No. 830,276. PATENTED SEPT. 4, 1906.

H. AIKEN.

SHEAR MECHANISM.

APPLICATION FILED SEPT. 5, 1902.

3 SHEETS—SHEET 1.

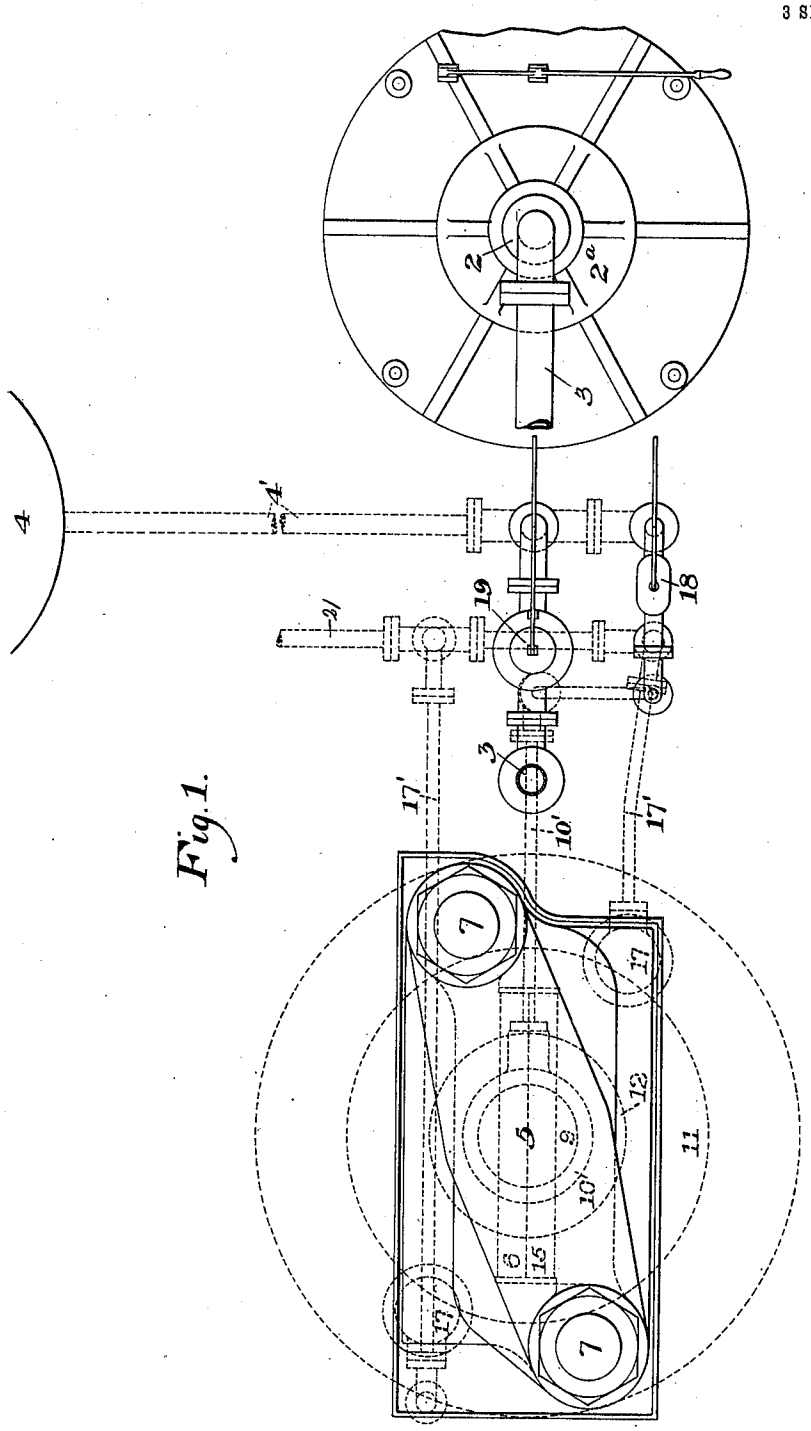


Fig. 1.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 4.

