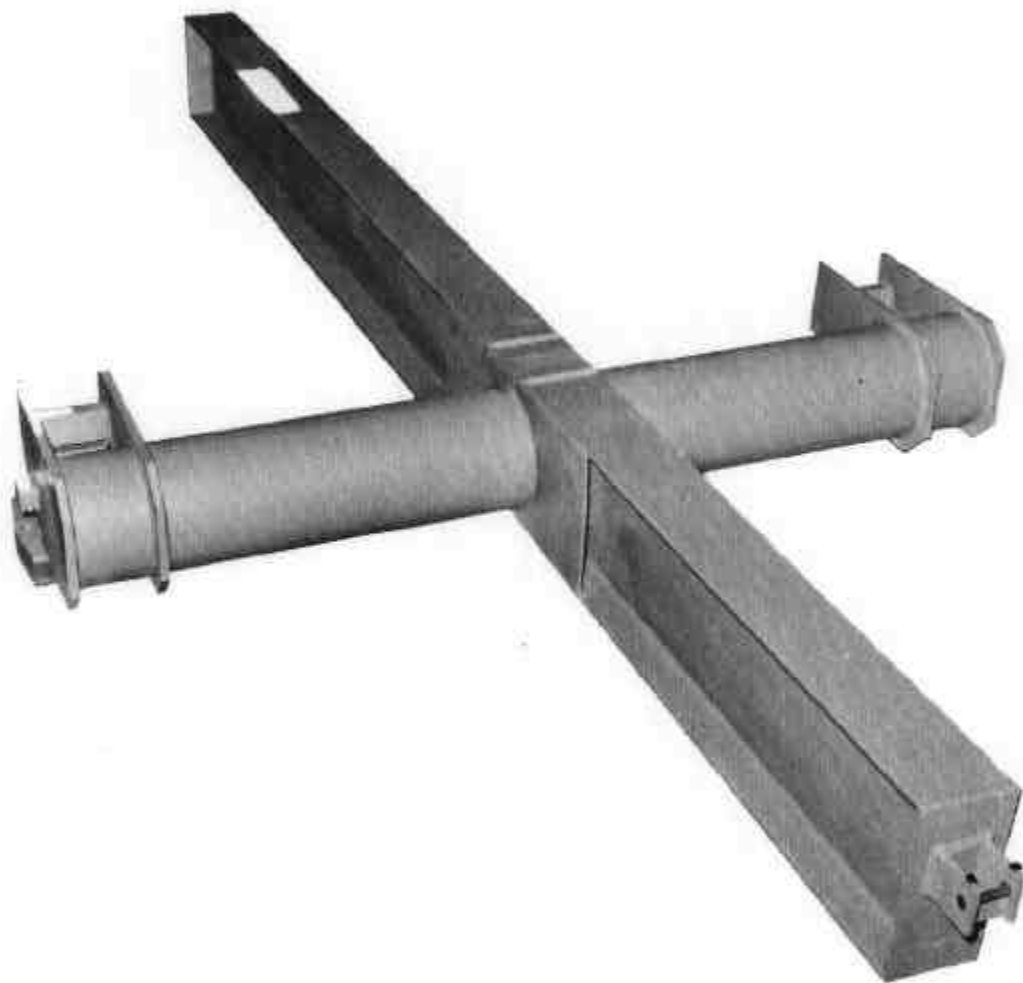
FIGURE 6/10A/4 - 22



Tubular Main Lever



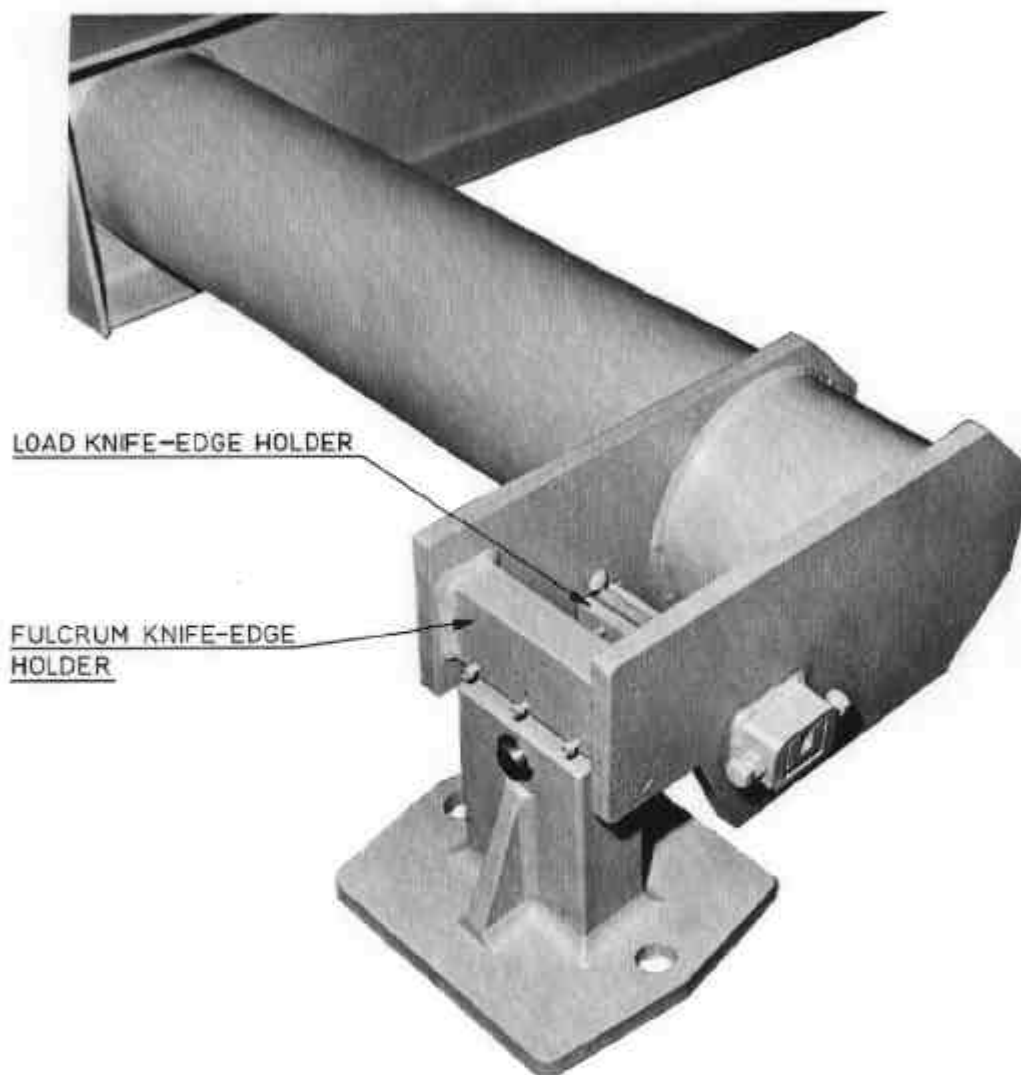
FIGURE 6/10A/4 - 23



