

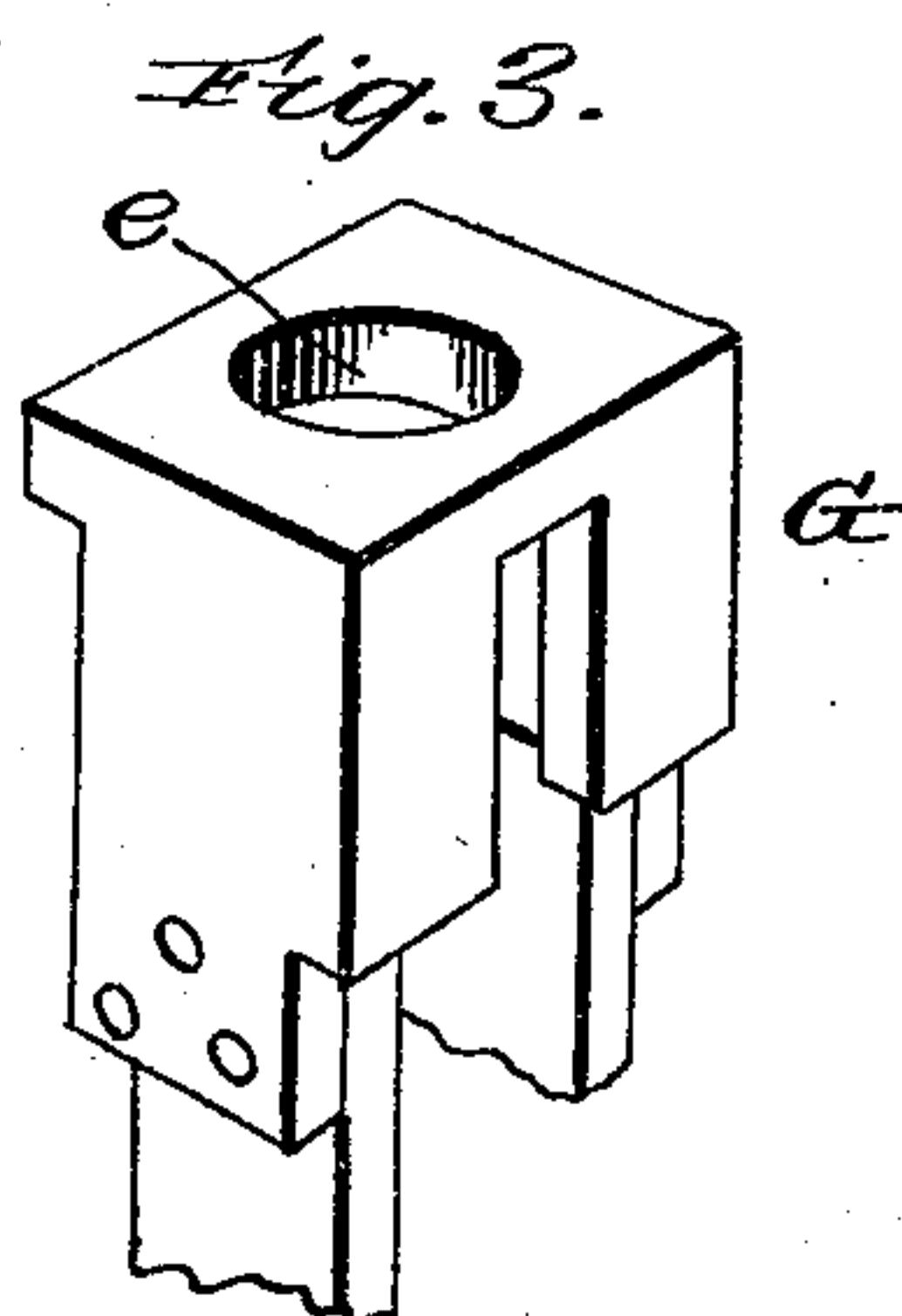