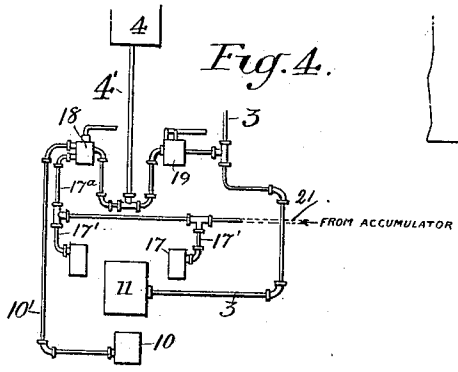


Fig. 5.

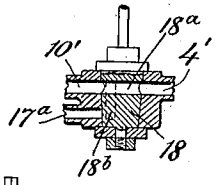


Fig. 2.

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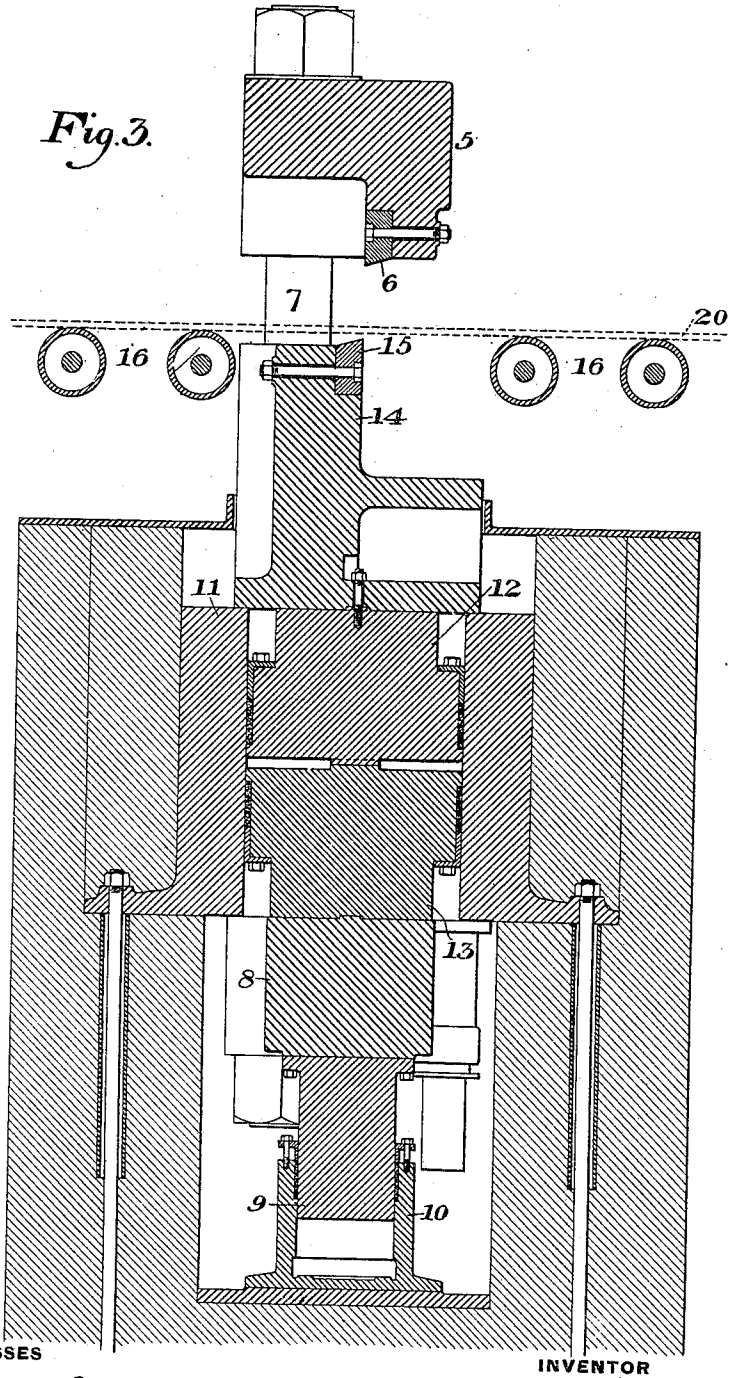
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3 SHEETS—SHEET 3.

Fig. 3.



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HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

SHEAR MECHANISM.