Tubular Main Lever

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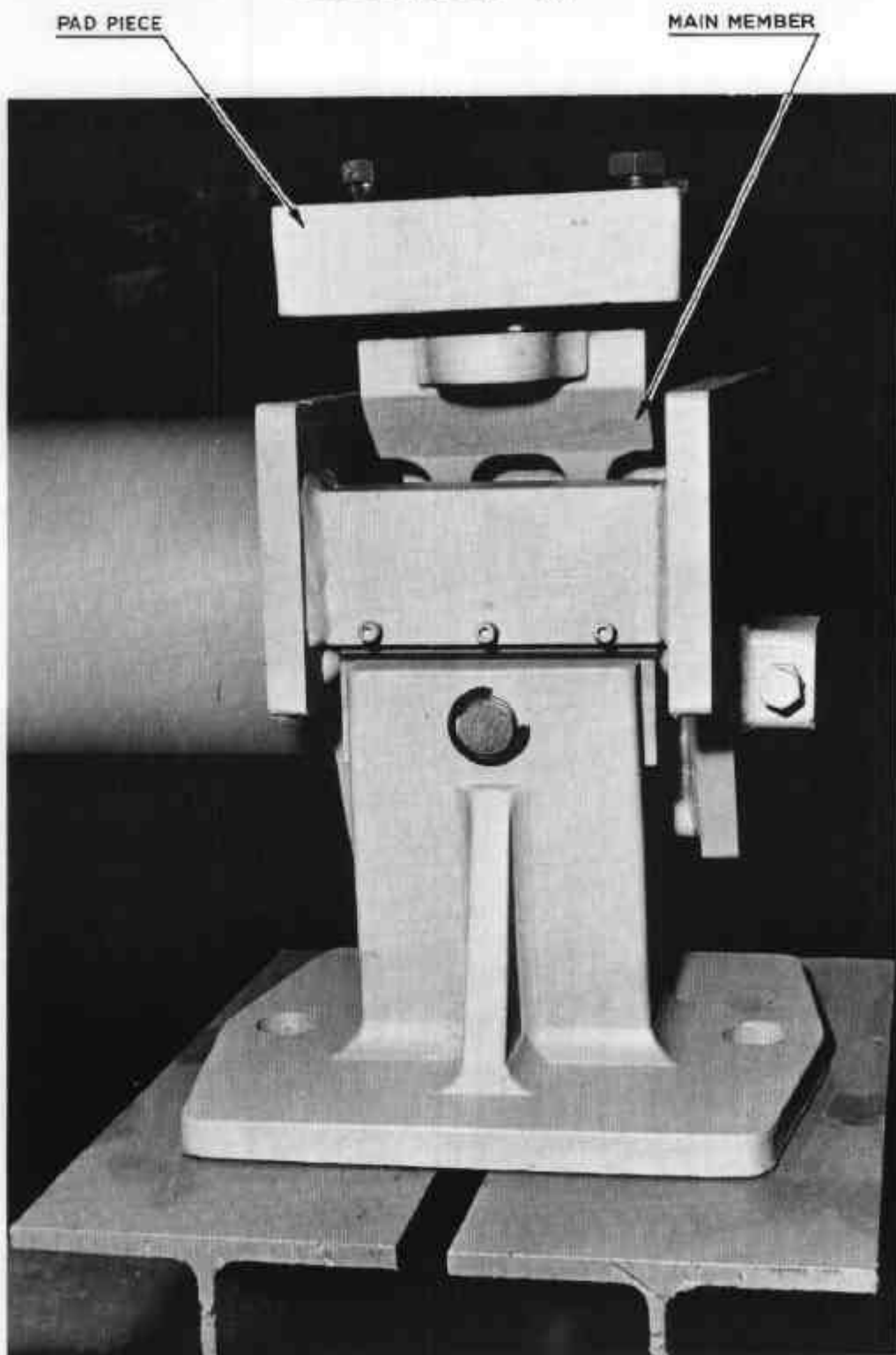
FIGURE 6/10A/4 - 24



