

(No Model.)

4 Sheets—Sheet 1.

F. H. STILLMAN & C. WIGTEL.
MECHANISM FOR BENDING PLATES.

No. 504,310.

Patented Aug. 29, 1893.

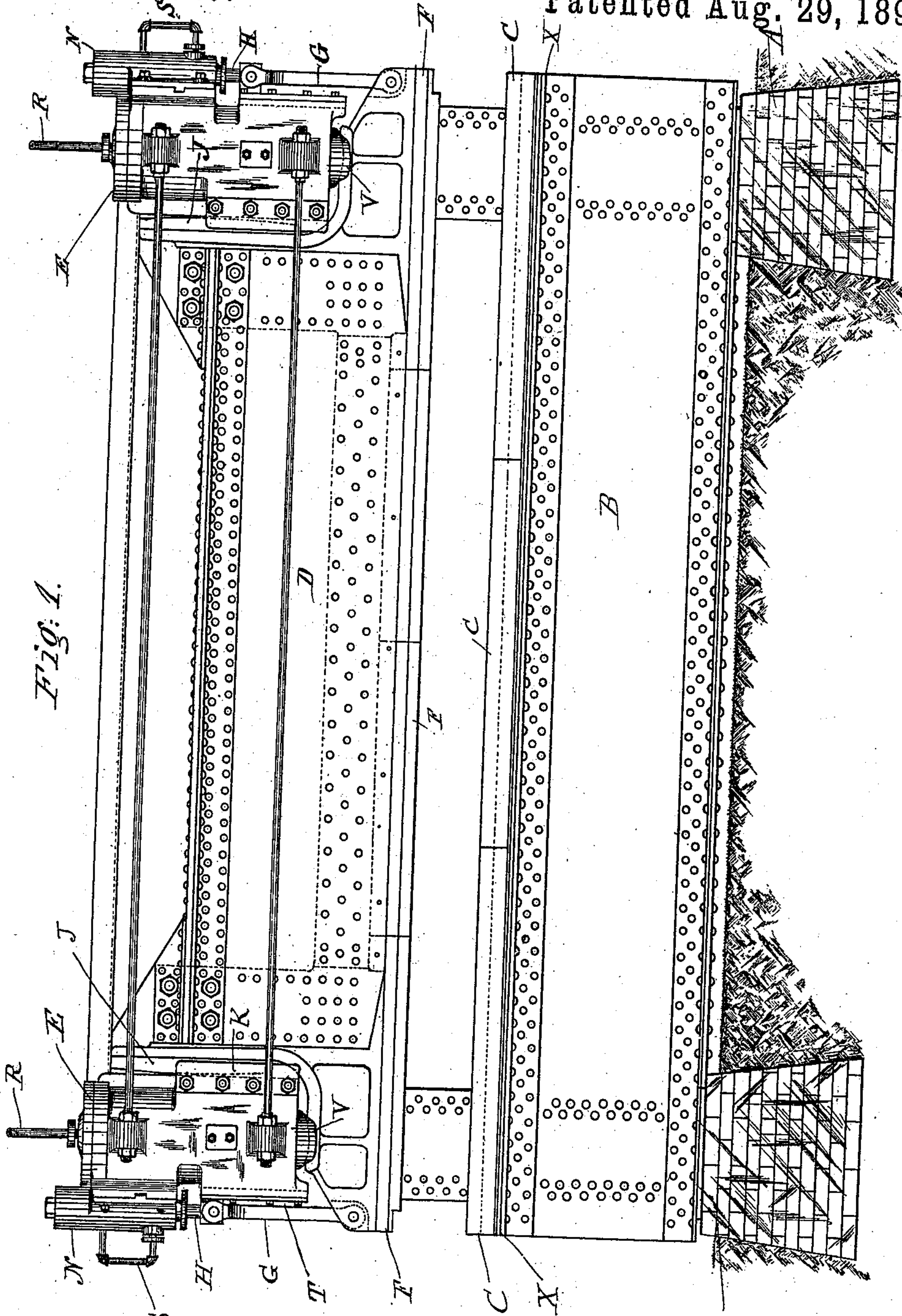


Fig. 1.

