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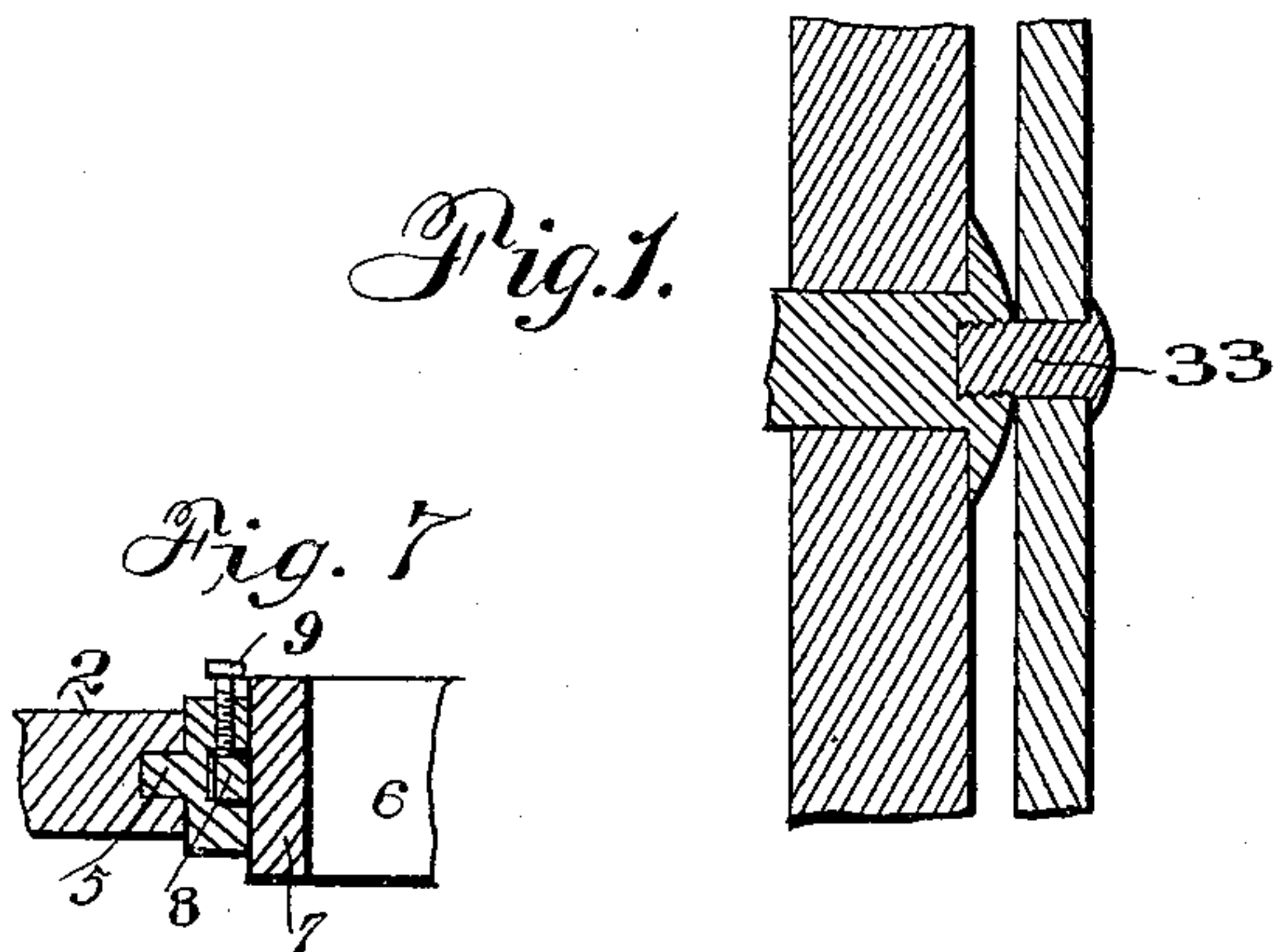
Patented Sept. 20, 1898.