Load and Fulcrum Knife-edge Holders

20/7/71

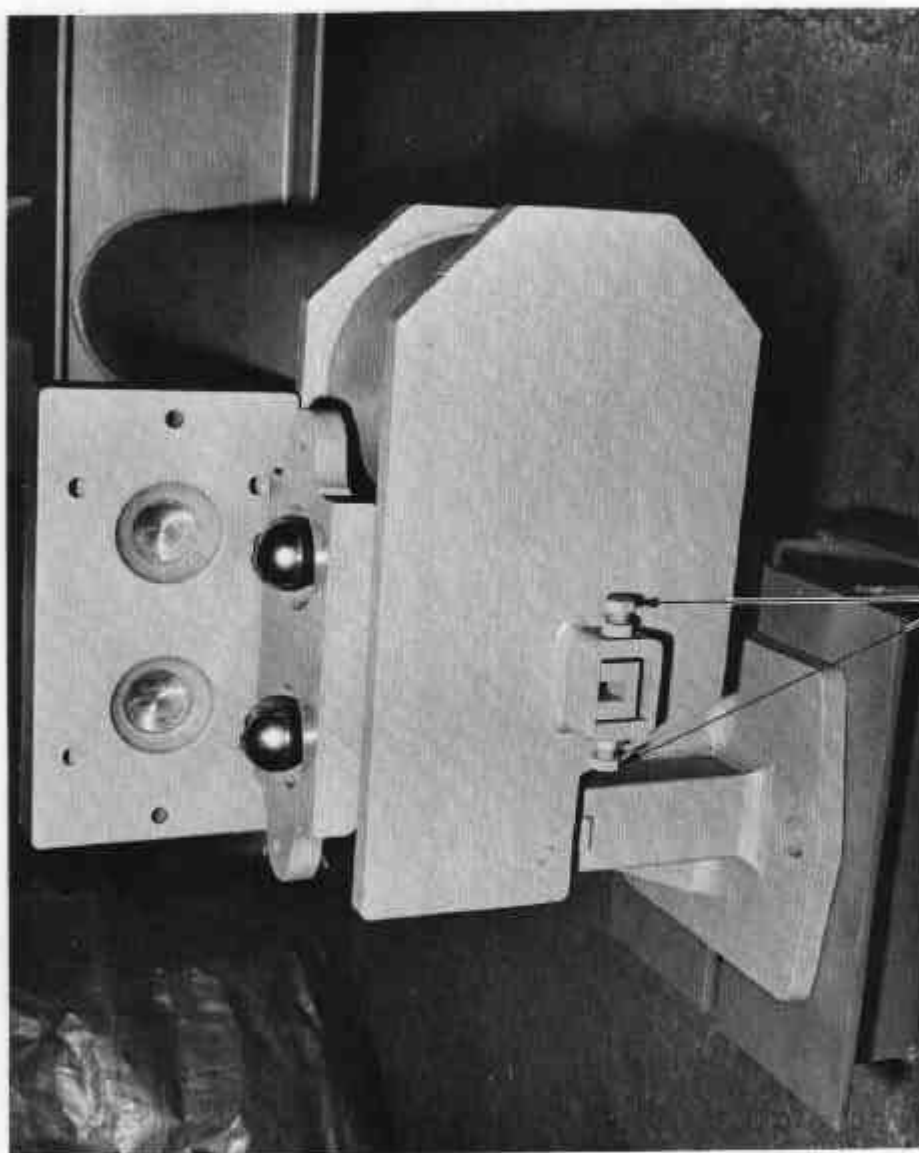
FIGURE 6/10A/4 - 25



Ball-bearing Support Unit and Pedestal