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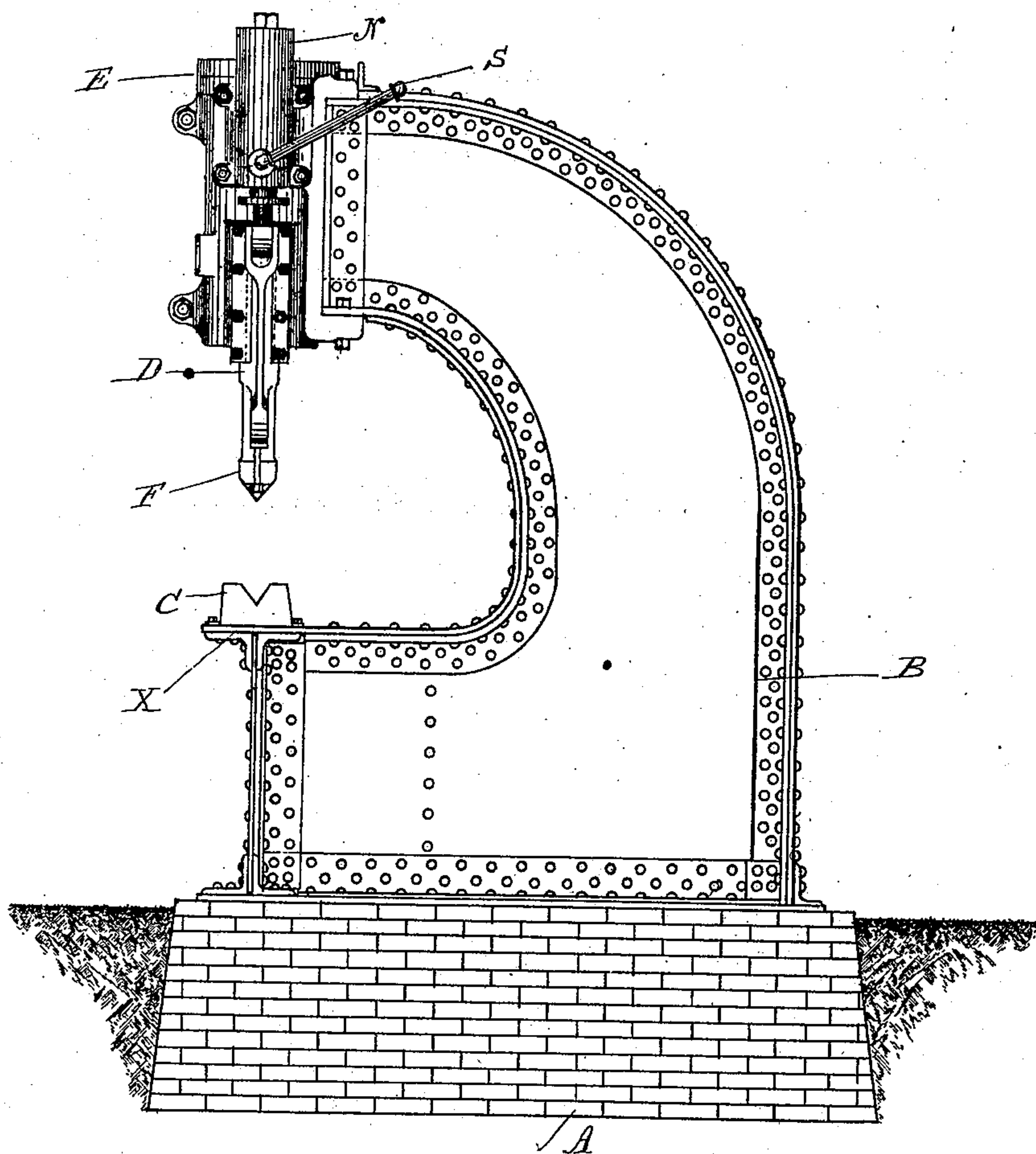
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Fig. 2.