J. L. JONES.  
DRILLING MACHINE.

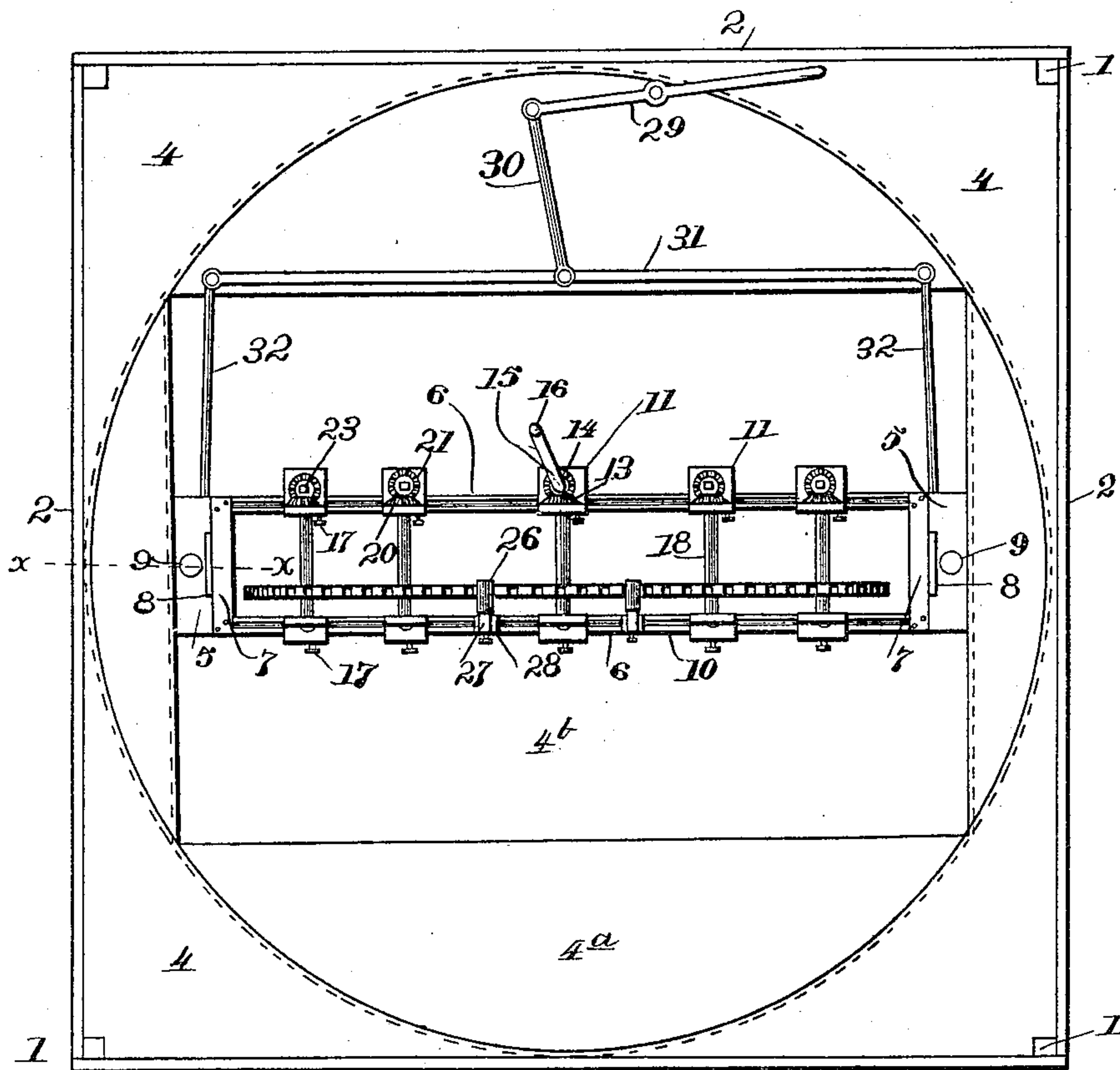
(Application filed May 15, 1897.)

(No Model.)