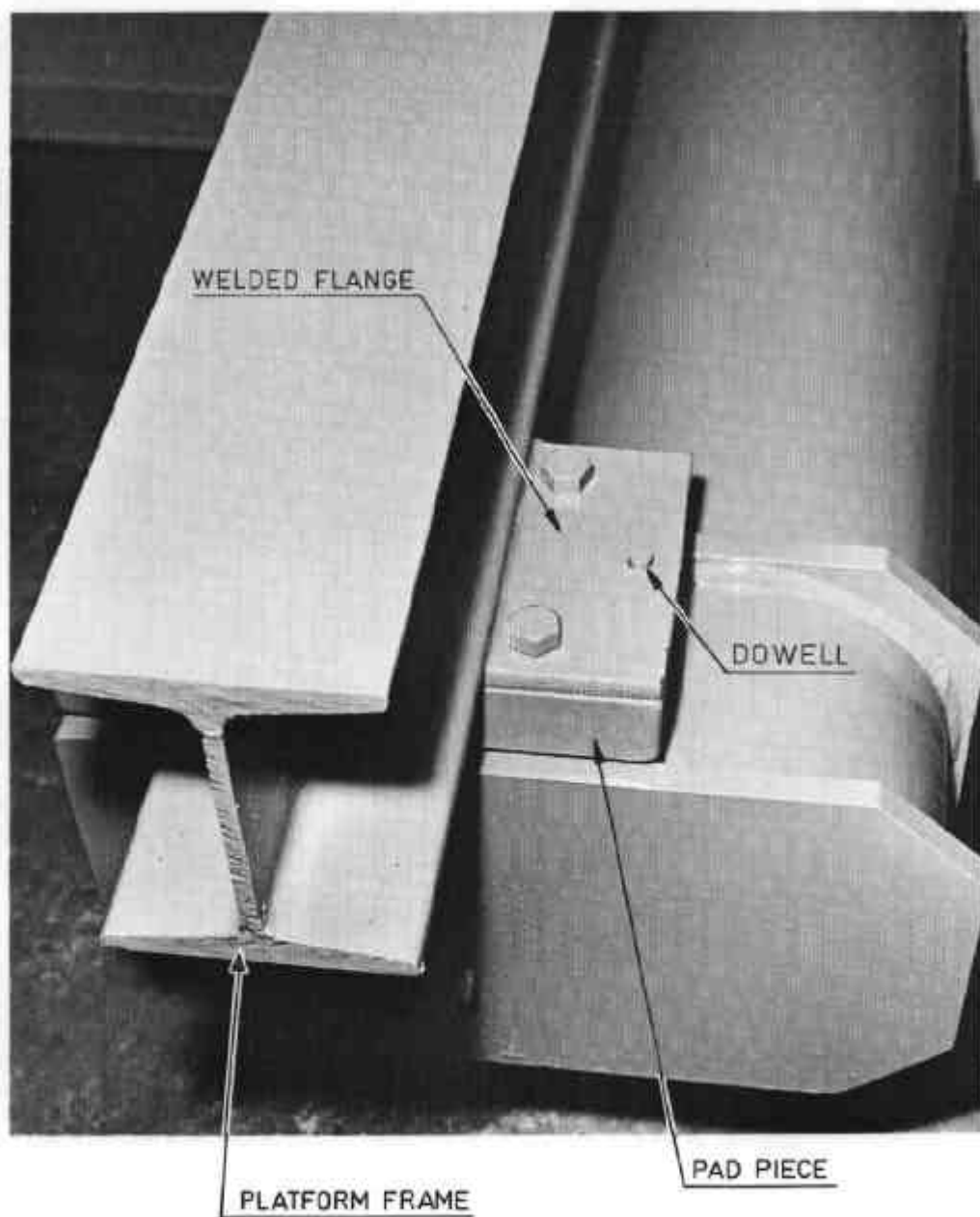
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FIGURE 6/10A/4 - 26