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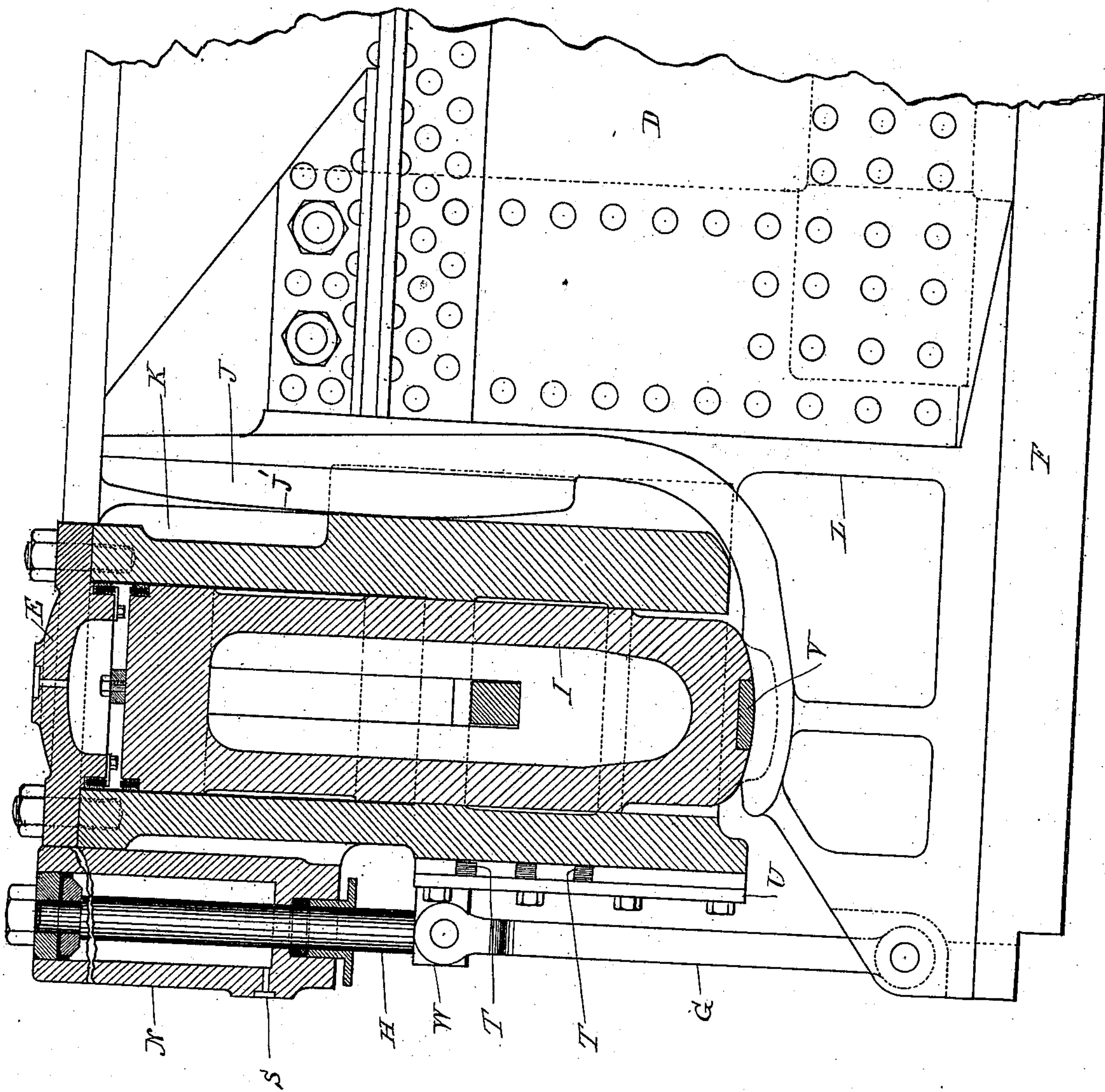


Fig. 3.

