

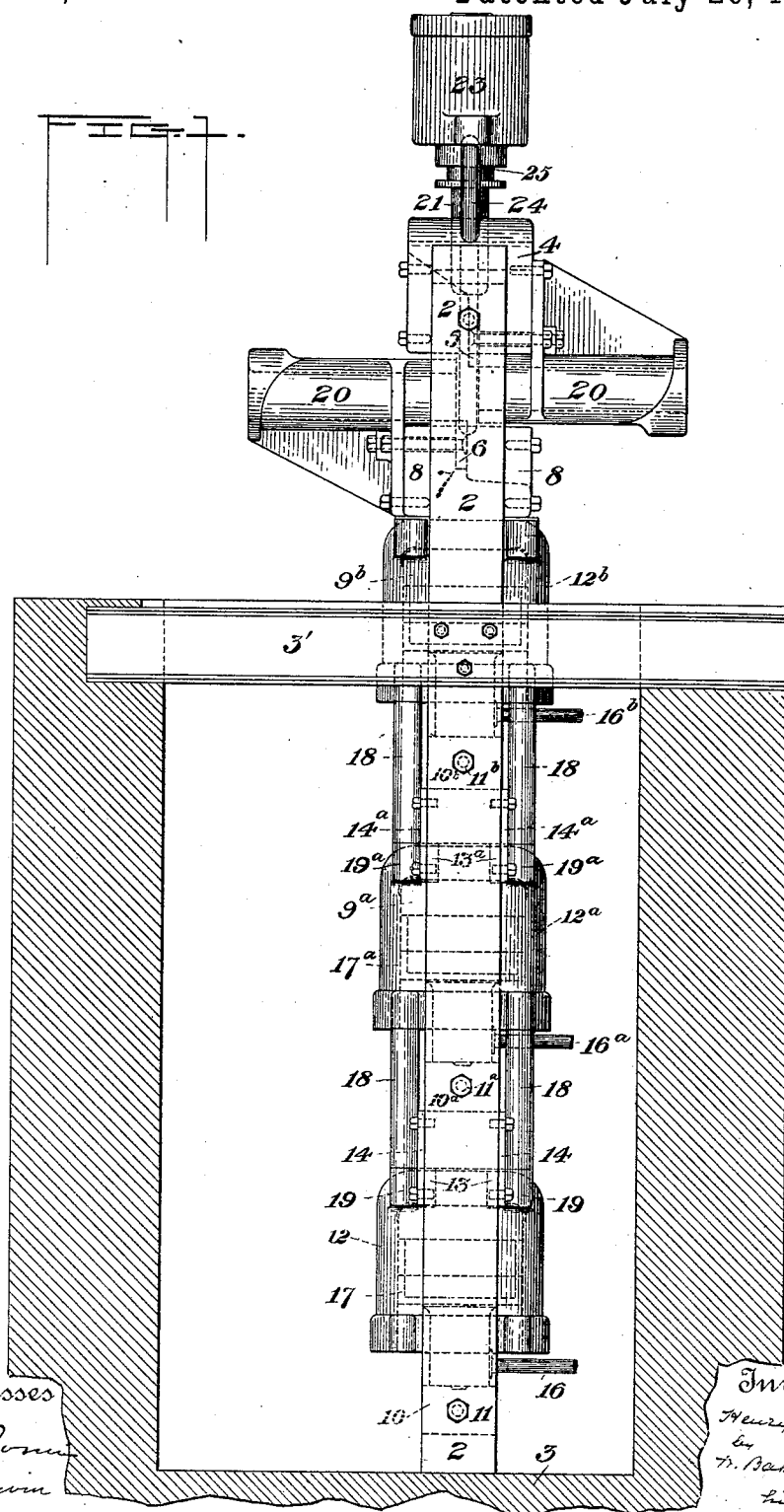
(No Model.)

2 Sheets—Sheet 1.

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METAL SHEARS.

No. 479,392.

Patented July 26, 1892.



