No. 871,834. PATENTED NOV. 26, 1907.

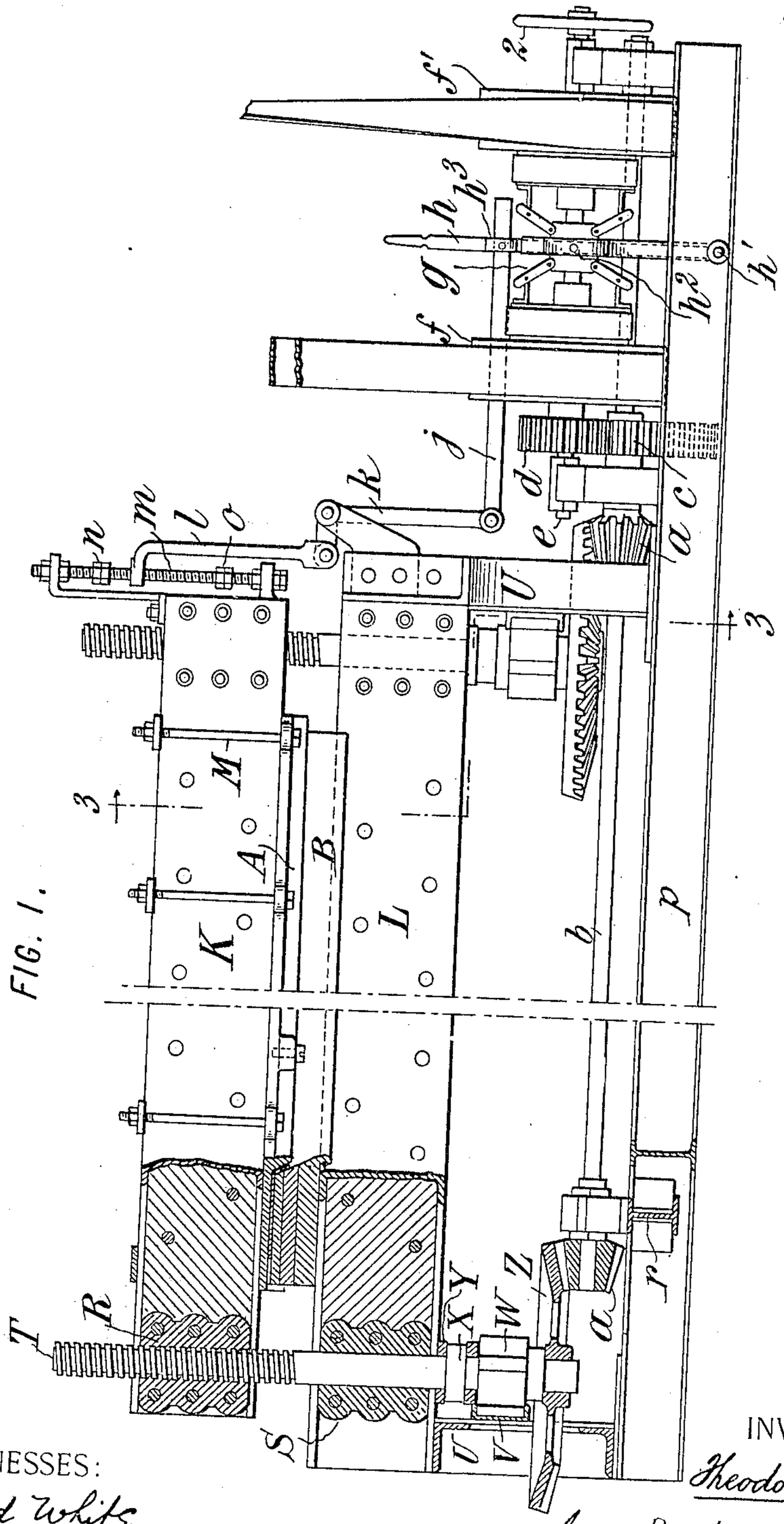
T. VOGT.

SHEET METAL WORKING MACHINE.

APPLICATION FILED FEB. 6, 1907.

4 SHEETS—SHEET 1.

FIG. 1.



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4 SHEETS—SHEET 2.

