United States Patent [19]

Savory

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[54] **HYDRAULICALLY OPERATED GUILLOTINE**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **83/625;** 83/626; 83/632

[51] **Int. Cl.** **B26d 5/08**

[58] **Field of Search** 83/625, 626, 632, 633

[56] **References Cited**

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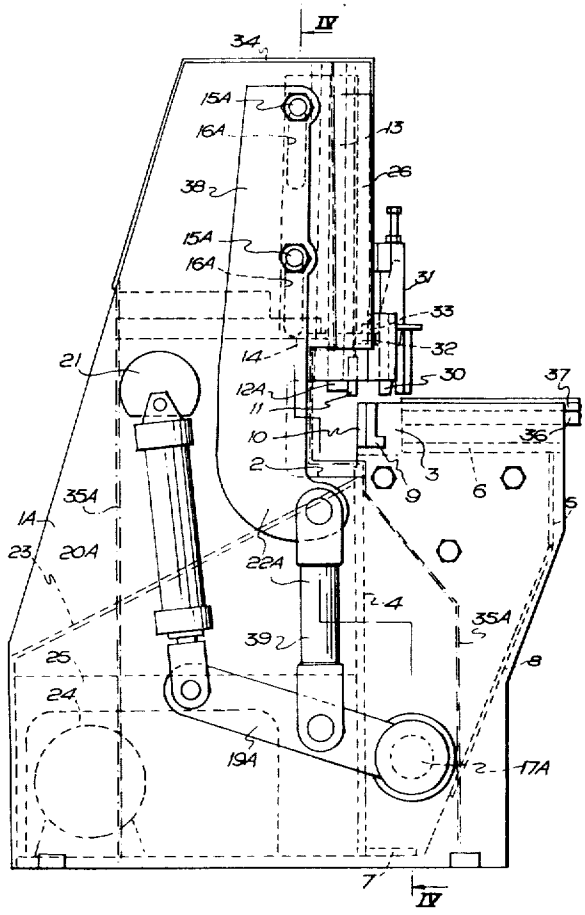
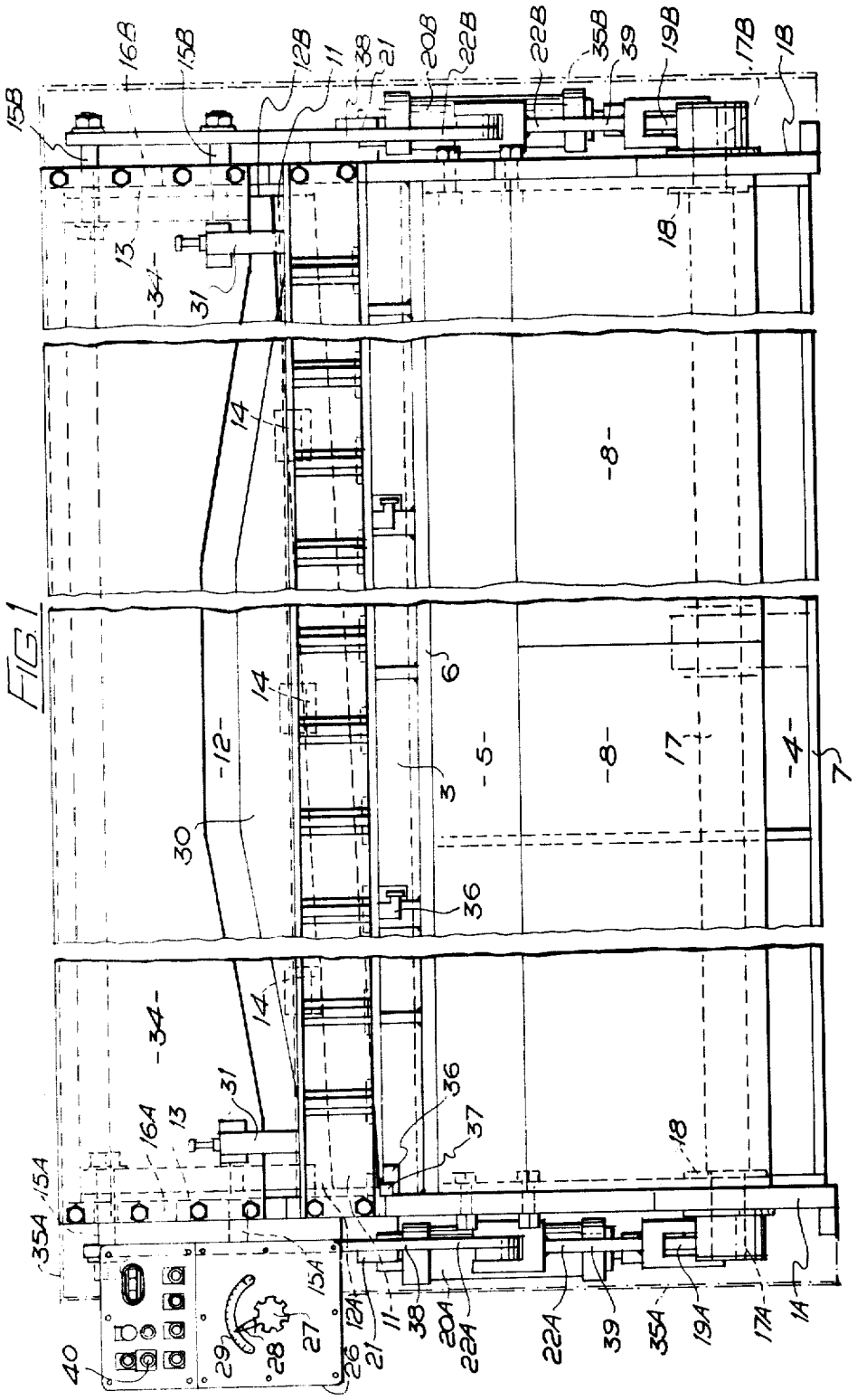
Assistant Examiner—Fred A. Silverberg
Attorney, Agent, or Firm—Lowe, King and Price