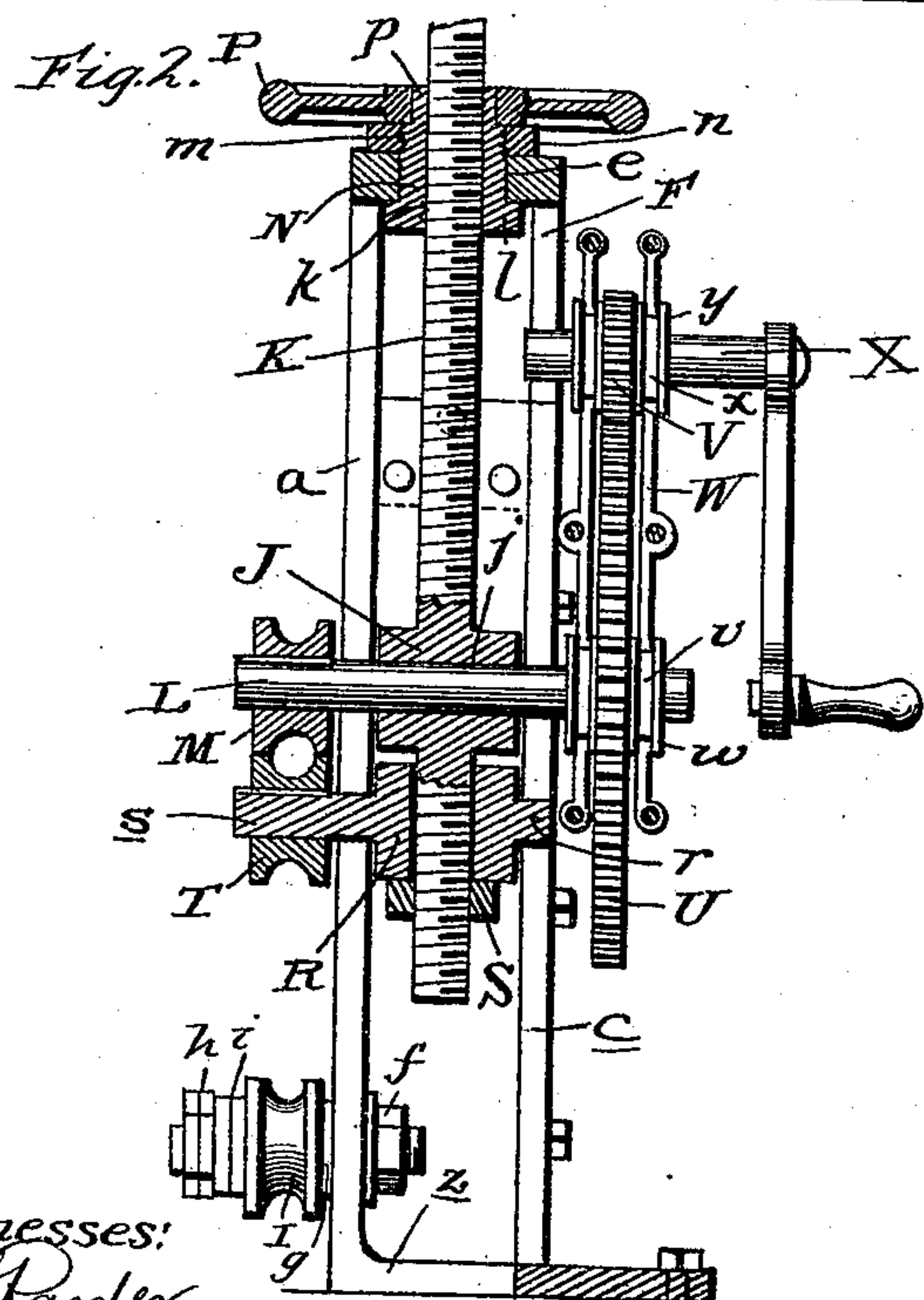