No. 830,276. Specification of Letters Patent. Patented Sept. 4, 1906.

Application filed September 5, 1902. Serial No. 122,190.

To all whom it may concern:

Be it known that I, HENRY AIKEN, of Pittsburg, Allegheny county, Pennsylvania, have invented new and useful Shear Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in plan view shears constructed in accordance with my invention. Fig. 2 is a front elevation thereof, partly in vertical section. Fig. 3 is a vertical section of the shears on the line III III of Fig. 2, but on a larger scale. Fig. 4 is a diagrammatic view of the fluid connections, and Fig. 5 is a detail view of the valve 18 with the valve shown in its open position.

In the drawings, 2 represents the intensifier actuated by a steam-cylinder 2^a, controlled by a valve 2′. The intensifier supplies water under pressure through a pipe 3 to the cylinders of the shears; but not being part of this invention I will not describe it in detail.

4 is a return-water tank which receives the return or waste water from the cylinders 10 and 11 and is elevated so as to afford a constant back pressure in its pipe 4′ to counterbalance the plunger 12, so as to hold it at all times in contact with the head 14.

5 is the upper head of the shears, having a shear-knife 6 and connected by rods 7 with a cross-head 8, which is supported by the plunger 9 of a hydraulic adjusting-cylinder 10. The head 5, cross-head 8, and rods 7 constitute the frame of the shears, which is longitudinally adjustable for the purpose of varying the gap between the shear-blades, as explained below.

11 is the main cylinder of the shears. It is open at both ends and has two oppositely-directed plungers 12 13, the plunger 13 being supported by the cross-head 8 and the upper plunger 12 bearing upon the lower head 14 of the shears, which has a shear-knife 15 and is normally at about the level of a feed-table 16.

17 17 are retracting-cylinders whose plungers are connected with the lower head 14, These cylinders are under constant pressure of water from pipes 17′ and assist in displacing the water from the main cylinder 11. The pipes 17′ receive pressure through a pipe 21 from an accumulator or some other suitable source of supply, the pressure in said pipes being sufficient to displace the water in the cylinder 11 when the plungers of the pull-back cylinders 17 are actuated. The cylinder 10 has a water-supply pipe 10′, controlled by a valve 18, which is connected to the accumulator-pipe 17′ by a branch pipe 17^a. The valve 18 is shown as having a port 18^a, which in one position of the valve connects the pipes 4′ and 10′, and also a second port 18^b, which in another position is arranged to connect the pipes 10′ and 17^a. The hydraulic valve 19 is a check-valve of any suitable type in the waste-pipe 4′, which when the operating pressure is applied to the cylinder 11 automatically closes, so as to cut off connection of said cylinder with the return-water tank 4 and which when the actuating pressure is shut off from the main cylinder 11 opens under the pressure from the tank 4 and connects the tank 4 with the cylinder 11, and thus counterbalances the upper plunger 12 by pressure exerted between the plungers 12 13, the elevation of the tank being such that the fluid-pressure exerted on the piston area will accomplish this result.

The shearing is done by moving the lower shear-head 14 upwardly and does not strain the feed-table 16, on which the piece to be sheared rests. The upper head 5 is adjustable vertically in order to vary the gap between the knives to suit the thickness of the piece to be sheared. Thus if the parts are in the position shown in Fig. 3 and it is desired to shear a piece 20 of less thickness than the present gap between the blades the operator moves the valve 18 so as to place the cylinder 10 in communication with the waste-pipe 4′, whereupon the cross-head 8 and its attached shear-head 5, with the bolts 7, constituting the shear-frame, descend the required distance. The valve 18 is then moved to close the pipe 10′ and to hold the upper head 5 in the position in which it has thus been adjusted. The gap between the knives of the shears is thus reduced so as to be but little greater than the piece to be cut, and the least possible volume of water is therefore required in the main cylinder to do the work of shearing. To shear the piece fed between the knives, the intensifier 2 is connected with the cylinder 11 through the pipe 3, and the pressure acting between the plungers 12 13 moves the plunger 12 and the head 14 upwardly and shears the piece between the knives, the head 5 being stationary, because the plunger 9 rests upon the water confined in the cylinder 10. After the piece has been sheared the valve 2′ of the intensifier is reversed. The valve 19 is no longer seated by the actuating