2 Sheets—Sheet 1.



*Fig. 3.*



Witnesses

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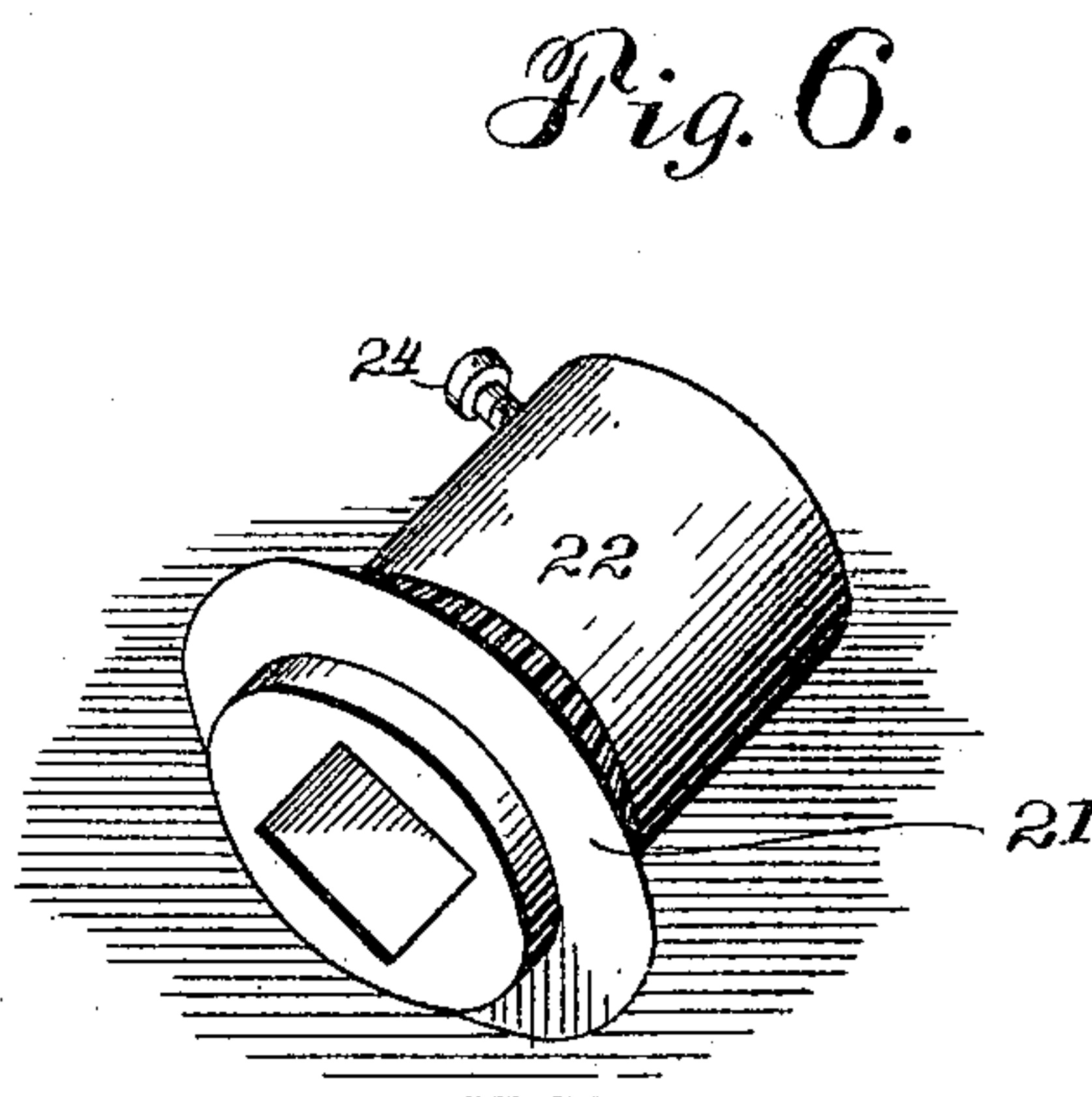