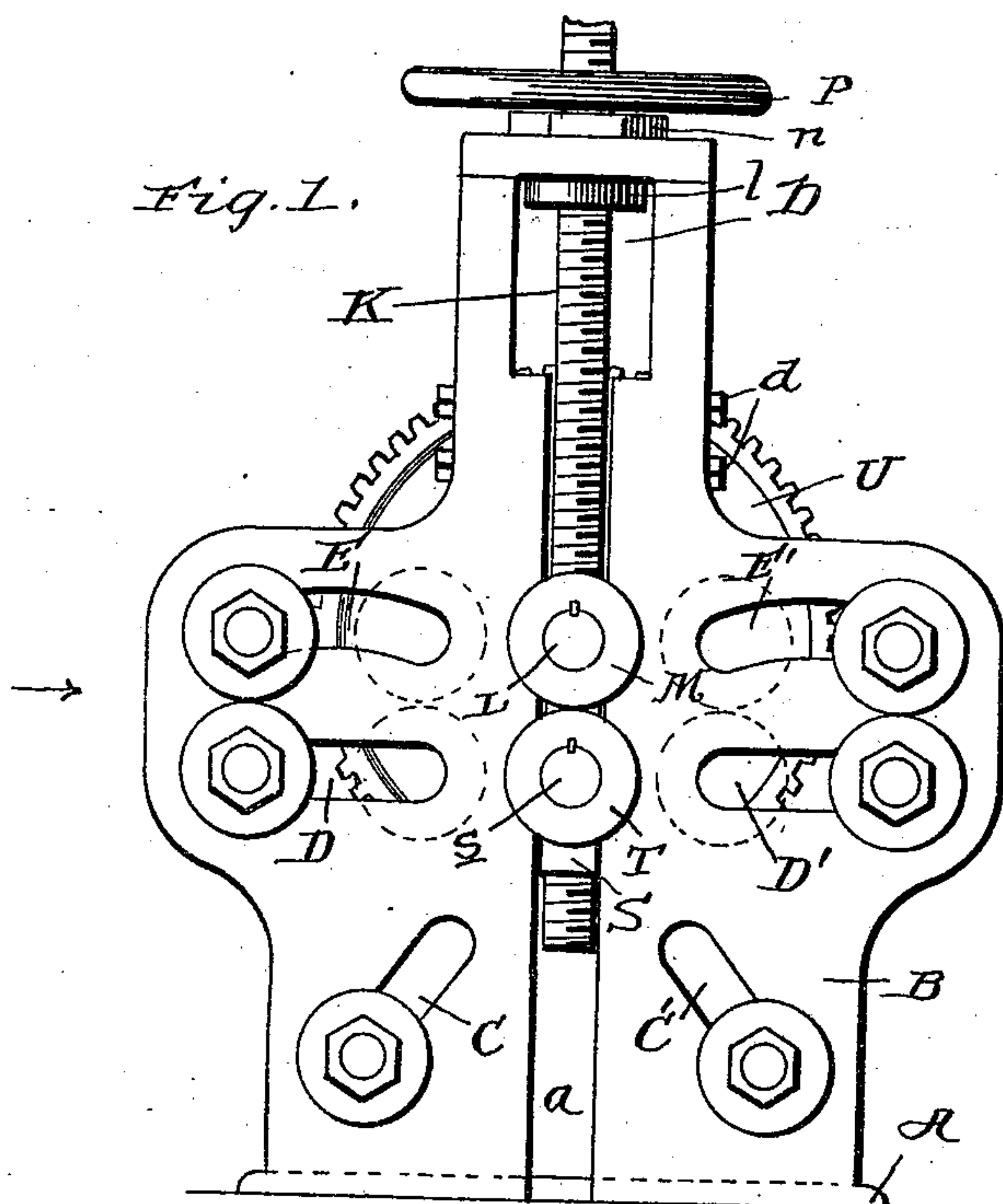
(No Model.)