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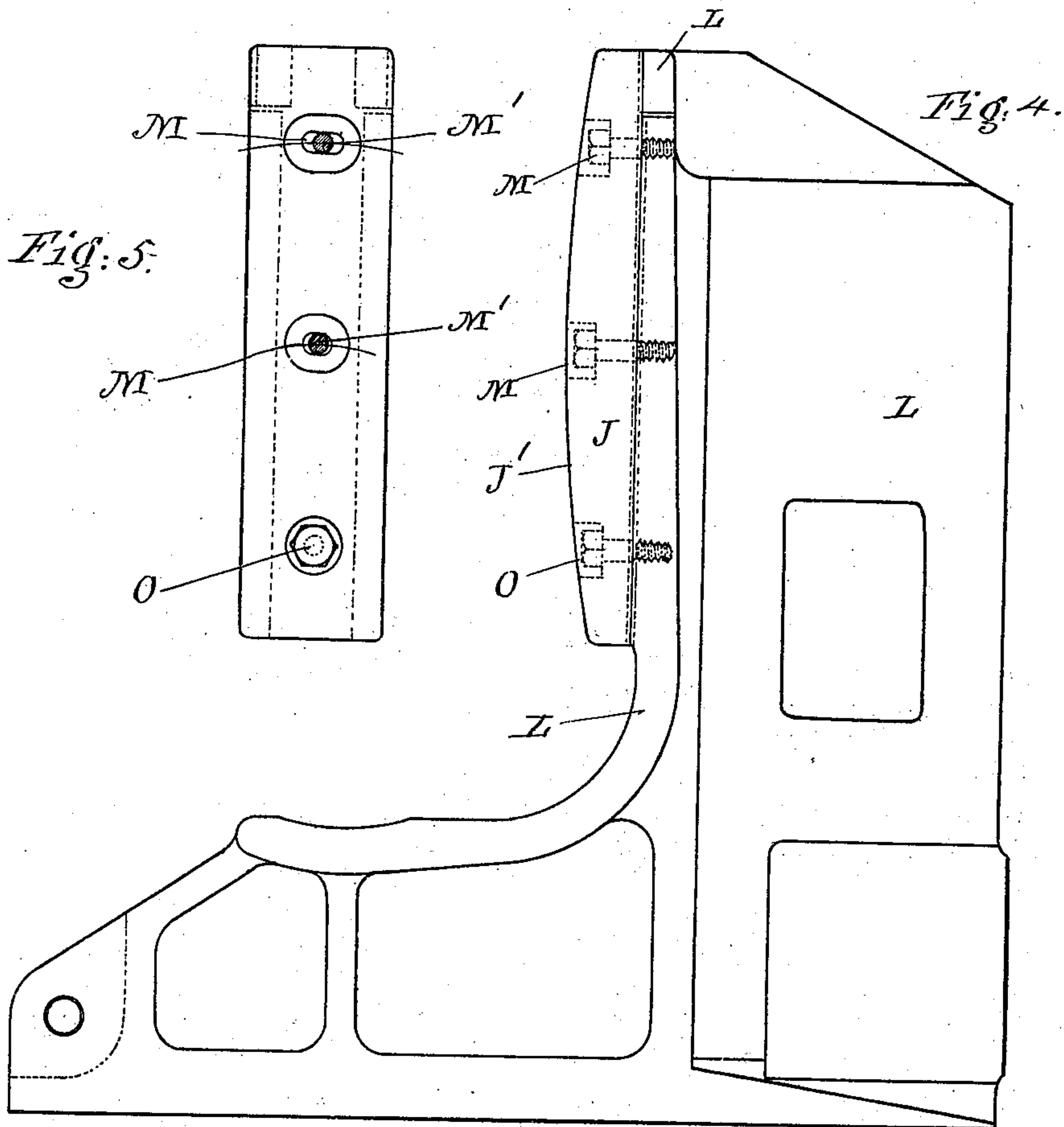