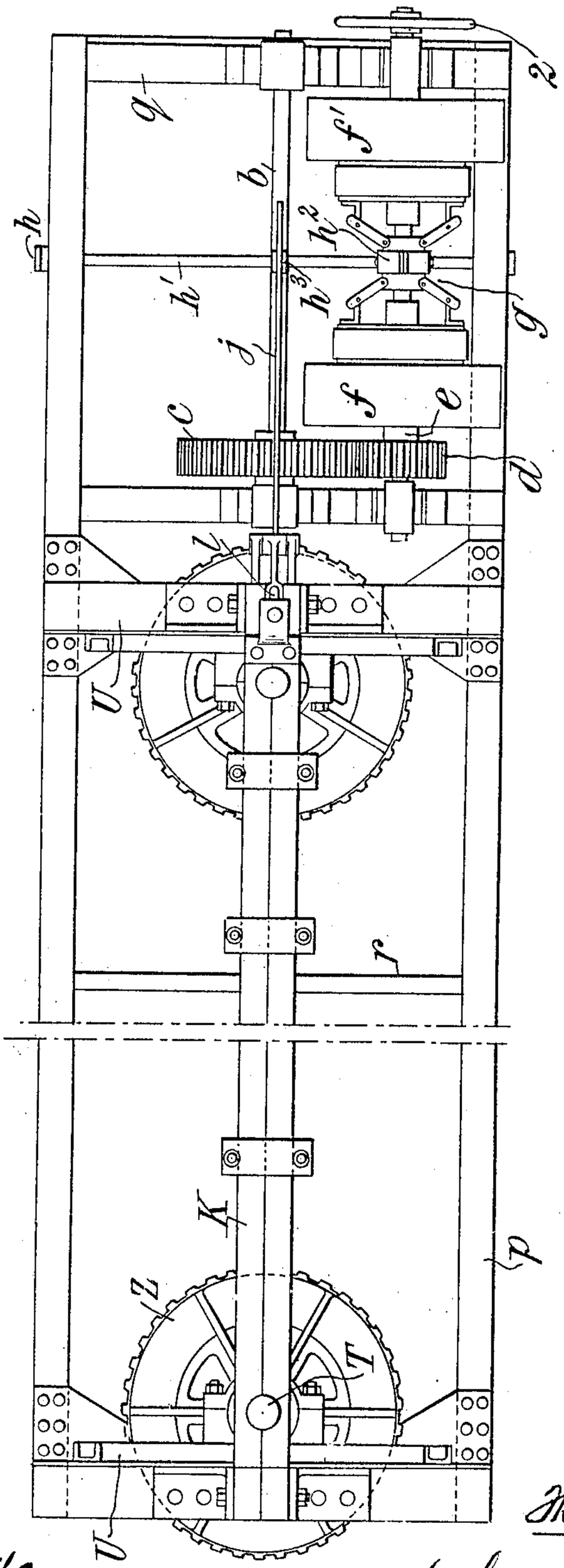

FIG. 2.

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4 SHEETS—SHEET 3.

FIG. 4.

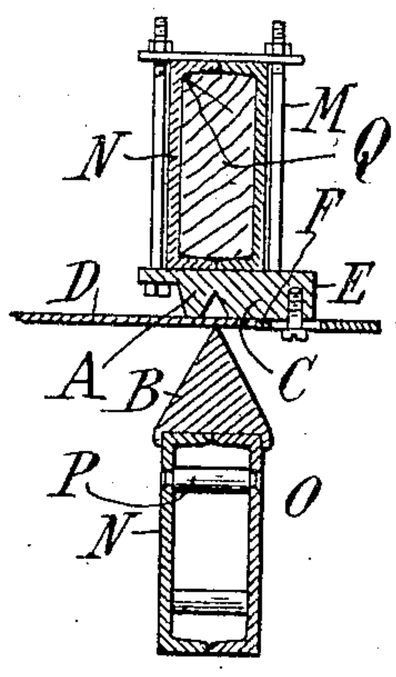


FIG. 3.