2 Sheets—Sheet 1.

W. LITCHFIELD.
MACHINE FOR BENDING PIPES.

No. 551,827.

Patented Dec. 24, 1895.



Witnesses:
C. Raeder
R. K. Matthews.

Inventor
W. Litchfield
By James J. Sheehy
Attorney

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

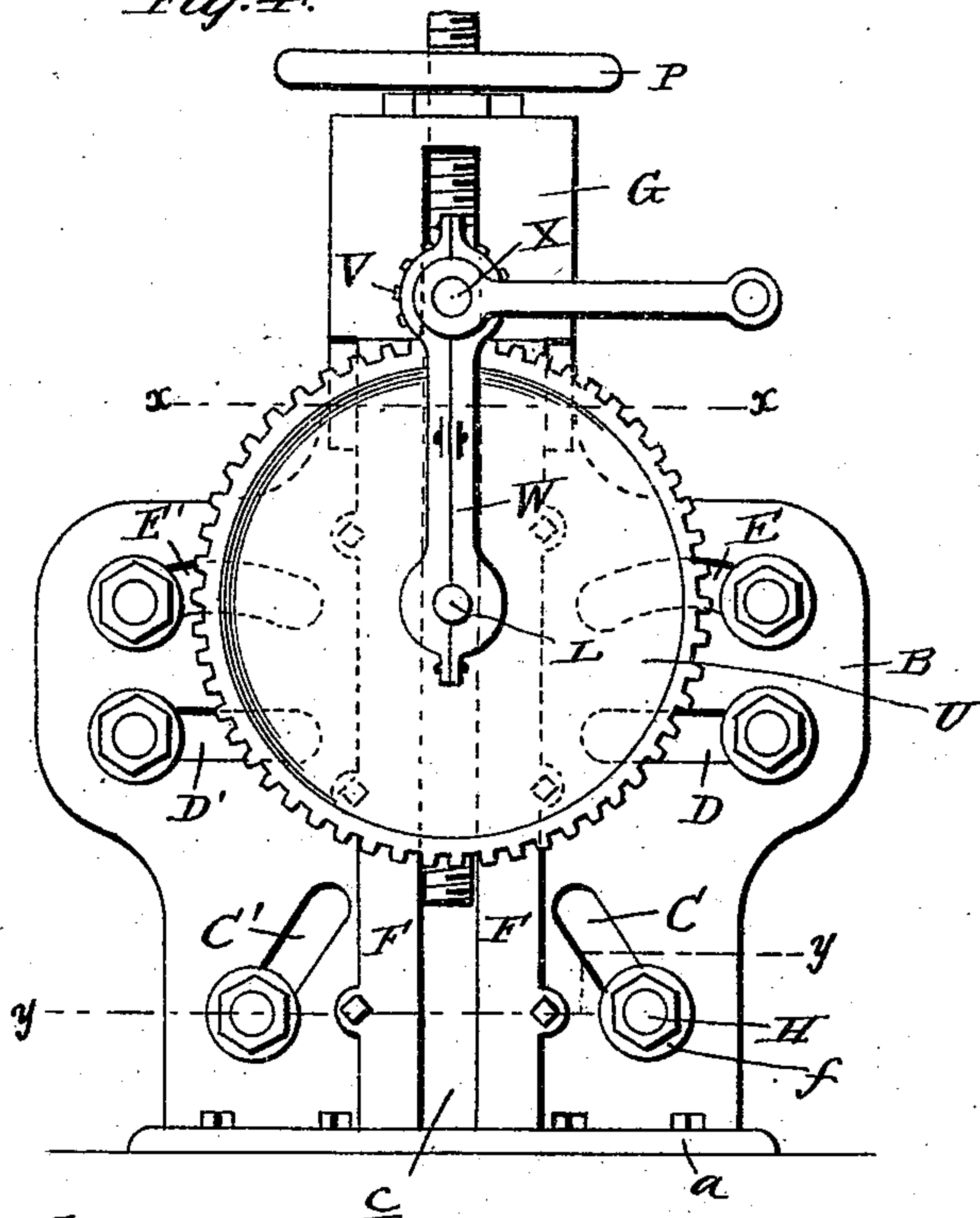


Fig. 5.