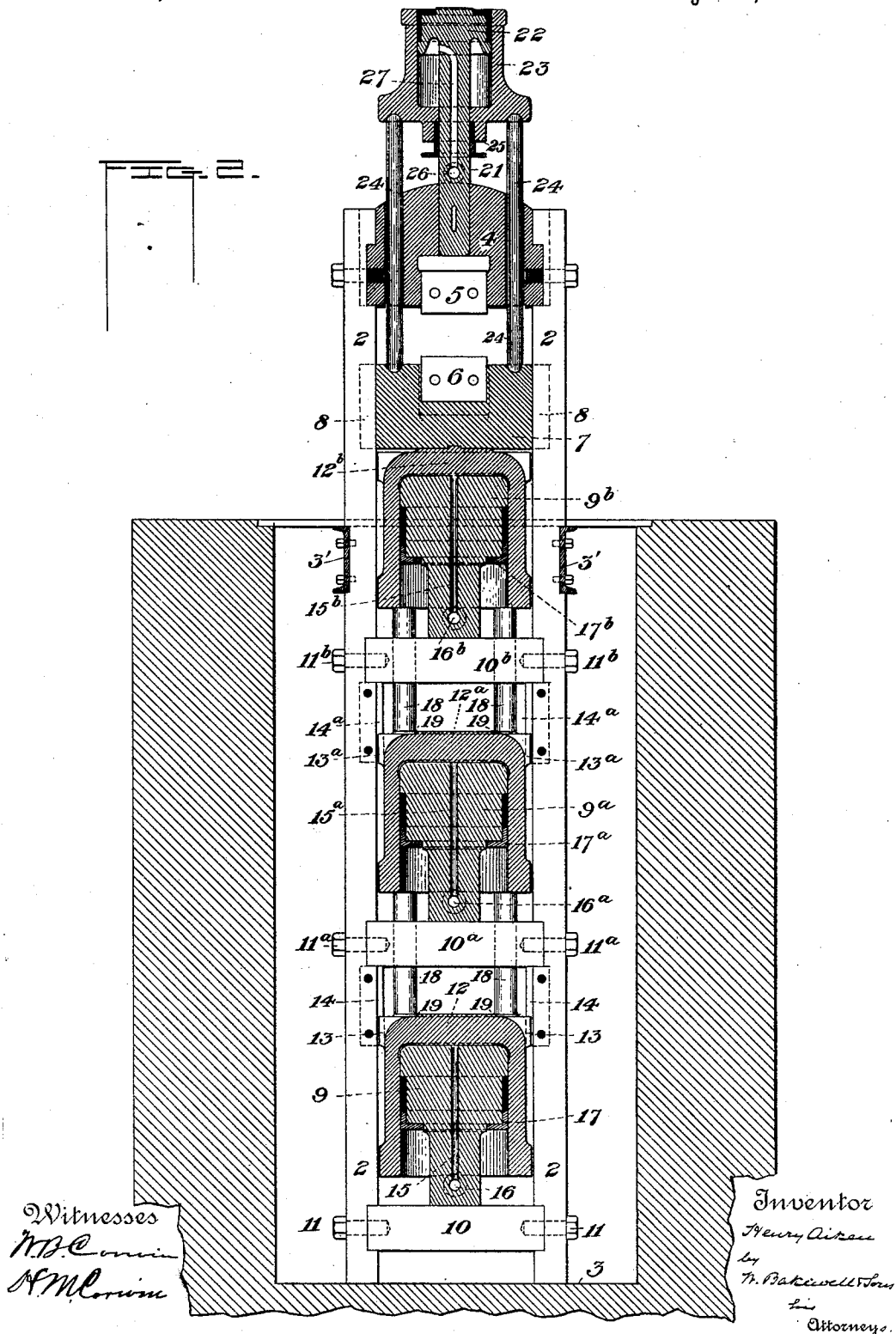
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# UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF PITTSBURG, PENNSYLVANIA.

## METAL-SHEARS.

SPECIFICATION forming part of Letters Patent No. 479,392, dated July 26, 1892.

Application filed November 16, 1891. Serial No. 412,014. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY AIKEN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Metal-Shears, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved shears. Fig. 2 is a vertical central section of the same.

In the accompanying drawings, 2 2 represent parallel posts forming the framework of my improved shears, which posts rest at their bases on a foundation 3 and may be suspended from or fixed to suitable beams 3'. The posts at their upper ends are connected by a block or casting 4, to which is bolted a stationary shear-knife 5.

6 is the movable shear-knife adapted to operate in conjunction with the knife 5. It is secured to a block or knife-head 7, set between the posts 2 and provided with guide-wings 8, which embrace said posts and guide the knife-head in its vertical motion.

In order to operate the movable knife-head, I employ a series of two or more cylinders and plungers set in tandem and adapted to operate in unison. In the drawings I illustrate three of them, and I show the plungers stationary and the cylinders adapted to move to the plungers. The latter feature of construction is desirable and is claimed herein specifically; but I do not wish to limit the broad claims of this application thereto. The lowest plunger 9 is set upon a supporting-bar 10, which is secured between the opposite posts 2 by bolts 11. The movable cylinder 12 is fitted over the plunger 9 and is provided with opposite laterally-projecting wings 13, which fit between guide-plates 14 on the posts 2. Water is admitted to the cylinder through a passage 15, which extends through the plunger 9 and communicates at its lower end with a valve-controlled water-pipe 16. The plunger is provided with suitable packing 17. The second plunger 9<sup>a</sup> is set above the plunger 9 on a supporting-bar 10<sup>a</sup> and is provided with a cylinder and water-supply passage in like manner to the arrangement of the lower parts, already described. The third plunger 9<sup>b</sup> is similarly supported and provided with simi-