[57] **ABSTRACT**

A hydraulically operated guillotine with a hydraulic ram at each end of a movable blade-carrying beam is adapted for substantially full utilisation of the efforts of both rams at any position of cutting by providing projections on the ends of the movable blade-carrying beam projecting through slots in the side-frames extending in the direction of movement of the movable blade-carrying beam, a shaft extending through journals in the side frames with its axis parallel to the central plane of the slots in the side-frames, a pair of arms rigidly secured one to each end of the shaft and extending transversely with respect to the central plane of the slots in the side-frames, with the hydraulic rams secured one between each arm on the shaft and an anchorage on the respective side-frame, and linkages from positions on the arms intermediate the shaft and the rams to the projections on the ends of the movable blade-carrying beam, whereby the shaft transmits effort, as torque, to the end of the movable blade-carrying beam nearest which cutting is taking place from the hydraulic ram at the other end.

7 Claims, 4 Drawing Figures

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18
164
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154
354
154
15A
124
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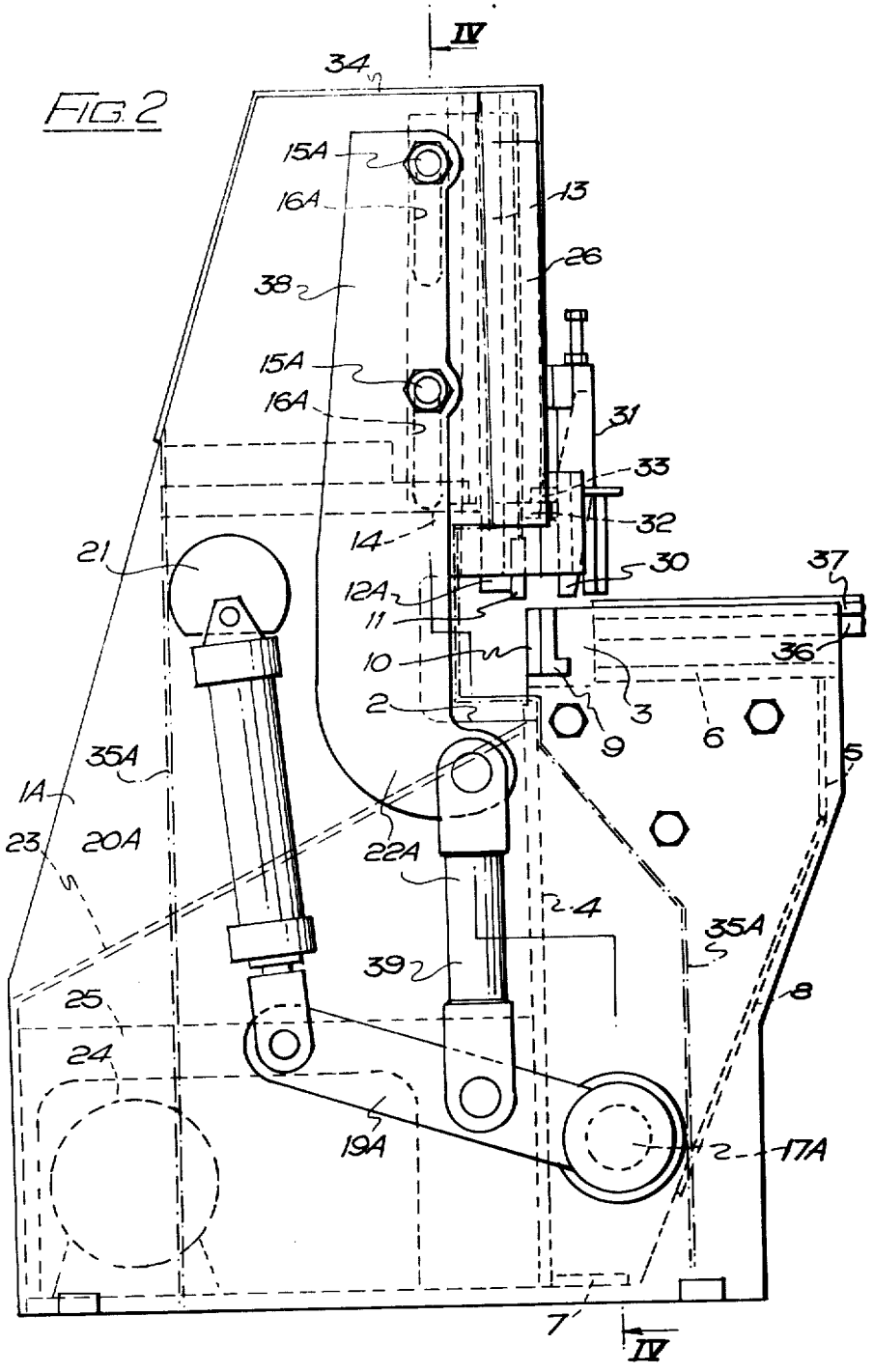
FIG. 1