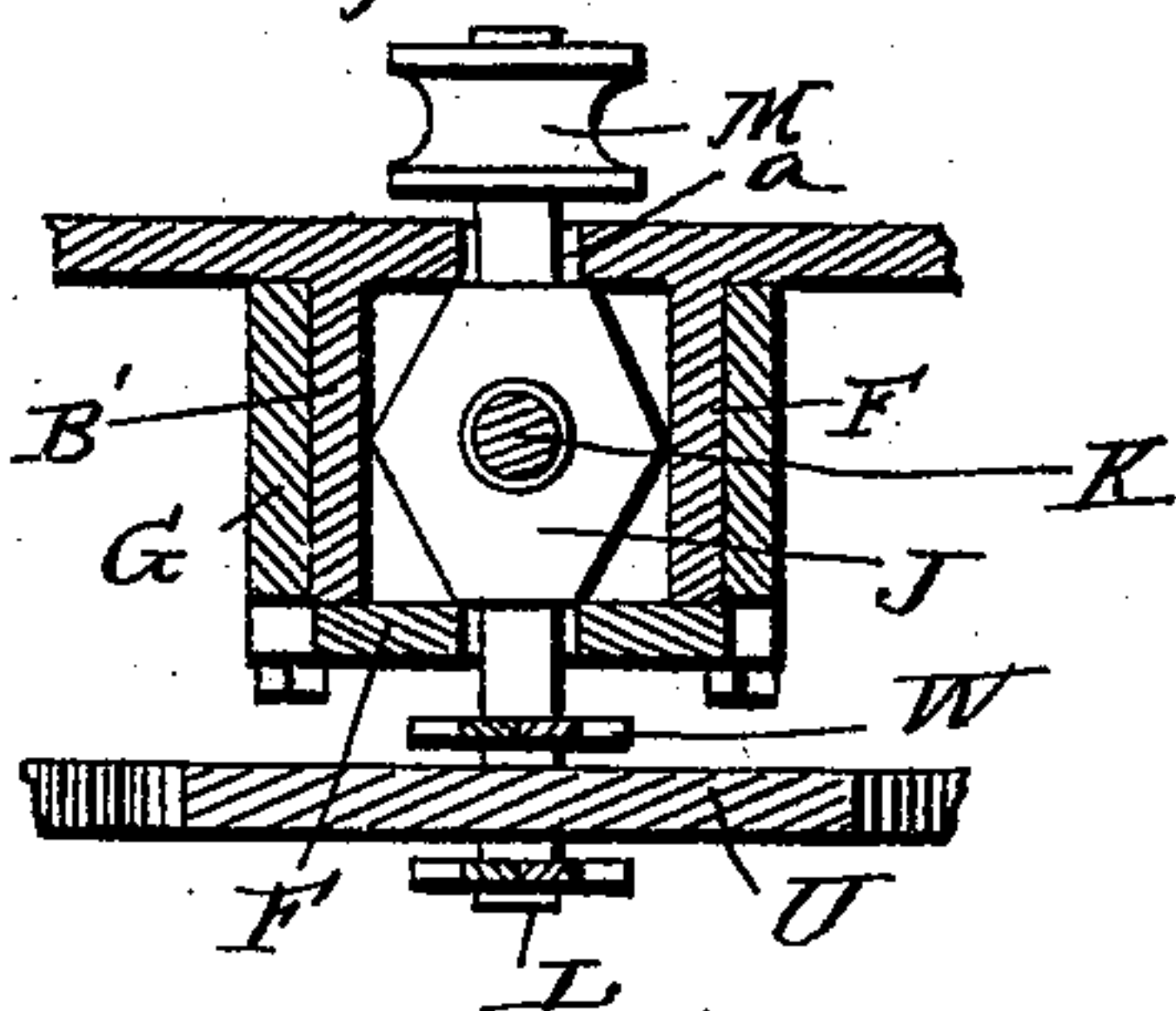


Fig. 6.