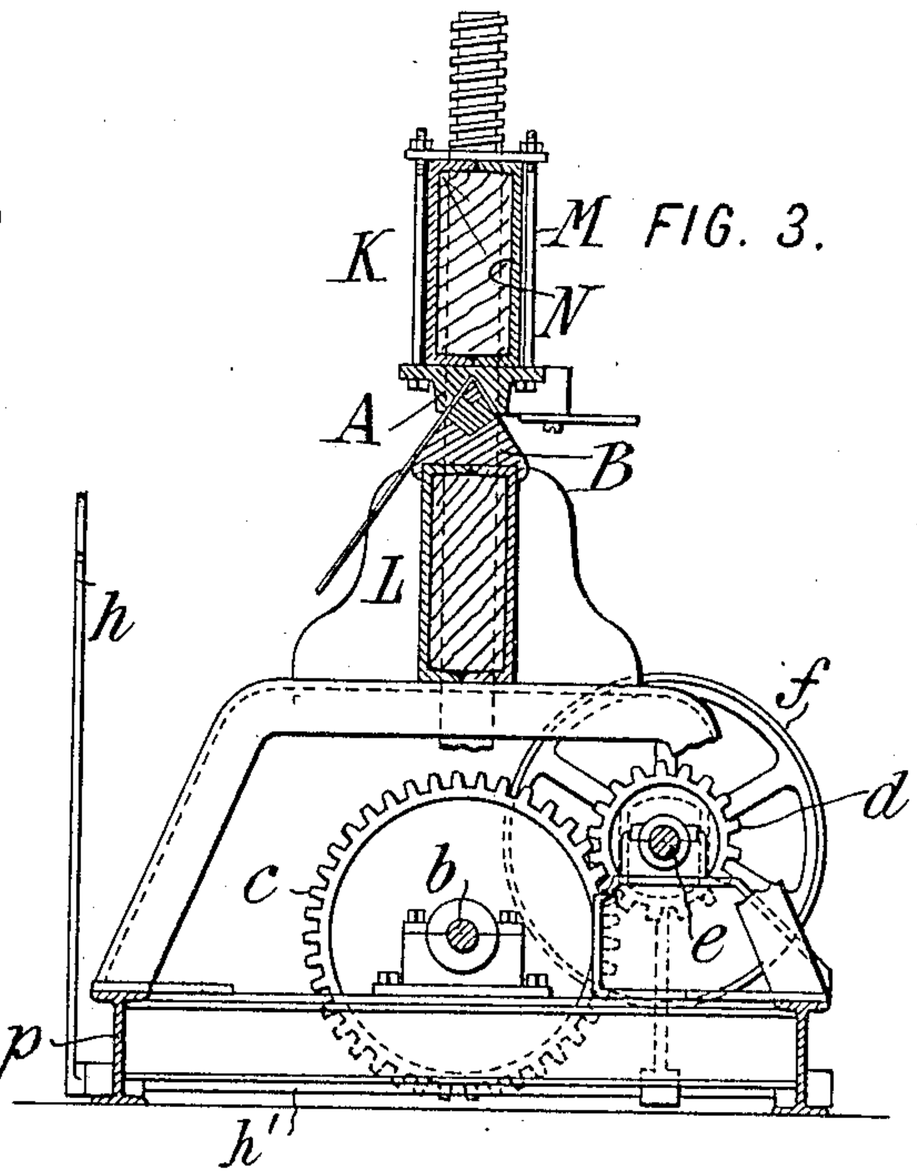


FIG. 5

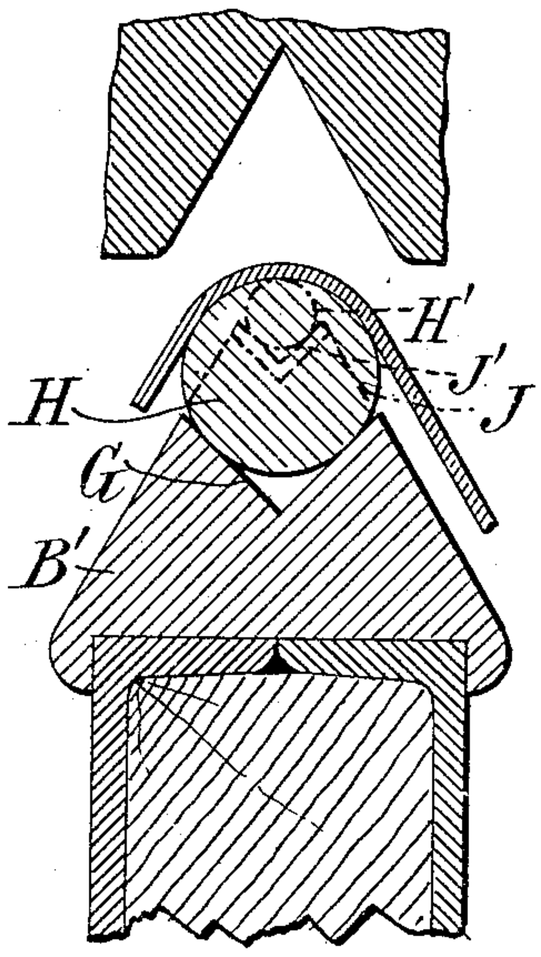


FIG. 8.

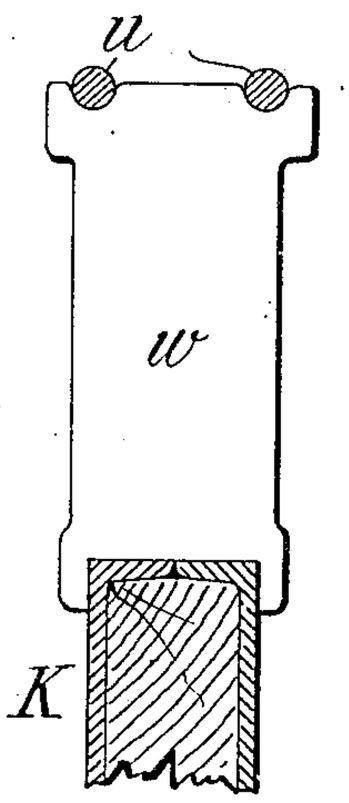
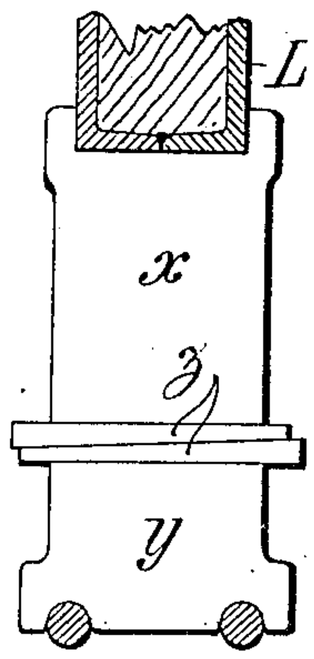


FIG. 9.



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4 SHEETS—SHEET 4.