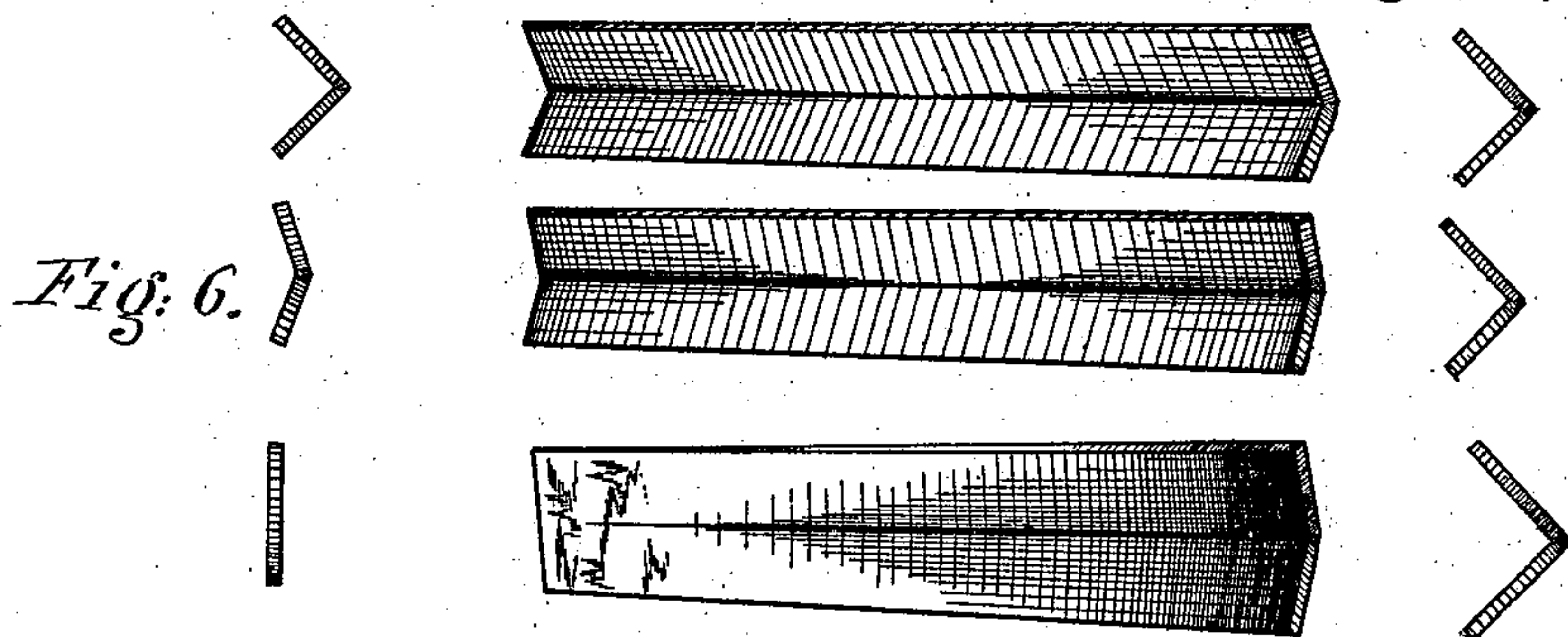
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MECHANISM FOR BENDING PLATES.