LOAD KNIFE-EDGE ADJUSTING SCREWS

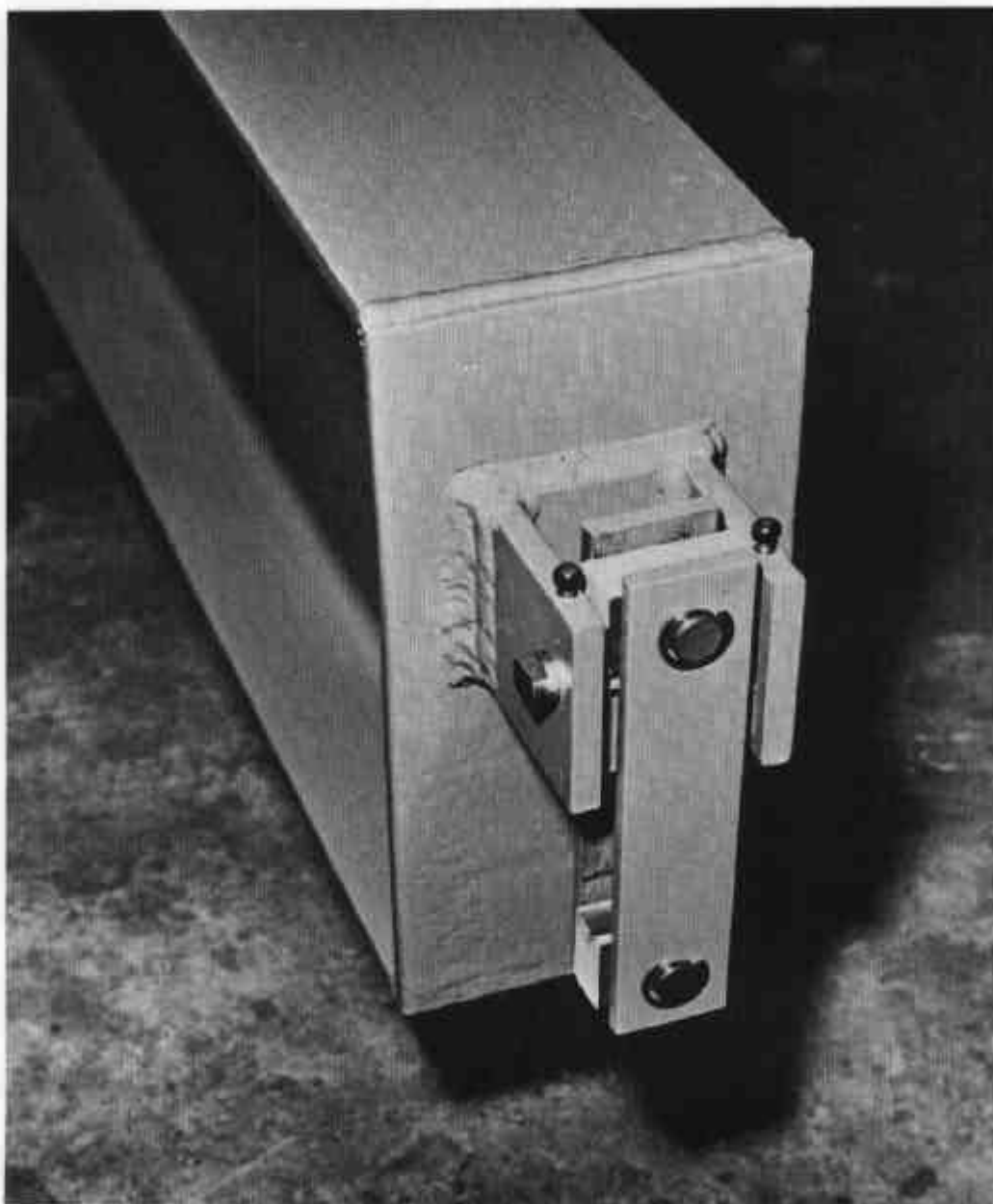
Ball-bearing Support Unit



Platform Attached to Pad Piece