FIG. 2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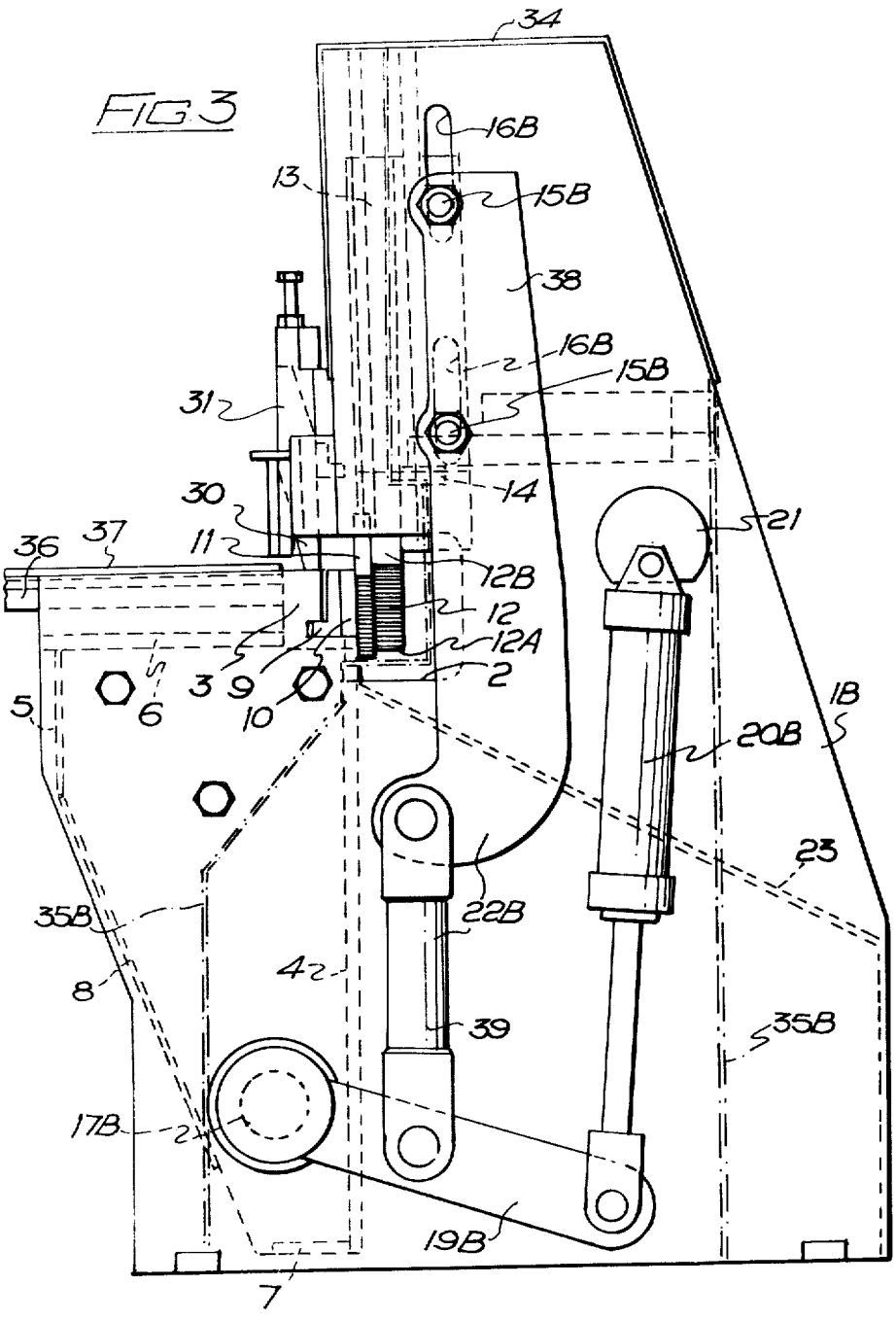
34
15A
16A
13
26
38
15A
16A
31
33
32
14
30
37
21
12A
11
10
36
2
3
9
6
5
35A
1A
23
20A
22A
4
35A
39
8
25
24
19A
17A