SPECIFICATION forming part of Letters Patent No. 504,310, dated August 29, 1893.

Application filed April 7, 1892. Serial No. 428,238. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS H. STILLMAN, a citizen of the United States, and CARL WIGTEL, of Drouthem, Norway, residing in the city of Brooklyn, county of Kings, and State of New York, have invented new and useful Improvements in Mechanism for Bending Plates, of which the following is a specification.

The object of this invention is to bend metal plates at uniform angles, or at any varying angles throughout their entire lengths or only partially bent, adapted to be employed in constructing ships and other similar purposes.

Figure 1, represents a front elevation showing the foundation upon which the frame of this bending machine is supported, and the manner of suspending, raising, lowering and rendering adjustable either in a horizontal plane as shown, or at any desired angle, the bending beam thereof—also showing an adjustable and removable lower bending block into which the plates are to be forced in bending. Fig. 2, represents an end elevation showing the contour of the end of the frame upon which the hydraulic cylinders are mounted and by which the bending beam is raised, lowered and rendered adjustable, and an end view of the lower bending-block into which the plates are to be forced in bending. Fig. 3, is a vertical, central section through one of the hydraulic cylinders by which the bending beam is to be forced downward in bending plates, and a sectional view through one of the hydraulic cylinders by which the bending beam is suspended and to be raised after a plate has been bent. Fig. 4 is a side elevation of one of the guides secured to the ends of the bending beam and rendered adjustable laterally on said bending-beam so that said beam may be moved up and down freely in a horizontal plane or at any desired angle in bending plates as will be hereinafter described. Fig. 5, represents a face view of one of these adjustable and removable guides detached from the bending beam and showing the manner of its adjustability to said beam in either direction, by means of the slotted bolt-holes and bolts—the lowermost bolt serving as a pivot. Fig. 6 is a series of sectional views showing the product.

The several views represented in Fig. 6

show various angles at which plates may be bent by this adjustable bending mechanism in order that these plates may be adapted to the various parts in constructing ships and other similar purposes.

Similar letters of reference indicate corresponding parts throughout the several views.

Upon a suitable foundation A, is secured the frame B, consisting of wrought iron plates firmly riveted together and of the required configuration to form a base upon which to secure an adjustable lower bending-block C, and to the upper part of which, at either end, to suspend an upper bending-beam D, which beam is rendered adjustable laterally by means of adjustable guides J. J. and capable of being moved up and down and maintained in a horizontal plane or at different angles in its up and down movements in bending plates as will be described.

Upon the frame B, at either end, are mounted hydraulic cylinders E. E. by which the bending-beam D, with its V shaped bending-block F, secured thereto is to be forced downward into the bending-block C, in bending plates as shown. To the outsides of these hydraulic cylinders E. E. are secured smaller hydraulic cylinders N. N. by which the bending-beam D, is suspended and to be raised after a plate has been bent, and rendered adjustable up and down at either end by means of the connecting bars G. G. pivoted at one end to the piston-rods H. H. of the cylinders N. N., and at their lower ends pivoted to the bending-beam D., thus suspending and maintaining this bending-beam against the lower ends V. V. of the pistons I. I. in the cylinders E. E. as shown. In order to render this bending beam D. adjustable and capable of being raised and lowered so as to bend plates with a uniform angle throughout, or to vary the angle at which plates may be bent as required, adjustable and removable guides J. J., having convex edges Fig. 4, are secured to the heads L. of the bending-beam D., said guides J. moving up and down in ways K. secured to the sides of the cylinders E. E. as clearly shown in Figs. 1 and 3. That the bending-beam D. may move freely up and down, the guides J. J. are rendered adjustable laterally by means of the slotted bolt-holes M. and bolts M', the lowermost bolts O.

O. serving as pivots upon which to adjust these guides perpendicularly so that the bending-beam D., to which they are secured, may move up and down freely and with accuracy.

Thus it will be seen that by suspending the bending-beam D. at either end thereof from the piston-rods of the cylinders N. N., and maintaining said bending-beam against the shoes V. V. on the lower ends of the pistons I. I. in the cylinders E. E. the power imparting liquid to operate the pistons in the lifting cylinders N. N. may be so regulated that the bending-bar may be moved up and down with accuracy to bend any number of plates at the same angle, or at any variable angles as may be required.