20/7/71

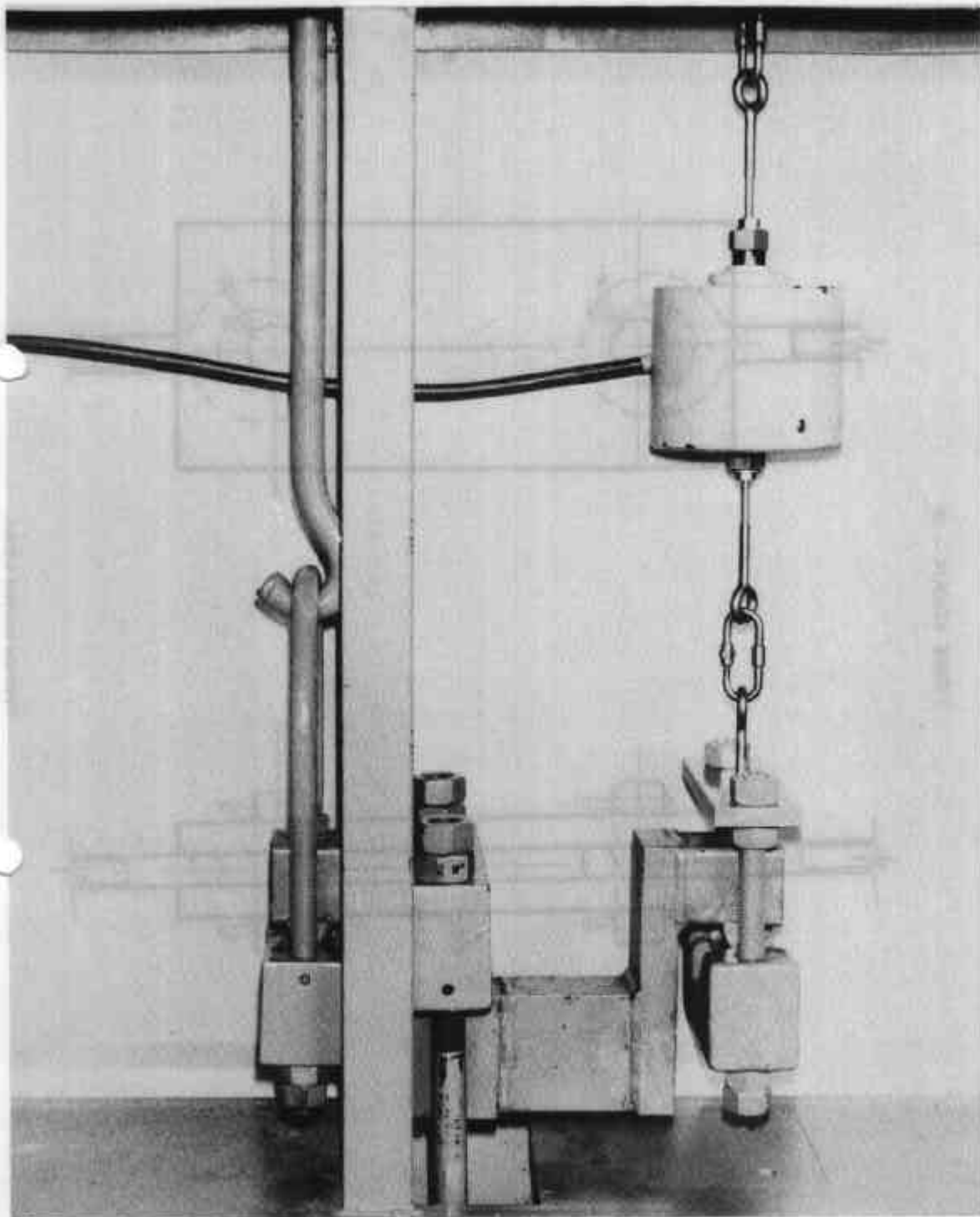
FIGURE 6/10A/4 - 28



Main Lever Nose-end Knife-edge and Link

20/7/71