lar accessory mechanism, the corresponding parts of each cylinder and plunger being designated by the same reference-figures, distinguished in the cases of the two upper cylinders and plungers by the exponent-marks *a* and *b*. The adjacent cylinders are connected with each other by vertical posts 18, preferably four in number, which fit upon shoulders 19 on the top of one cylinder and within sockets at the base of the next cylinder above. The top of the end cylinder 12<sup>b</sup> fits against the base of the knife-head 7, so that when said cylinder is raised it will elevate the knife-head and will cause the movable knife to operate in conjunction with the stationary knife 5 and to shear off an interposed metal bar or rail. The bar or rail to be sheared is fed between the shear-knives through opposite guide-troughs 20, which support the rail during the cutting operation and are separated at their ends sufficiently to accommodate the knives. When such bar or rail is to be sheared, it is fed into the troughs 20 and is supported therein. Water under pressure from a suitable pump or accumulator is then admitted into the lower cylinder 12 or the upper cylinder 12<sup>b</sup> through the supply-pipe 16, thereby raising said cylinder, and by means of the connecting-bars 18 raising also the cylinders 12<sup>a</sup> and 12<sup>b</sup> and lifting the knife-head 7, so as to shear the rail or bar. If additional shearing-power be required, it is supplied by admitting water also into the two or all of the cylinders. When the cylinders have done their work and it is desired to retract the moving knife-blade, the water may be exhausted from the cylinders, so that they may descend by gravity. It is desirable, however, to employ some positively-acting means for moving them downward. To this end I secure to the casting 4 a vertical plunger 21, whose head 22 fits within a movable cylinder 23, the open end of which is uppermost. The lower end or head of the cylinder 23 is connected with the knife-head 7 by bars 24, passing through the casting 4.

25 is the stuffing-box, through which the plunger passes into the cylinder 23.

26 is the water-controlled supply-pipe, and 27 is the water-passage, which leads through the plunger and discharges into the cylinder 23.

To move the shearing-cylinders 12 downward, water is admitted into the cylinder 23, and acting therein moves it downward, as shown in Fig. 2, and by means of the connecting-bars 24 this downward motion of the cylinder is communicated to the knife-head 7 and thence to the cylinders 12, forcing them down on their plungers and exhausting the water therefrom. The cylinder 23 is of small area relatively to the cylinders 12, and I therefore prefer to have the water-pressure continually exerted within it, so that it shall serve as a constantly-acting counter-balance. In practice I prefer to set the posts 2 within a pit below the floor of the mill or building in which the apparatus is used, but so that the shear-knives shall extend above the floor and shall be in convenient position for use. This is the construction shown in the drawings; but it may be modified, if desired. So, too, instead of having the machine set in an upright position it may be horizontal, though this is not so desirable as the arrangement illustrated, which is embodied in specific claims of this specification.

The advantages appertaining to my improved machine will be appreciated by those skilled in the art. The use of a number of small actuating-cylinders is more convenient than the use of a single large cylinder. The small cylinders arranged in tandem are very much easier and cheaper to construct and to keep in working order, and there are other advantages which result from the strength due to the small lateral compass of the machine and the ease of varying the amount of power exerted conformably to the requirements of the particular piece to be sheared.

My improved power mechanism may be used not only as means for actuating metal shears, but also for actuating forging or pressing apparatus, &c.

I claim—

1. The combination of a series of hydraulic motors set in tandem, each comprising a cylinder and plunger, one of which is stationary and the other movable, supports for the stationary parts of the motors, common guides within which the movable parts move, connections between said movable parts, and an operating-tool, substantially as and for the purposes described.

2. The combination of a series of hydraulic motors, each comprising a cylinder and plun-

ger, one of which is stationary and the other movable, supports for the stationary parts of the motors, said motors being set one in advance of the other with their moving parts connected, and an operating-tool at the outer end of the last motor of the series, substantially as and for the purposes described.

3. In metal-shears, the combination of a series of hydraulic motors, each comprising a cylinder and plunger, of which one is stationary and the other movable, supports for the stationary parts of the motors, said motors being set one above the other with their moving parts connected, a head or block above the end of the series, an upright frame connecting the same with the base of the machine, a shear-knife fixed to the head or block, and a shear-knife moved by the motors, substantially as and for the purposes described.

4. The combination of an upright series of stationary plungers set on supports one above the other, cylinders set on the plungers, a guide-frame for the cylinders, said cylinders being connected, so that the power of one shall be transmitted to the next, an operating-tool, and a counterbalancing-cylinder acting on the series in opposite direction, substantially as and for the purposes described.

5. The combination of an upright series of stationary plungers set on supports one above the other, cylinders set on the plungers, a guide-frame for the cylinders, said cylinders being connected, so that the power of one shall be transmitted to the next, an operating-tool, a plunger fixed to the top of the guide-frame, and a cylinder set on the plunger and acting on said series in the opposite direction, substantially as and for the purposes described.

6. The combination of a series of stationary plungers set on supports, cylinders set on the plungers, a guide-frame for the cylinders, said cylinders being connected, so that the power of one shall be transmitted to the next, a knife-blade moved by said series of cylinders, and a stationary knife-blade fixed to the end of the frame, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 6th day of November, A. D. 1891.

HENRY AIKEN.

Witnesses:

JNO. B. SCOTT,  
W. B. CORWIN.