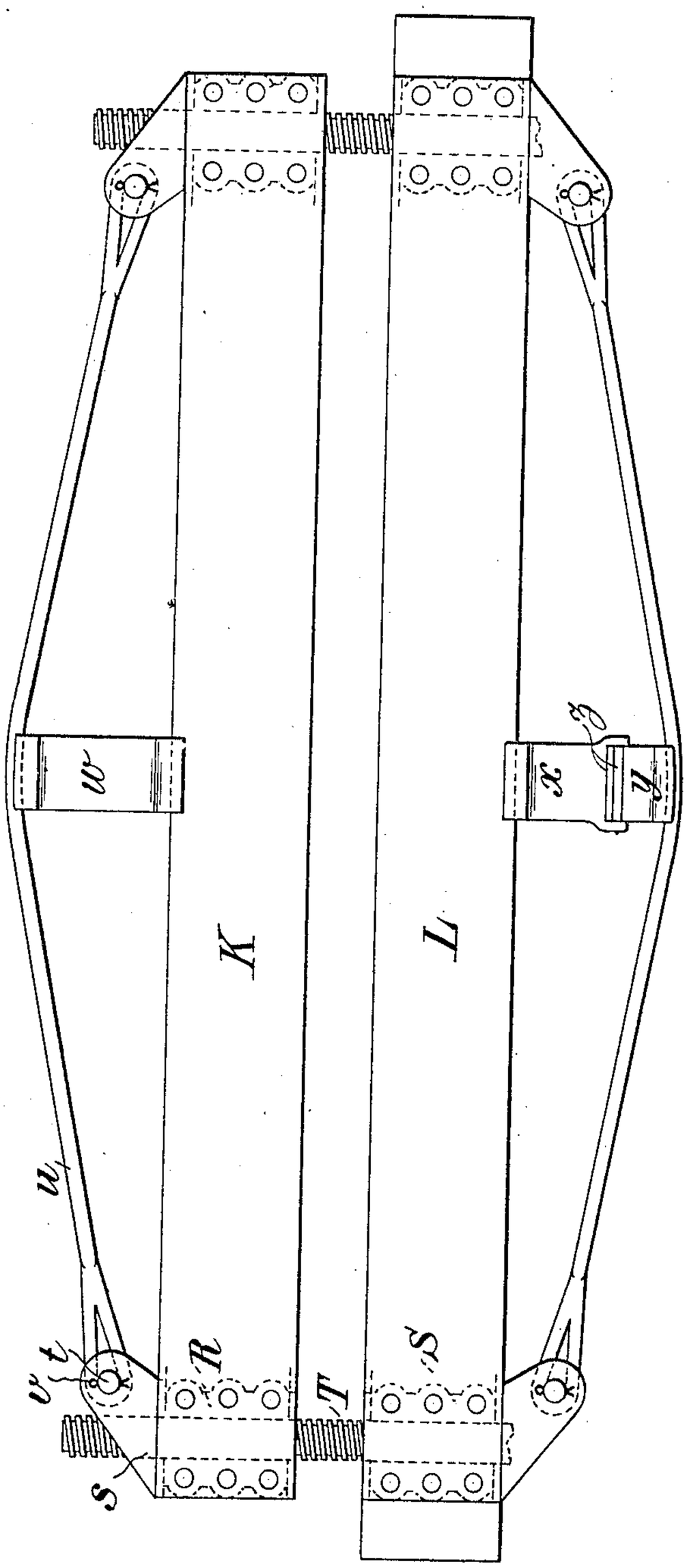

FIG. 6.

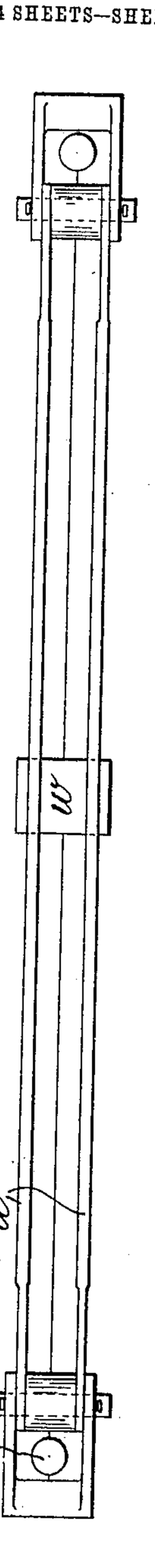

FIG. 7.

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UNITED STATES PATENT OFFICE.

THEODORE VOGT, OF HOBOKEN, NEW JERSEY.

SHEET-METAL-WORKING MACHINE.

No. 871,834. Specification of Letters Patent. Patented Nov. 26, 1907.

Application filed February 6, 1907. Serial No. 356,072.

To all whom it may concern:

Be it known that I, THEODORE VOGT, a citizen of the United States, residing in the city of Hoboken, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Sheet-Metal-Working Machines, of which the following is a specification.

This invention aims to provide an improved machine of the class stated which is of great strength and simplicity, and therefore of great durability, and which is adapted to work very rapidly in the flanging, clamping, bending, punching or shearing of sheet metal or any similar work.

The accompanying drawings illustrate a machine embodying the invention and equipped for bending or flanging.

Figure 1 is a longitudinal elevation partly in section; Fig. 2 is a plan; Fig. 3 is a transverse section substantially on the line 3—3 of Fig. 1; Fig. 4 is an enlargement of a portion of Fig. 3 showing the clamping jaws in their separated positions; Fig. 5 is an enlargement of the lower jaw indicating the possibility of using different tools to vary the nature of the bend; Fig. 6 is a side elevation showing a truss construction of the beams for extra heavy work; Fig. 7 is a plan of the same; Figs. 8 and 9 are transverse sectional views of the central struts and their connections with the beams.