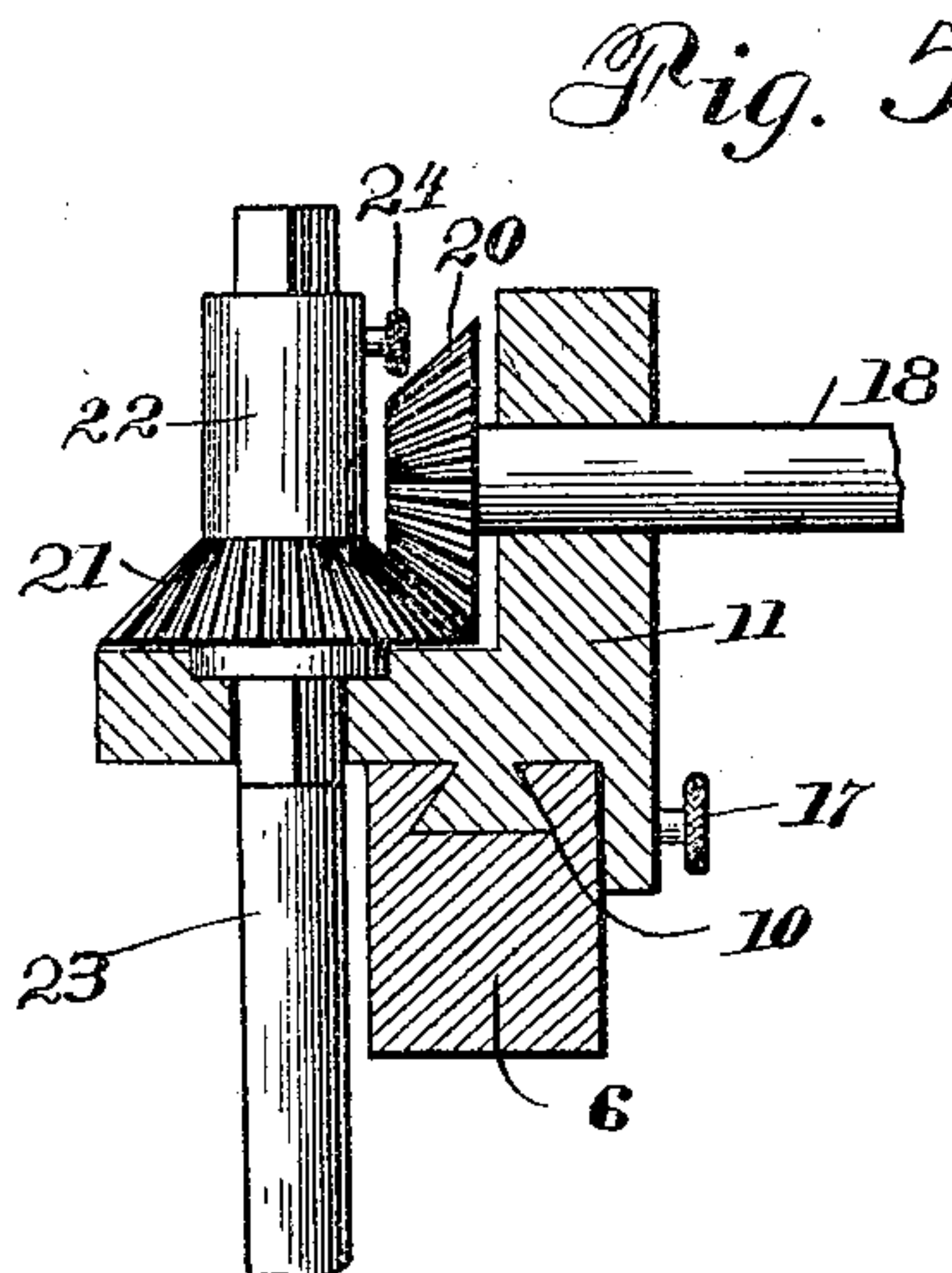
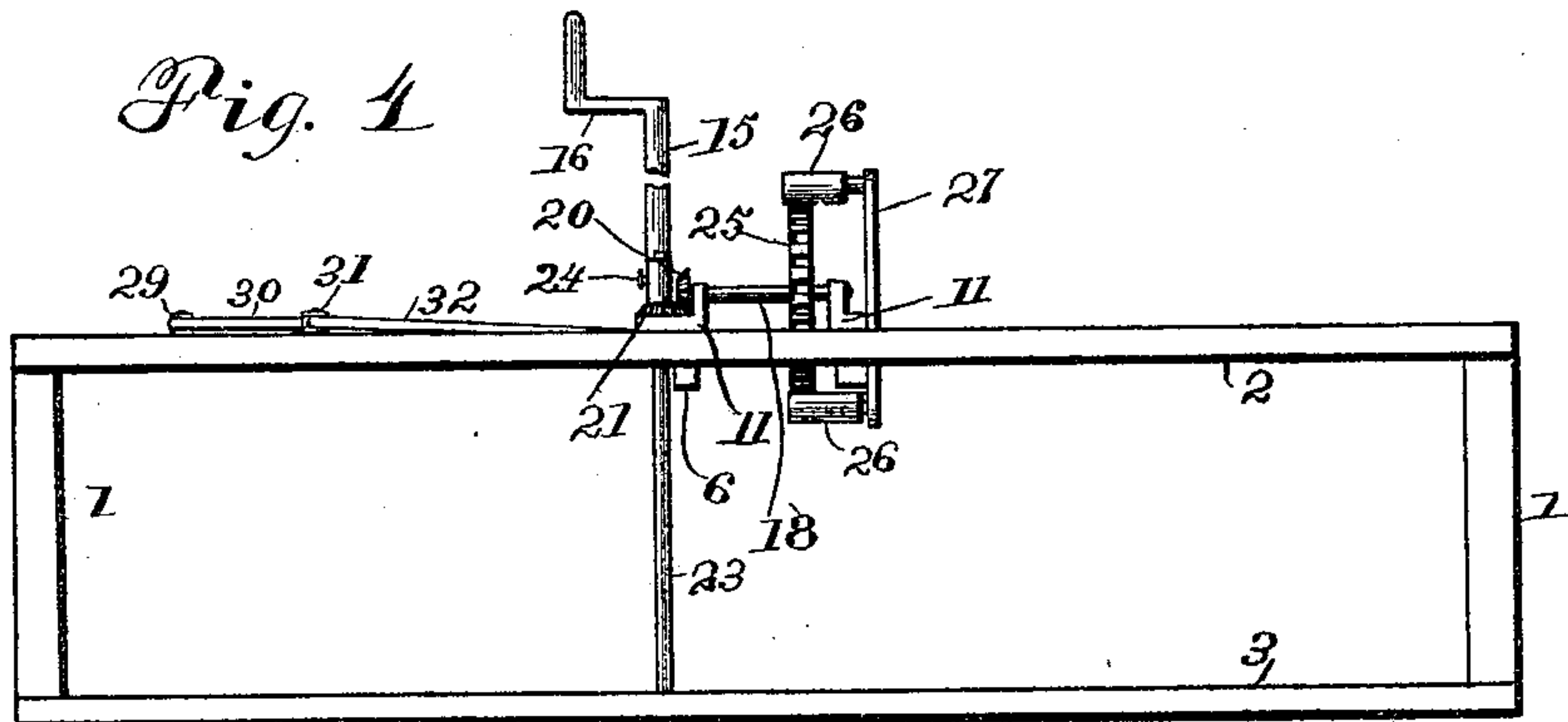
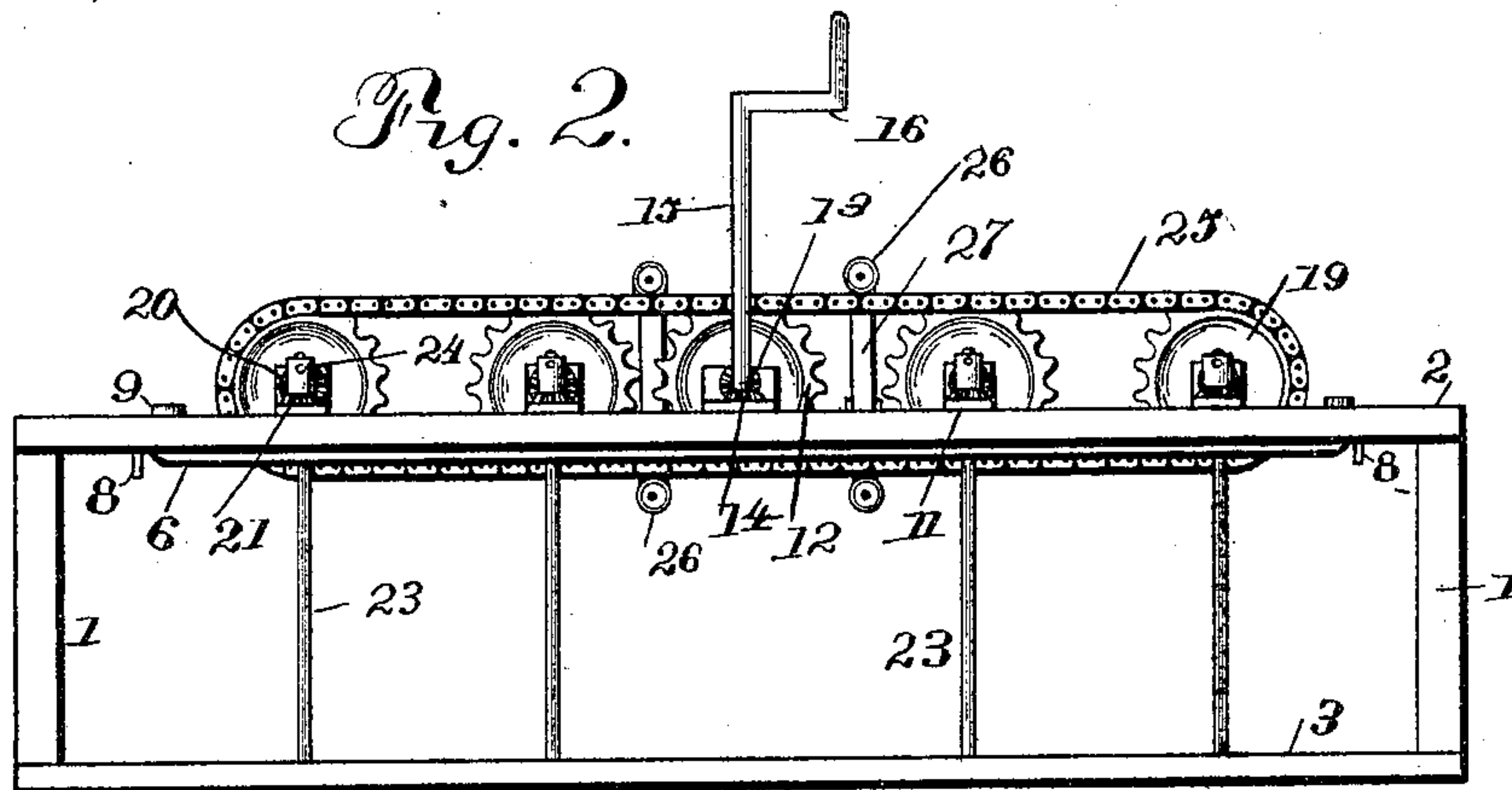
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(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