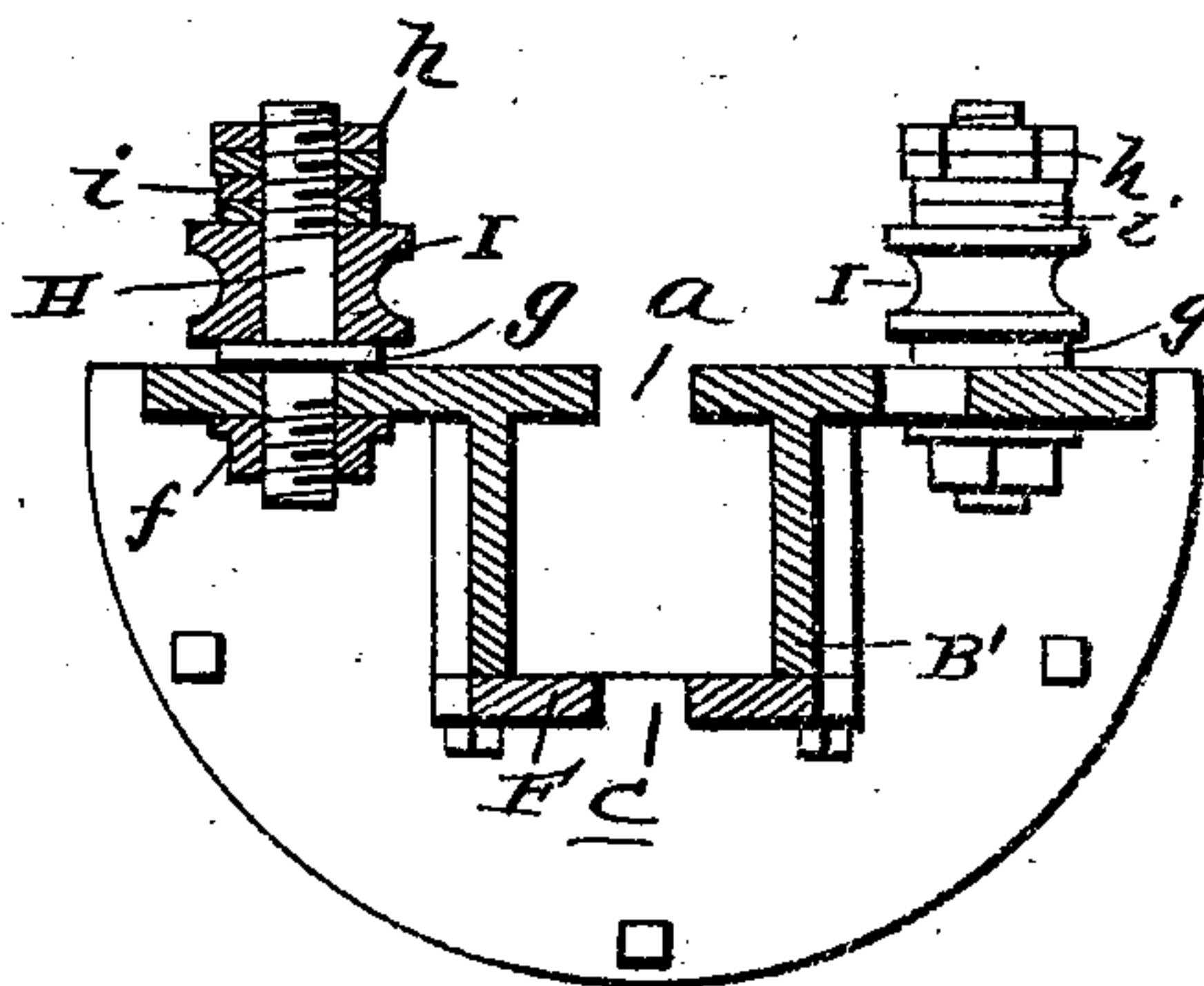
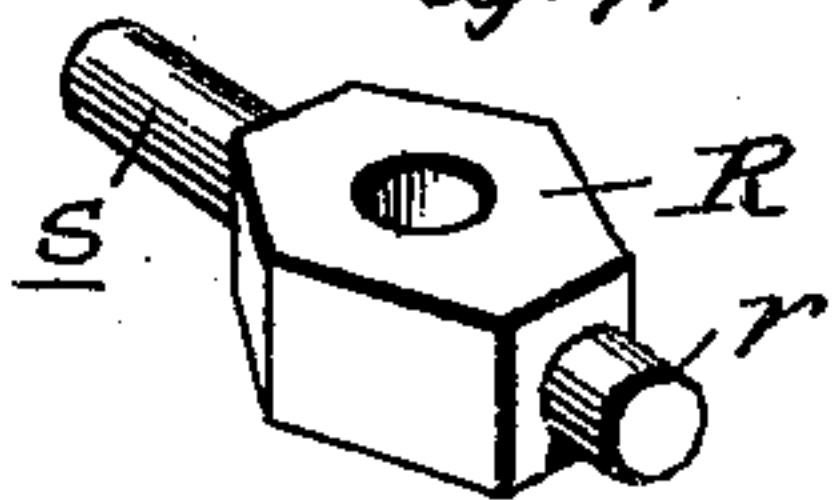


Fig. 7.



Witnesses:

C. A. Rauber
N. C. Matthews.

Inventor

W. Litchfield

By James J. Sheehy

Attorney

UNITED STATES PATENT OFFICE.

WILLIAM LITCHFIELD, OF WINNIPEG, CANADA.

MACHINE FOR BENDING PIPES.

SPECIFICATION forming part of Letters Patent No. 551,827, dated December 24, 1895.

Application filed September 28, 1895. Serial No. 563,992. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LITCHFIELD, accountant, a citizen of the Dominion of Canada, residing at the city of Winnipeg, in the county of Selkirk and Province of Manitoba, Canada, have invented certain new and useful Improvements in Machines for Bending Pipes; and I do 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.

My invention relates to improvements in machines for bending pipes; and it has for its general object to provide such a machine of a simple, durable and efficient construction and one through the medium of which an operator may bend pipes of various diameters into various desired shapes with the exercise of a minimum amount of effort or labor.

Other objects and advantages of the invention will be fully understood from the following description and claims, when taken in connection with the annexed drawings, in which—

Figure 1 is an elevation of one side of my improved machine. Fig. 2 is a vertical transverse section of the machine. Fig. 3 is a perspective view of the cap-casting. Fig. 4 is an elevation of the side of the machine opposite to that shown in Fig. 1. Figs. 5 and 6 are horizontal sections taken in the planes indicated by the lines *xx* and *yy*, respectively, of Fig. 4; and Fig. 7 is a detail perspective view to be hereinafter referred to.

Referring by letter to said drawings, A indicates the base of my improved machine, which is designed to be placed and secured upon a bench or table or upon a floor.

B indicates uprights provided with angularly-disposed flanges B', and are preferably formed integral with and rise from one edge of the base A, and are so arranged as to form the elongated opening *a* between them which is increased in width at its upper end, as indicated by *b*.