Referring to the embodiment of the invention illustrated, the bending is effected by means of a pair of jaws A and B which, for convenience, we will term upper and lower jaws although their positions may be inverted or they may be set at any desired angle. The upper jaw A is formed with a pair of projecting ribs C with a V-shaped or similar groove or space between them, and the lower jaw B has its upper edge adapted to enter between the ribs C. The jaws being separated, the work piece which, for example, may be a plate D of sheet iron to be flanged, is laid between the jaws as indicated in Fig. 4, and the bringing of the jaws together (Fig. 3) effects the desired bending. The amount of movement of the jaws toward each other is controllable so that the flange may be bent to any desired angle, the movement usually being greater than that calculated to give the desired angle, so as to allow for a slight backward spring when the jaws are again separated.

The upper jaw A is provided with one or more lugs E or similar supports for one or more gages F which may be used as stops to determine the position of the plate D and thus determine the width of flange to be formed. Where a great width of the plate is to be on each side of the bend, instead of a narrow flange, other expedients may be used to determine the position of the plate accurately before bending.

For ordinary sharp bends, the simple jaw B of Fig. 4 may be used, being a solid tapered edge. Where a definite curvature is desired a jaw B′ (Fig. 5) is provided having at its upper end a longitudinal groove or socket G into which may be fitted a round rod or former such, for example, as H of the desired radius or curvature. For smaller radii, fillers such as are indicated in dotted lines at J and J′ may be used in connection with a smaller rod H′.

The jaws A and B are supported from cross beams which I designate as a whole by the letters K and L, the jaw A being preferably suspended by bolts M from the upper cross beam and the jaw B being preferably provided with a socket on its under side by which it is held in position upon the lower cross beam L. Each of the beams K and L is made extremely strong and simple being built up of a pair of channel irons N fastened together by countersunk rivets leaving smooth vertical faces and spacers P at suitable intervals, the flanges of the channels being turned inward to come substantially or approximately in contact with each other. Instead of the spacers P a core Q may be used of wood or other stiff material adding extra strength to the beam. At the ends of the upper beam there are provided between the channel irons N nuts R of phosphor bronze or similar material firmly clamped between the channels. At or near the ends of the lower beam L are provided guides S of cast iron or the like. Passing through each guide S and screwing into the nut R above it is a threaded rod T by the rotation of which the two jaws are brought together or separated. The lower beam rests at its ends upon frames U which carry cross bars V supporting bearings W for the shafts T. Each shaft, however, is formed with a collar X preferably forged thereon and carrying an anti-friction washer Y adapted to engage the under side of the beam L. Slight vertical play of the shafts T in the bearings W is permitted so that when the shafts T have been turned

sufficiently to bring the upper beam down with a pressure upon the work, these shafts will be lifted until the collars X (through the intermediation of the washers Y) react upward against the under side of the lower beam. The bending pressure, therefore, is exerted only between the beams K and L and is not transmitted to any substantial extent to the frames U which need only be made strong enough to support the weight of the parts.

The clamping shafts T may be driven by means of gears Z upon their lower ends engaging pinions *a* upon a longitudinal shaft *b* which is operated by a gear *c* and a pinion *d*, the latter being on a shaft *e* carrying pulleys *f*, *f'* adapted to be operated in opposite directions from overhead belts and being both loose upon the shaft. A double clutch *g* which serves to connect either one of the pulleys *f*, *f'* to the shaft *e* so as to either separate the jaws or bring them together, is controlled by a hand lever *h* on a cross shaft *h'* which has the usual forked arm h^2 engaging the clutch ring, and has also an arm h^3 for automatically operating the clutch.

Preferably the control of the movement of the movable jaw is not left solely to the discretion of the operator since he might by permitting too great a movement in either direction strain or damage the machine. To prevent this, automatic means are provided for throwing the clutch to the central position, in which no movement is transmitted to the clamping shafts, when a determined limit of movement has been reached. For example, a rod *j* may be connected to the clutch through the central lever h^3, and may be operated by means of a crank lever *k*, the opposite arm of which carries a link *l* through the end of which slides a rod *m* carrying a pair of adjustable stops such as the nuts *n*, *o* threaded on the rod *m*. The rod *m* being fastened at its ends to the movable beam K throws the clutch to a neutral position either by an extreme upward or downward movement, and also prevents the movement of the clutch by hand except to the position for effecting an opposite movement of the beam. This automatically determines the amount of bend.