JAMES L. JONES, OF STARBUCK, WASHINGTON.

## DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 611,173, dated September 20, 1898.

Application filed May 15, 1897. Serial No. 636,742. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES L. JONES, of Starbuck, in the county of Columbia and State of Washington, have invented certain new and useful Improvements in Drilling-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in means for applying copper plates to steel or iron vessels, an especial object being to bore holes in the rivets, said holes being tapped to receive copper pins or pegs that secure the copper plates in place.

A further object of the invention is to provide an apparatus for boring the holes which will drive a series of drills or boring-tools and properly feed the same to the work, the drills being susceptible of independent adjustment as to distance apart and to and from the work upon which they are operated.

The invention contemplates a construction in which the several drills are carried by a movable frame which feeds them uniformly upon the work, the said drills being geared to the driving-wheel or power mechanism in such manner that they can be adjusted laterally with respect to each other and also have an independent vertical adjustment to accommodate any unevenness in the plate or object with which they engage or operate upon.

With the above objects in view the invention consists in the manner of applying the copper plates and in the apparatus providing a stationary frame presenting guides, a second frame movable within said guides and carrying bearings in sliding engagement therewith, the bearings supporting transverse shafts geared to horizontal pinions having axial openings which receive the bits or drills, said shafts being connected to each other and to the power mechanism by sprocket-wheels and a chain or chains, together with a lever and connecting-rods for raising or lowering the movable frame.

In the following specification I have entered into a detail description of the parts which constitute my invention, reference being had to the accompanying drawings and to the nu-

merals thereon, and what I consider to be the novel features of construction are specifically recited in the claims.

In the drawings forming part of this specification, Figure 1 is a sectional view showing the manner of applying the copper plates. Fig. 2 is a side elevation of a drilling-machine constructed in accordance with my invention. Fig. 3 is a plan view of the machine. Fig. 4 is an end view thereof. Fig. 5 is a transverse sectional view through one of the supports and boxings carried thereby. Fig. 6 is a detail view of one of the pinions to which drills or boring-tools are adjustably attached. Fig. 7 is a detail section taken on the line  $x x$  of Fig. 3.