C C', D D', and E E' indicate oblique horizontal and curved slots, respectively, which are formed in the uprights B. F indicates vertical plates, which are connected to the outer edges of the flanges B' of uprights B

by bolts, and are so arranged as to form a vertical opening *c* between them which is opposite to and in alignment with the openings *a b* between the uprights B; and G indicates the cap-casting, which is preferably of the form shown in Fig. 3, and is detachably connected by bolts *d* to the upper ends of flanges B' of uprights B, and is provided in its top with a circular aperture *e*, for a purpose presently to be described. These several parts A, B, F, and G, when connected together, as described, constitute the main frame of my improved machine, which is preferably of the general construction illustrated, although it may be of any other construction suitable to the purposes of my invention.

In each of the oblique, horizontal, and curved slots of the uprights B is arranged a spindle H, such as is better illustrated in Fig. 6 of the drawings. These spindles H are threaded at one end to receive nuts *f*, designed to bear against the inner side of the uprights B, and they are also provided with collar-flanges *g*, designed to bear against the opposite sides of the uprights, and at their opposite ends they are also threaded to receive the nuts *h*, which are designed to hold the peripherally-grooved pipe-bending wheels I on the spindles and also the washers *i*, which are interposed between the nuts *h* and the wheels I, so as to permit the latter to turn loosely on the spindles. This construction, as will be readily observed, admits of the wheels I being readily removed from the spindles H, and of other wheels having peripheral grooves of greater or less width being as readily secured on the spindles to bend pipes of diameters greater or less than the width of the wheels I illustrated.

K indicates a vertically-movable screw which extends through the opening *e* in the cap-casting G, and is provided at an intermediate point of its length with the enlargement J, which moves in the space formed by the uprights B, their flanges B', and the plates F, and serves to hold the screw K against rotation. Said enlargement J is provided with a transverse bore *j*, for the reception of the transverse shaft L, and on one end of this shaft, which extends through the opening *a* between uprights B and the opening *c* be-

tween plates F, is removably keyed or feathered a peripherally-grooved wheel M, the purpose of which will be presently understood.

N indicates a rotary nut, which is journaled in the opening *e* of the cap-casting G, and has a threaded bore *k* to receive the screw K, the flange *l*, designed to bear against the under side of the top of said casting, the threaded portion *m*, to receive a nut *n*, which rests upon the top of the casting G and holds the nut N against vertical movement, and the reduced portion *p* at its upper end, of angular form in cross-section. This reduced portion *p* is designed to receive the hand-wheel P, which has a central aperture of angular form, and is designed to be turned when it is desired to rotate the nut N and move the screw K down or up to bend pipe, as will be presently described. This wheel P is readily removable, and when it does not afford sufficient leverage it may be replaced by a long lever (not illustrated) having an opening adapted to receive the portion *p* of the nut N.

With the construction thus far described various U-shaped bends and L-shaped bends and other varieties of curves, coils, spirals, &c., may be formed, it being necessary, however, when the latter shaped bends are to be formed to provide two spindles in each of the horizontal slots D and D' and the slots E E'.

When it is desired to form a U-shaped bend, the wheels I are suitably adjusted and a wheel M, of a width suited to the diameter of the pipe to be bent and of a diameter which will form the desired curve, is keyed or otherwise fastened on the shaft L. The pipe is then introduced in the direction indicated by arrow (see Fig. 1) above the wheels I in the horizontal slots D D' and below the wheel M, and when said pipe is in position the hand-wheel P and the nut N are rotated to move the screw K and wheel M downwardly until the desired curve is made, when by reversing the direction of the nut N to raise the screw and wheel M the bent pipe may be readily removed by lifting it off the wheels I.

When an L bend is to be made, the wheels in the slots of the right-hand upright B are removed and two wheels I are arranged with their spindles in each of the horizontal slots D and E. The pipe is then introduced in the direction indicated by arrow a distance conforming to the desired length of bend and the screw K and wheel L are formed downwardly to form the bend, in the manner before described.

In some cases it is desirable and necessary to firmly hold the pipe when it is being bent, and I therefore provide the block R, which is loosely mounted on the screw K and is held up thereon by the nut S and is provided with the projection *r*, designed to move in the opening *c* between plates F and the projection or spindle *s*, which is designed to move in the opening *a* between the uprights B and the wheel T, which is mounted on said axle *s* and

is designed, when the block R is moved up by turning the nut S, to pinch the piece of pipe against the wheel M.