Any suitable support may be provided for the complete apparatus such, for example, as the base consisting of longitudinal **I**-beams *p* connected by the end supports U of the beams and by the end pieces *q* carrying the driving shaft and connected also at intervals by means of braces *r* which may serve likewise to carry bearings for the longitudinal shaft *b*.

Wherever heavy metal is to be bent I provide truss rods as shown in Figs. 6 and 7, these rods being preferably made easily detachable so as to avoid cumbering the machine with them in doing light work, and to permit the bending of box-like forms which have to pass around the back of one or other of the beams. For this purpose the end nuts R of the upper beam K and the end guides S of the lower beam L are provided with projecting ears *s* through which are passed pins *t* carrying the ends of tension eye-bars or rods *u* with suitable spacers and with cotter pins *v* which may be readily driven out to permit the removal of the hinge pins *t*. A simple strut *w* is located upon the top of the upper beam K, being flanged to fit over the side of the same as indicated. As the upper beam tends to sag at the middle under normal conditions, no means are necessary for putting the truss rods *u* of this beam under tension. It is necessary, however, to use an extensible strut for the lower beam L, and for this purpose a compound strut is provided consisting of two parts *x* and *y* between which are driven wedges *z* to maintain the center of the beam in a horizontal line with the ends. These wedges are readily driven out when the truss rods are not to be used.

By removing the bending jaws the beams may be used for merely clamping a plate in such a position as to permit the bending of the edge with sledges, or otherwise working of the projecting portion of the plate against the smooth vertical faces of the beams. Instead of the bending jaws illustrated, I may substitute dies and punches capable of performing various punching or drawing operations such as the making of rivet holes or the like. Or by the substitution of suitable blades instead of the jaws shown the machine may be used for shearing.

Although I have described with great particularity of detail certain specific embodiments of the invention, yet it is not to be understood therefrom that the invention is limited to the particular embodiment disclosed. Various modifications thereof in detail and in the combination and arrangement of the parts may be made by those skilled in the art without departure from the invention. For example the struts of Fig. 6 may be made identical with each other and may be simple posts with guiding flanges, tensioning wedges being driven between the post and the beam in each case as desired.

A hand wheel 2 may be arranged upon the end of the shaft *e* for setting the beams and nuts *n* and *o* in proper starting and stopping positions for any desired line of work.

What I claim is:—

1. A sheet metal working machine of the class described, including in combination a lower beam L, a supporting frame therefor, a pair of operating shafts T normally supported from said frame and guided through said beam L, an upper beam K carrying nuts through which said shafts T are threaded, and means for rotating said shafts to bring

the upper beam down upon the lower one, said shafts having collars X adapted to operate on the under side of the beam L when an upward action is exerted on the beam K by the work and thus take up the strain of the operation without transmission of any substantial part thereof to the frame or bearings.

2. A machine of the class described, including in combination a pair of beams each comprising a pair of channel irons bolted together with their flanges projecting inward, nuts R included between said channels at the ends of the upper beam, guides S included between said channels at the ends of the lower beam, and operating shafts passing through said guides S and threaded through said nuts R for drawing said beams together or separating them.

3. In a machine of the class described, a movable beam K, a shaft for moving said beam, and a clutch for rotating said shaft in either direction, a rod *m* moving with said beam, a pair of adjustable stops *n*, *o* carried by said rod, and a member *l* adapted to be engaged by one or the other of said stops as the beam is raised or lowered to a determined limit and to be moved in one or the other direction thereby, and means for operating the clutch by the movement of said member *l*.

4. A machine of the class described, including in combination a pair of beams adapted to be moved toward each other, a jaw adapted to be fastened to the under side of the upper beam and having a pair of ribs C with a groove between them, and a jaw B′ adapted to be carried on the lower member and having a socket G adapted to carry round rods of various radii in position to force the work into the groove of the upper jaw.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE VOGT.

Witnesses:
DOMINGO A. USINA,
THEODORE T. SNELL.