7
IV

FIG 3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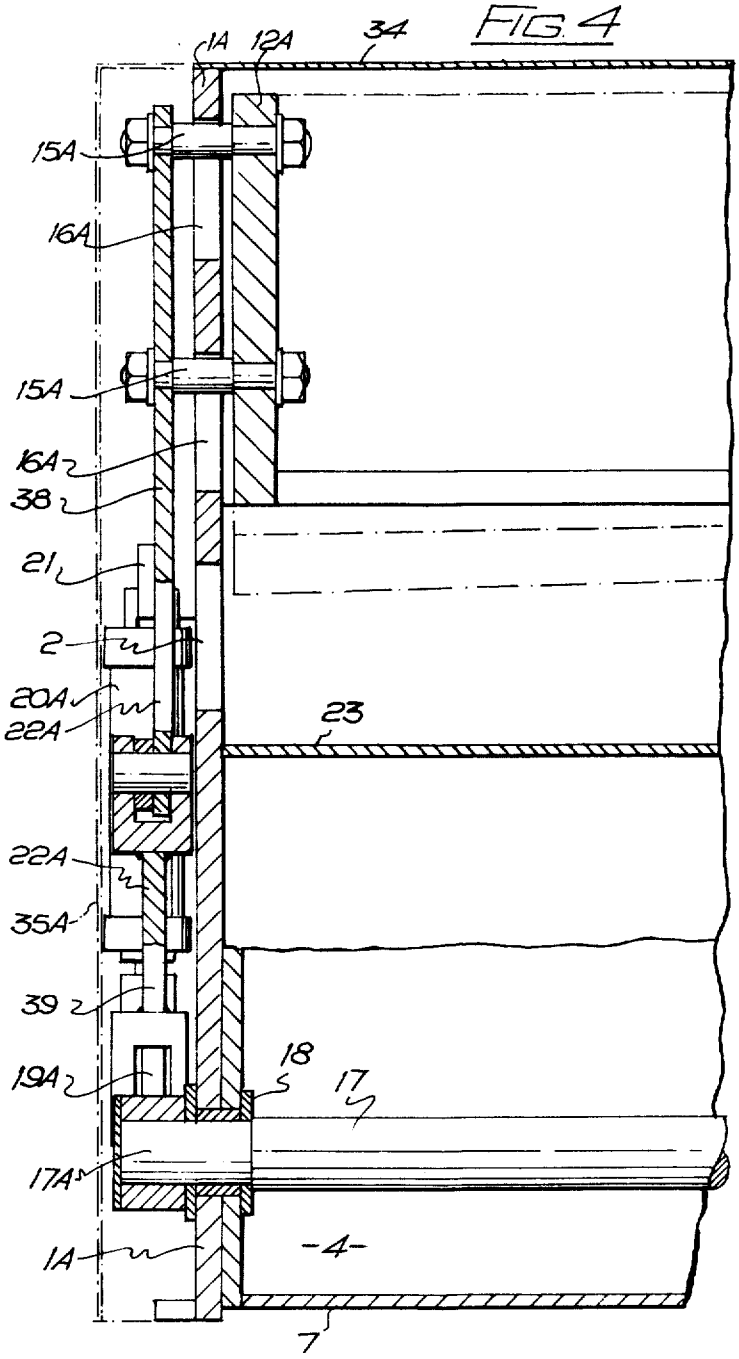
16B
13
15B
38
16B
15B
31
14
30
21
36
37
11
12B
12
12A
2
3
9
6
10
5
18
20B
23
22B
35B
4
8
39
35B
17B
19B
7