pressure, and accumulator-pressure is admitted to cylinders 17, and as the plungers of these cylinders 17 are connected to the head 14 the downward movement of the head overcomes the counterbalance-pressure upon the plunger 12, due to the elevated position of the tank 4, and the water in the cylinder 11 between the plungers 12 and 13 is forced through the check-valve 19 into the pipe 4′ and thence into the tank 4, and a portion of the water drives the ram 2^a downwardly in the cylinder 2 by passing back through the pipe 3, the ram 2 being directly connected to the cylinder 11. The parts are then in their initial position, ready to repeat the shearing operation.

To enlarge the gap between the blades 6 and 15, the valve 18 is moved so as to admit water to the cylinder 10 and to raise the heads 8 and 5 and the posts 7, forming the frame of the shears. The function of the cylinder 10 is to serve as an adjustable stop to limit and restrain the plunger 13 and to cause the motion imparted by the main cylinder to be exerted upon the other plunger 12 in shearing. Instead of the cylinder 10 I may use other stop devices not hydraulically actuated. My invention is applicable not only to hydraulic shears, but to other mechanism, such as presses, punching-machines, and the like.

The novel feature of my invention consists principally in the actuating-cylinder 11, open at both ends, with plungers acting in opposite directions, and the adjustable stop-cylinder, and its advantage arises from the ease of adjustment which it affords to the heads of the machine and the simplicity and strength of the mechanism. The other parts of the apparatus may be varied or modified in construction in many ways, since

What I claim is—

1. Mechanism having an actuating-cylinder, open at both ends, oppositely-directed plungers, a pressure-supply and a counterbalancing-pressure supply communicating with the intermediate space in the cylinder, and an adjustable stop for said plungers; substantially as described.

2. Mechanism having an actuating-cylinder open at both ends and having oppositely-directed plungers therein, one of said plungers constituting a movable bottom, a stop therefor, and a pressure-supply arranged to counterbalance the weight of the other plunger; substantially as described.

3. An actuating-cylinder open at both ends and having oppositely-directed plungers, and a pressure-supply and counterbalancing-pressure supply communicating with the intermediate space in said cylinder; substantially as described.

4. Mechanism having movable heads, an upright actuating-cylinder open at both ends and having oppositely-directed plungers, and an adjusting-cylinder connected directly to one of said heads to vary the gap between the heads; substantially as described.

5. Mechanism having adjustable heads, one of which forms part of the machine-frame, an adjusting-cylinder, a frame connected to said head and moved by said cylinder, an actuating-cylinder open at both ends having oppositely-directed plungers, one of said plungers actuating the other movable head and its companion plunger arranged to engage an abutment formed by the frame carried by the adjusting-cylinder; substantially as described.

6. Mechanism having two movable heads, an actuating-cylinder open at both ends, oppositely-directed plungers in said cylinder, one of said plungers actuating one of the movable heads, a fluid-actuating pressure connection between the plungers, a cylinder having a fluid-actuated plunger which supports the other one of the first-named plungers, and a connection between said plunger and the other movable head; substantially as described.

7. Mechanism having two movable heads, and an upright actuating-cylinder open at both ends, and having oppositely-directed plungers, one of said plungers engaging one of said heads to actuate the same, and the other plunger engaging a frame containing the other movable head, and a fluid-controlled support for said frame; substantially as described.

8. Mechanism having a cylinder open at both ends, two oppositely-directed plungers in the said cylinder, an actuating fluid-pressure connection between the plungers, a movable head actuated by one of the plungers, a second movable head connected to the other plunger, and a cylinder having a plunger therein forming a support for the last-named plunger; substantially as described.

9. Mechanism having movable heads, an adjusting-cylinder acting upon the machine-frame, a portion of which constitutes one of the movable heads, an upright actuating-cylinder open at both ends and having oppositely-directed plungers, a movable head actuated by one of said plungers, the position of the other plunger being determined by the gap between the movable heads; substantially as described.

In testimony whereof I have hereunto set my hand.

HENRY AIKEN.

Witnesses:
JOHN MILLER,
H. M. CORWIN.