It will be understood that the cylinders E. E. and N. N. are to be operated from an ordinary accumulator in the usual manner of operating the pistons in several hydraulic cylinders simultaneously and with equal or varying force. The pipes R. R. from the cylinders E. E. and the pipes S. S. extending from the lifting cylinders N. N., connect respectively with the accumulator, an illustration of which is omitted in the accompanying drawings as being unnecessary to a clear understanding of our invention.

To resist the pressure exerted in bending plates and to preserve the lower ends of the pistons I. I., steel shoes V. V. are fitted thereto as shown in sectional view Fig. 3.

In order to govern and limit the upward movement of the bending-bar D., stop-bars may be inserted into the recesses T. T. formed in the guides U., Fig. 3, against which bars the heads W. W. of the piston-rods in the cylinders N. N. in their upward movements may rest as shown.

The operation of this mechanism to bend plates either at the same angle throughout their entire lengths, or at varying angles as the case may require to be employed in constructing the varying outlines of ships and other similar purposes may be briefly described as follows:—A plate to be bent having been placed in position upon the lower bending-block C., which block is firmly secured to the bed X. of the frame, the power conveying liquid from an accumulator is permitted to flow into the cylinders E. E. through the pipe-connections R. R. on the upper ends thereof with a sufficient force to expel the liquid from the raising cylinders N. N. through pipes S. S. at their lower ends, and to force the bending-beam downward until the upper V shaped bending-block secured thereto forces the plate into the lower bending block the distance required to bend the plate to the desired angle, after which the power-conveying liquid is again permitted to flow into the cylinders N. N. and forcing the liquid from the cylinders E. E. The flow of the power-conveying liquid therein having been cut off from the accumulator, the bending-beam is again raised to the required height by means of the cylinders N. N. to permit of the removal of the bent plate from

the bending-block C., when the same operation of the mechanism may be repeated in bending a number of plates at the same angle, or at varying angles as before stated. It will be understood that the adjustable guides J. J. may be secured to the sides of the cylinders E. E. and the ways K. K. mounted upon the ends of the bending-beam D. in order that these guides J. J. may be adjusted to the bending-beam as described—which form of construction would be mechanical only and no departure from our invention. When plates are to be bent at varying angles throughout their entire lengths or only partially bent as shown in the several diagrams, Fig. 6, the bending-beam is adjusted to the required angle by means of the raising cylinders N. N., one of the guides J. J. serving as a fulcrum upon which the opposite end of the bending-beam is to be moved up or down. The power-conveying liquid is then forced into the cylinders E. E. and the bending-beam forced downward until the plate is bent.

Having thus fully described our invention, what we claim therein as new, and desire to secure by Letters Patent, is—

1. In a machine adapted to bending or shaping metal plates in combination with a bending-beam therein capable of being adjusted so as to bend or shape plates at different angles or at the same angle throughout their entire length—the hydraulic cylinders to raise and maintain said bending-beam in position, and the hydraulic cylinders to force said bending-beam downward in bending or shaping plates, said cylinders being in pairs at either end of said bending-beam and connected so that the power-imparting liquid may flow alternately into and from said cylinders constructed, arranged and operating substantially as herein set forth and shown.

2. In a machine adapted to bending plates constructed and operating substantially as herein shown and described, the adjustable and removable guides secured respectively to the opposite ends of the bending-beam, said guides having convex surfaces as and for the purpose described.

3. In a machine adapted to bending metal plates consisting of a bending-beam suspended to the pistons of hydraulic cylinders, by which cylinders said bending-beam is to be raised after a plate is bent or shaped—and hydraulic cylinders to force the bending-beam downward into a stationary bending-block to bend or shape metal plates—a series of recesses to receive therein the removable stops and by which stops the upward movement of the bending-beam is to be governed and limited substantially as herein shown and described.

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