FIG. 4


1A
12A
34
15A
16A
15A
16A
38
21
2
20A
22A
23
22A
35A
39
18
19A
17
17A
1A
-4-
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HYDRAULICALLY OPERATED GUILLOTINE

This invention relates to guillotines, and more particularly to hydraulically operated guillotines having a hydraulic ram acting on each end of a movable blade-carrying beam, and is primarily concerned with providing means whereby the efforts of both rams are substantially fully utilised for any position of cutting along a blade carried by the blade-carrying beam. A secondary object is to enable one ram to be rendered inoperative to enable faster operation by the other ram when cutting material of small cross sectional area or which is easier to cut compared with the maximum capacity of the guillotine.

According to the present invention, a hydraulically operated guillotine comprises side-frames with guides for a movable blade-carrying beam, projections on the ends of the blade-carrying beam projecting through slots in the side-frames extending in the direction of movement of the blade-carrying beam, a shaft extending through journals in the side frames with its axis parallel to the central plane of the slots in the side-frames, a pair of arms rigidly secured one to each end of the shaft and extending transversely with respect to the central plane of the slots in the side-frames, a pair of hydraulic rams secured one between each arm on the shaft and an anchorage on the respective side-frame, and linkages from positions on the arms intermediate the shaft and the rams to the projections on the ends of the blade-carrying beam.

In operation, with hydraulic fluid supplied under pressure to both rams to move the arms to cause initial cutting movement of a blade carried by the blade-carrying beam, the effort of the ram at the trailing end of the blade is transmitted to the blade through its arm and linkage to the blade-carrying beam and also through the shaft (as torque) to the arm and linkage of the ram at the leading end of the blade. During the final cutting movement, the effort of the ram at the leading end of the blade is transmitted to the blade through its arm and linkage to the blade-carrying beam and also through the shaft (as torque of opposite hand) to the arm and linkage of the ram at the trailing end of the blade. At the middle cutting position of the blade little or no effort is transmitted through the shaft as the efforts of the rams transmitted to the blade-carrying beam through their respective arms and linkages will be substantially in balance. Thus for all positions of cutting the efforts of both rams are substantially fully utilised.

The arrangement of the linkages from intermediate the rams and the shaft is also advantageous in affording a mechanical advantage to the rams, which is preferably at least two to one.

Each linkage preferably consists of a bar extending rigidly from the projections at one end of the blade-carrying beam and a link pivotally connected at the other end to the bar. Each bar is preferably cranked or curved towards its end remote from the projections on the blade-carrying beam, so as to lie clear of the usual notches in the side-frames affording side access to a bolster-receiving member, the bolster for which carries a fixed blade for co-operation with the movable blade on the blade-carrying beam. The bolster-receiving member extends between and is secured to the side-frames, which are — as usual — preferably thick plates of generally L-shape, with the notches at the inside of the angle, and the side frames are preferably connected below and forwardly of the bolster-receiving member by means of vertical, horizontal, and inclined plates forming a box-section reinforcing beam. Slipper bearings are provided for guiding a plate forming the movable blade-carrying beam. A plate extending between the side frames and inclined downwardly rearwardly from below the bolster receiving member serves both for directing cut-off material out to the rear of the guillotine and for protecting a motor-and-pump unit and oil reservoir housed behind the box-section reinforcing beam.