Regarding the apparatus and referring to the drawings by numerals, 1 1 designate the corner-pieces of the stationary frame, which are connected at their upper ends by cross-pieces 2 and at their lower ends by cross-pieces 3 3, leaving a space between for the drills or boring-tools. Between the corner-posts 1 is a plate 4, which is also secured to the cross-pieces. The plate 4 has a large circular opening in its center and is grooved or rabbeted along the edge of said opening to receive a rotatable disk 4<sup>a</sup>, having a rectangular opening 4<sup>b</sup>, and grooved or rabbeted along the edges of said opening to form guides for bearings or boxings 5 5, which are adapted to slide thereon. These boxings form supports for the frame, consisting of the side pieces 6 6, connected by the end pieces 7 7, from which extend trunnions 8, which are passed into openings in the movable bearings or boxings 5 5, said boxings being provided with set-screws 9, adapted to bear upon the trunnions to secure the proper level or inclination of the frame. The side pieces 6 6 of the movable frame, which is located within the stationary frame and in sliding engagement with the horizontal pieces thereof, extend nearly the entire distance between said side pieces and form the supporting means for the mechanism which operates the drills or boring-tools. To this end the side pieces 6 6 are provided in their upper surfaces with dovetailed channels 10, extending longitudinally, and with these channels engage corresponding projections depending from bearing-plates 11, adapted to slide upon said pieces. The



bearing-plates at the center of the movable frame support a transverse shaft, upon which is mounted a sprocket-wheel 12, said shaft having a bevel-wheel 13 in mesh with a horizontal bevel-wheel 14, supported by one of the bearing-plates and connected to a vertical shaft 15, having a crank-handle 16. The bearing-plates which support this part of the mechanism may be rigidly secured to the central portion of the movable frame, as the sprocket-wheel 12 forms the driving-wheel. The other bearing-plates are preferably movable upon the side pieces and when adjusted thereon are held by set-screws 17, and it may be here mentioned that the sets of bearing-plates correspond in number with the number of drills or boring-tools with which the device is intended to be supplied. Each set of bearing-plates supports a transverse shaft 18, having a sprocket-wheel 19 thereon of the same size as the sprocket-wheel 12, and said shaft has a bevel-wheel 20 in mesh with a horizontal bevel-wheel 21, the latter having an enlarged hub or axle 22, which engages its bearings and permits of an axial opening being formed in the beveled wheel. This axial opening is preferably square to receive the shank of a bit or boring-tool 23, which is held in place by a set-screw 24. Over the sprocket-wheels 12 and 19 passes an endless sprocket-chain 25, and this sprocket-chain is held into proper engagement with the intermediate sprocket-wheels by means of idle-pulleys 26, supported by vertical bars 27, carried by plates 28, which are also in sliding engagement with the side pieces of the movable frame and held in adjustable position by set-screws. The idle-pulleys are adapted to bear upon the upper and lower portions of the endless chain, and by having them adjustable upon the movable frame they can be brought to accommodate the position of the intermediate sprocket-wheels. It will be understood, of course, that each horizontal bevel-wheel 21 is adapted to carry a drill or boring-tool which, being detachably connected thereto, will permit the number to be decreased as desired. In order to raise and lower the movable frame when desired, it is connected to a lever 29 through the intervention of a rod 30, cross-bar 31, and rods 32, the latter being attached to the end pieces of the said arm, while the lever is pivoted to the upper cross bar or bars thereof. The lever may have a sliding dog or pawl and engage a segment-rack and hold the same elevated when setting the drills.

The machine hereinbefore described is especially adapted for use in copper-plating iron or steel vessels, in which the device can be suitably clamped against the side of the vessel and by operating the crank-handle 16 a number of the rivets are drilled with holes at one time. It is also apparent that the device could be used in drilling the holes in the copper plates, in which case the stationary frame would be disposed vertically.

The holes that are drilled in the rivets of

the steel plating are tapped, so that when the copper pins or pegs 33 are driven therein they will be firmly held in engagement therewith, being headed to hold the plates in place. This forms a simple and effective manner of applying copper plates to steel or iron vessels.