Fixed on the transverse shaft L, before described, is a large gear-wheel U, which has peripheral grooves *v* in its hub *w*, as better shown in Fig. 2, and meshing with this gear-wheel is a pinion V, which also has grooves *x* in its hub *y*. The said gear-wheel U and pinion V are held in proper relative position, when the shaft is moved up and down, by the two-part connection W, which engages the grooves in their hub, and the said connection W is held in the vertical position illustrated by the crank-shaft X, carrying the pinion V, which crank-shaft extends within the opening *c* between the plates F, as better shown in Fig. 2 of the drawings.

When curves other than those which can be obtained by properly adjusting the wheels I and moving the wheel M vertically are desired, they are formed in the well-known manner by properly adjusting the wheels I and introducing the pipe and rotating the wheel M.

The base A, as well as the support on which it is secured, is preferably provided with an opening *z*, through which the block R may be removed from the machine when desired.

It will be appreciated from the foregoing that, notwithstanding its capabilities and efficiency, my improved machine is very simple and durable and is therefore not likely to get out of order.

I have in some respects specifically described the construction and relative arrangement of the parts of my improved machine in order to impart a full, clear, and exact understanding of the same, but I do not desire to be understood as confining myself to such exact construction and arrangement, as such changes or modifications may be made in practice as fairly fall within the scope of my invention.

Having described my invention, what I claim is—

1. A pipe bending machine comprising a main frame having an upright provided with a central, vertical opening and slots on opposite sides of said opening, wheels mounted on spindles arranged in the said slots of the main frame, a vertically-movable screw carrying a spindle adapted to move vertically in the central vertical opening, of the frame, a wheel mounted on said spindle, and a rotary nut secured against vertical movement with respect to the frame and receiving the vertically movable screw, substantially as specified.

2. A pipe bending machine comprising a main frame having an upright provided with a central vertical opening *a*, and slots on opposite sides of said opening, and also having an opening *e*, in its top, wheels mounted on spindles adjustably fixed in the said slots of the main frame, a vertically-movable screw extending through the opening *e*, in the frame and carrying a spindle adapted to move in the opening *a*, of the frame, a wheel mounted

on said spindle, the rotary nut N, receiving the screw and journaled in the opening *e*, of the frame and having the flange *l*, engaging the under side of the frame top, the threaded portion and the angular upper end, the nut engaging the threaded portion of nut N, and arranged on the upper side of the frame top and the lever engaging the angular end of the nut N, substantially as and for the purpose set forth.

3. A pipe bending machine comprising a main frame having an upright provided with a central, vertical opening and slots on opposite sides of said opening, wheels mounted on spindles adjustably fixed in the said slots of the main frame, a vertically-movable screw carrying a spindle adapted to move in the opening *a*, of the frame, a wheel mounted on said spindle, and a rotary nut secured against vertical movement with respect to the frame and receiving the vertically-movable screw, the block R, loosely mounted on the screw and having a spindle adapted to move in the opening *a*, of the frame, the wheel mounted on the spindle of said block, and the nut S, engaging the screw and arranged below the block R, substantially as specified.

4. A pipe bending machine comprising a main frame having central, vertical, openings *a*, *c*, in its opposite sides and slots on opposite sides of the opening *a*, wheels mounted on spindles fixed in the said slots of the main frame, a vertically movable screw, means for moving said screw, a shaft journaled in said

screw and extending through the openings *a*, *c*, in the frame, a wheel M, fixed on one end of said shaft, a gear wheel fixed on the opposite end of the shaft and having a hub provided with peripheral grooves, a crank shaft extending into the opening *c*, of the frame, a pinion fixed on said crank shaft, and meshing with the gear wheel and having peripheral grooves in its hub and the sectional connection between the hub of the pinion and the hub of the gear wheel engaging the peripheral grooves of said hubs, substantially as and for the purpose set forth.

5. A pipe bending machine comprising a main frame having an upright provided with a central vertical opening, a vertically-movable screw carrying a spindle adapted to move in the central vertical opening of the frame, a wheel mounted on said spindle, a gear wheel also mounted on said spindle, a crank shaft extending into the central vertical opening of the frame, a pinion fixed on said crank shaft and meshing with the gear wheel, and a connection between the gear wheel and pinion engaging the hubs of said gear wheel and pinion, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WM. LITCHFIELD.

Witnesses:

J. STANLEY HOUGH,
WALTER J. HARRISON.