The supply line to the ram at the trailing end of the blade-carrying beam is preferably provided with a shut-off valve, so that that ram can be rendered inoperative, whereby all the hydraulic supply can be directed to the ram at the leading end of the blade-carrying beam for faster operation when cutting material of small cross sectional area or which is easier to cut compared with the maximum capacity of the guillotine.

The usual clamping bar for the workpieces is preferably carried by the side frames and adapted to be hydraulically or mechanically operated just in advance of the movable blade-carrying beam.

One embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a front elevation of a hydraulically operated guillotine according to the invention;

FIGS. 2 and 3 are elevations of the left-hand and right-hand ends respectively of FIG. 1 to a larger scale and in opposite extreme positions; and

FIG. 4 is a fragmentary section generally on the line IV—IV of FIG. 2.

The guillotine shown in the drawings has two side frames 1A, 1B consisting of thick plates of generally L-shape with notches 2 at the inside of the angle and the side frames are connected below and forwardly of a bolster-receiving member 3 by means of vertical plates 4, 5, horizontal plates 6, 7 and an inclined plate 8 together forming a box-section reinforcing beam. A bolster 9 is shown fitted to the member 3 and carrying a fixed guillotine blade 10. A movable guillotine blade 11 is carried by a movable beam 12 consisting of a plate guided by slipper bearings 13 at each end and bearing pads 14 behind at three intermediate positions. The left-hand end of the movable blade 11 is set lower than its right-hand end, or in other words, the left-hand end 12A of the movable beam 12 is the leading end and the right-hand end 12B is the trailing end.

In the following description of like parts at each end of the guillotine the suffix 'A' denotes any part associated with the leading end 12A of the movable beam 12 and the suffix 'B' denotes any part associated with the trailing end 12B.

Projections 15A, 15B on the ends of the blade carrying beam 12 project through slots 16A, 16B in the side frames 1A, 1B extending in the direction of movement of the beam 12. A shaft 17 extends through journals 18 in the side frames with its axis parallel to the central plane of the slots 16A, 16B, and a pair of arms 19A, 19B are rigidly secured one to each end 17A, 17B of the shaft 17 and extend transversely with respect to the central plane of the slots 16A, 16B. A pair of hydraulic rams 20A, 20B are secured one between each arm on the shaft and an anchorage 21 on the respective side-frame, and the linkages 22A, 22B extend from posi-

tions on the arms 19A, 19B intermediate the shaft 17 and the rams 20A, 20B to the projections 15A, 15B on the ends 12A, 12B of the movable blade-carrying beam 12.

A plate 23 extending between the side frames 1A, 1B and inclined downwardly rearwardly from below the bolster-receiving member 3 serves both for directing cut-off material out to the rear of the guillotine and for protecting a motor-and-pump unit 24 and oil reservoir 25 (FIG. 2 only) housed behind the box-section reinforcing beam. A switching and control box 26 for the motor and for valves (not shown) for the oil to and from the rams 20A, 20B is conveniently mounted at the front upper left-hand end of the guillotine, but a foot switch (not shown) is preferably provided for initiating each cutting stroke of the movable beam, the extent of which stroke can be set by a control knob 27 with a pointer 28 movable over a scale 29.

A work clamp 30 is urged towards the bolster-receiving member 3 by springs in housings 31, but in the raised position of the movable beam 12 and blade 11 the clamp 30 is held raised against the spring-urge by interengaging projections 32, 33 (FIG. 2 only) on the beam 12 and the clamp 30 respectively. The housings 31 are secured to a cover plate 34 bent over and extending between the upper parts of the side frames 1A, 1B, and the outlines of covers 35A, 35B for the mechanisms on the outsides of the side frames are indicated in broken lines in all the Figures.

Supports 36 for the material to be cut extend from the bolster-receiving member 3 and the support at the left-hand end of the guillotine has an upstanding straight-edge 37 square with the fixed blade 10 to enable square cuts to be made easily.