From the foregoing description of the apparatus, in connection with the accompanying drawings, the construction and operation of the same will be readily understood, for when the drills or boring-tools are properly set, with the movable frame elevated, the lever is released, and by turning the crank-handle the several boring-tools will be rotated or turned simultaneously through the intervention of the sprocket chain and wheels, and the weight of the said movable frame and parts carried thereby will be sufficient to properly feed the drills or boring-tools. By supporting the movable frame on trunnions, in connection with the boxings, as hereinbefore mentioned, the said frame can be swung at an angle, when desired, and held by the set-screws 9. The idle-pulleys serve to insure the proper engagement of the sprocket-chain with the intermediate sprocket-wheels, and as the supports of the idle-pulleys are adjustable upon the frame they can be moved to accommodate the adjustment of the said intermediate sprocket-wheels.

By means of the particular construction and arrangement of the parts which make up my improved drilling-machine I provide for a very wide range of adjustment both in regard to the spacing of the bits or boring-tools and also to insure their proper engagement with the work when the surface is uneven.

This machine greatly reduces the work of drilling holes in rivets for plating vessels, as a number of drills or boring-tools are driven by the operation of a single crank-shaft.

It is apparent that instead of operating the crank-shaft 15 manually it could be driven from an engine or other power.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drilling-machine, the combination with a stationary frame, of a frame movable therein, adjusting means therefor, bearing-plates independently adjustable longitudinally upon the movable frame, transverse shafts mounted in the bearing-plates and adjustable therewith and geared to horizontal pinions having axial openings, bits or boring-tools secured within said openings, and means for driving the several transverse shafts in unison, substantially as shown and for the purpose set forth.

2. In a drilling-machine, the combination with a stationary frame, of a frame movable therein and having guides, bearing-plates mounted upon the frame by engaging the guides, said bearing-plates being secured in adjustment by set-screws or equivalent devices, transverse shafts, supported in the adjustable bearing-plates and having sprocket-



wheels mounted thereon, horizontal pinions also supported by the bearing-plates and geared to the sprocket-wheels, said horizontal pinions having axial openings to receive the bits or boring-tools, a sprocket-chain connecting the sprocket-wheels, and means for driving one of the sprocket-wheels, substantially as shown and for the purpose set forth.

3. In a drilling-machine, the combination with a stationary frame, of a frame movable therein, and having a series of bearing-plates adjustable longitudinally upon the movable frame, horizontal pinions supported in the boring-tools, means for driving the horizontal pinions in unison and from a single drive-wheel, together with a lever connected to the movable frame for raising and lowering the same, substantially as shown and for the purpose set forth.

4. In a drilling-machine, the combination with a stationary frame, of a frame movable therein and provided with bearing-plates adjustable longitudinally thereon, horizontal pinions supported in the bearing-plates and having axial openings to receive the bits or boring-tools, shafts geared to the pinions and having sprocket-wheels thereon, a sprocket-chain connecting the several sprocket-wheels, one of said sprocket-wheels being driven from a suitable power; together with bearing-plates adjustably mounted on the movable frame and carrying supports having idle-pulleys which engage the sprocket-chain, substantially as shown and for the purpose set forth.

5. In a drilling-machine, the combination

with a stationary frame, of a frame movable therein and having bearing-plates adjustable longitudinally thereon, shafts supported in the bearing-plates and having sprocket-wheels mounted thereon, horizontal pinions geared to the sprocket-wheels and having axial openings to receive the bits or boring-tools, set-screws for adjustably attaching the bits or boring-tools to the pinions, a sprocket-chain connecting the sprocket-wheels, one of said sprocket-wheels being driven from a suitable power; and a lever fulcrumed upon the stationary frame and connected to the movable frame for raising and lowering the same, substantially as shown and for the purpose set forth.

6. In a drilling-machine, the combination with a stationary frame, having vertical slots in the end pieces thereof, of boxings guided in the slots and having openings or bearings, a frame located within the stationary frame and having trunnions or stub-axles which bear in the blocks or boxings and are secured by set-screws, the said movable frame having a series of bits or boring-tools adjustable thereon and geared to be turned in unison from a driving power, substantially as shown and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES L. JONES.

Witnesses:

A. M. BAKER,  
W. E. SPROUT.