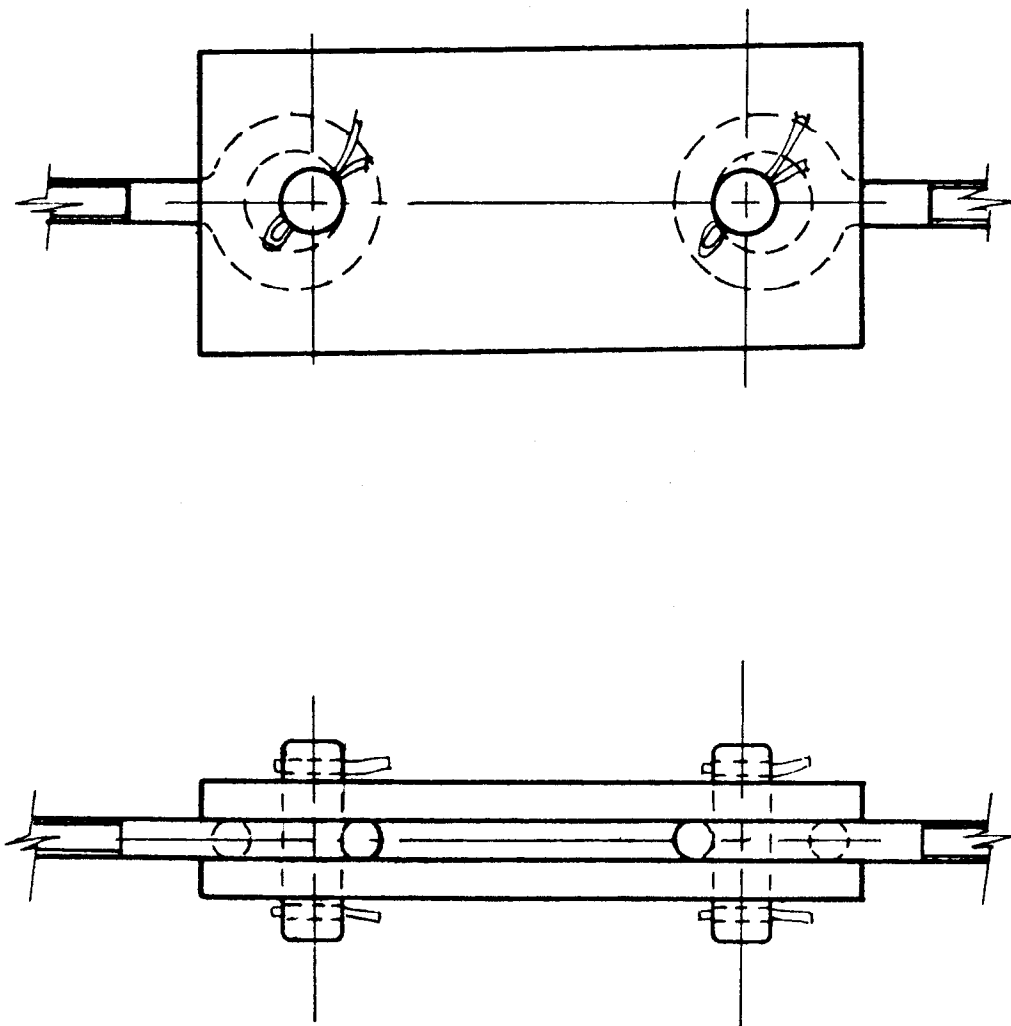
FIGURE 6/10A/4 - 29



HBM (GDR) Z3H Load Cell in Headwork Lever

31/7/81

FIGURE 6/10A/4 - 30



Prefabricated Links