In operation, with hydraulic fluid supplied under pressure by the motor-and-pump unit 24 from the reservoir 25 to both rams 20A, 20B to move the arms 19A, 19B to cause initial cutting movement of the blade 11 carried by the beam 12, the effort of the ram 20B at the trailing end 12B is transmitted to the blade 11 through its arm 19B and linkage 22B to the beam 12 and also through the shaft 17 (as torque) to the arm 19A and linkage 22A at the leading end 12A. During the final cutting movement, the effort of the ram 20A at the leading end 12A is transmitted to the blade 11 through its arm 19A and linkage 22A to the beam 12 and also through the shaft 17 (as torque of opposite hand) to the arm 19B and linkage 22B at the trailing end 12B. At the middle cutting position of the blade 11 little or no effort is transmitted through the shaft 17 as the efforts of the rams 20A, 20B transmitted to the beam 12 through their respective arms 19A, 19B and linkages 22A, 22B will be substantially in balance. Thus for all positions of cutting the efforts of both rams are substantially fully utilised.

The arrangement of the linkages 22A, 22B from intermediate their respective rams 20A, 20B and the shaft 17 is also advantageous in affording a mechanical advantage to the rams, which in the guillotine illustrated is two to one.

Each linkage 22A, 22B consists of a bar 38 extending rigidly from the projections 15A or 15B at one end 12A or 12B of the blade-carrying beam 12 and a link 39 pivotally connected at one end to the arm 19A or 19B from the shaft 17 and pivotally connected at the other end to the respective bar 38, which is curved towards that end so as to lie clear of the notch 2 in the side frame 1A or 1B.

The supply line (not shown) to the ram 20B at the trailing end 12B is preferably provided with a shut-off valve (not shown) operated by a knob 40 on the control box 26, so that that ram can be rendered inoperative, whereby all the hydraulic supply can be directed to the ram 20A at the leading end 12A for faster operation when cutting material of small cross-sectional area or which is easier to cut compared with the maximum capacity of the guillotine.

What I claim is:

1. A hydraulically operated guillotine comprising side-frames with guides for a movable blade-carrying beam, projections on the ends of the blade-carrying beam projecting through slots in the side-frames extending in the direction of movement of the blade-carrying beam, a shaft extending through journals in the side frames with its axis parallel to the central plane of the slots in the side-frames, a pair of arms rigidly secured one to each end of the shaft and extending transversely with respect to the central plane of the slots in the side-frames, a pair of hydraulic rams secured one between each arm on the shaft and an anchorage on the respective side-frame, and linkages from positions on the arms intermediate the shaft and the rams to the projections on the ends of the blade-carrying beam, wherein each linkage comprises a bar extending rigidly from the projections at one end of the blade-carrying beam and a link pivotally connected at one end to the arm from the shaft and pivotally connected at the other end to the bar.

2. A guillotine as in claim 1, wherein the mechanical advantage afforded the rams by the arrangement of the linkages from intermediate the rams and the shaft is at least two to one.

3. A guillotine as in claim 1, wherein each bar is cranked or curved towards its end remote from the projections on the blade-carrying beam, so as to lie clear of the usual notches in the side-frames affording side access to a bolster-receiving member, the bolster for which carries a fixed blade for co-operation with the movable blade on the blade-carrying beam.

4. A guillotine as in claim 3, wherein the bolster-receiving member extends between and is secured to the side-frames, which are thick plates of generally L-shape, with the notches at the inside of the angle, and the side frames are connected below and forwardly of the bolster-receiving member by means of vertical, horizontal, and inclined plates forming a box-section reinforcing beam.

5. A guillotine as in claim 4, wherein slipper bearings are provided for guiding a plate forming the movable blade-carrying beam.

6. A guillotine as in claim 4, wherein a plate extends between the side frames and is inclined downwardly rearwardly from below the bolster receiving member, to serve both for directing cut-off material out to the rear of the guillotine and for protecting a motor-and-pump unit and oil reservoir housed behind the box-section reinforcing beam.

7. A guillotine as in claim 1, wherein a supply line feeding only the ram at the trailing end of the blade-carrying beam is provided with a shut-off valve, so that that ram can be rendered inoperative, whereby all the hydraulic supply can be directed to the ram at the leading end of the blade-carrying beam for faster operation when cutting material of small cross sectional area or which is easier to cut compared with the maximum capacity of the guillotine.

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