W. KLOCKE.

DRAWING PRESS.

APPLICATION FILED MAY 4, 1909.

955,173. **Patented Apr. 19, 1910.**

3 SHEETS—SHEET 1.

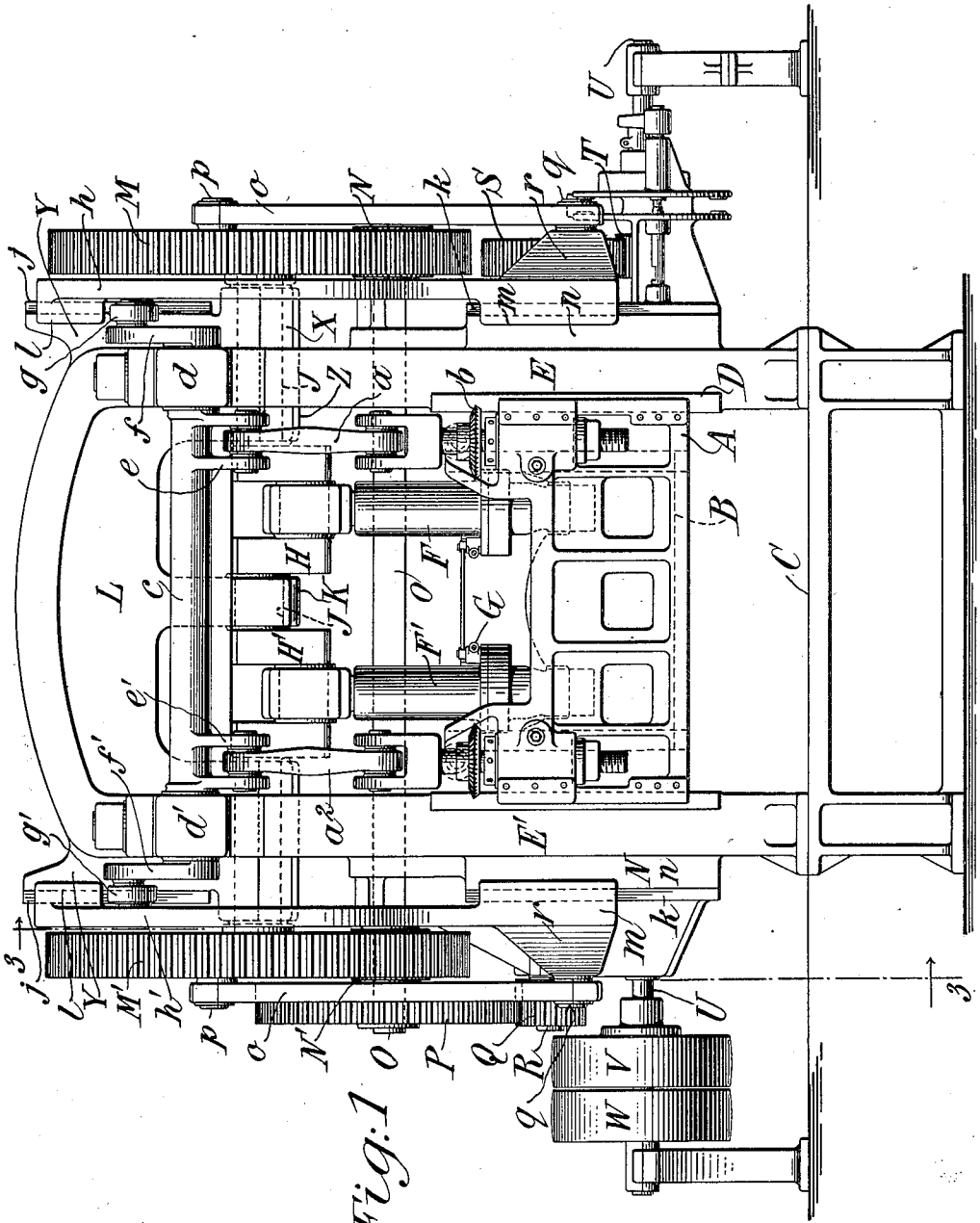

Fig. 1

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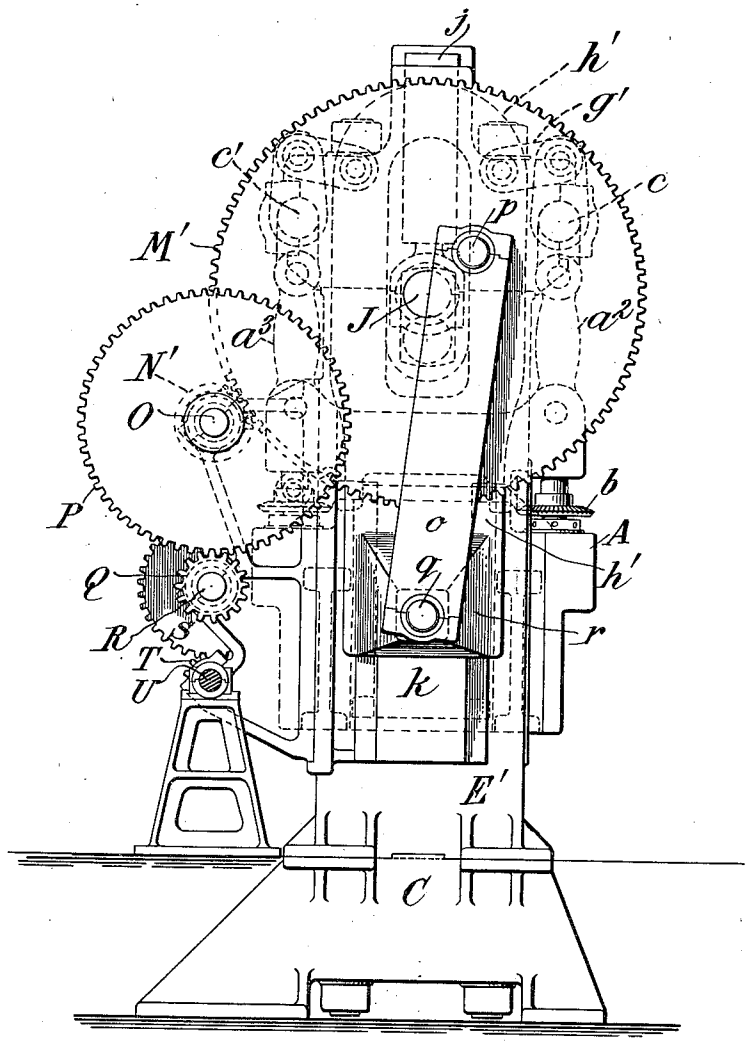
3 SHEETS—SHEET 2.

Fig. 2.



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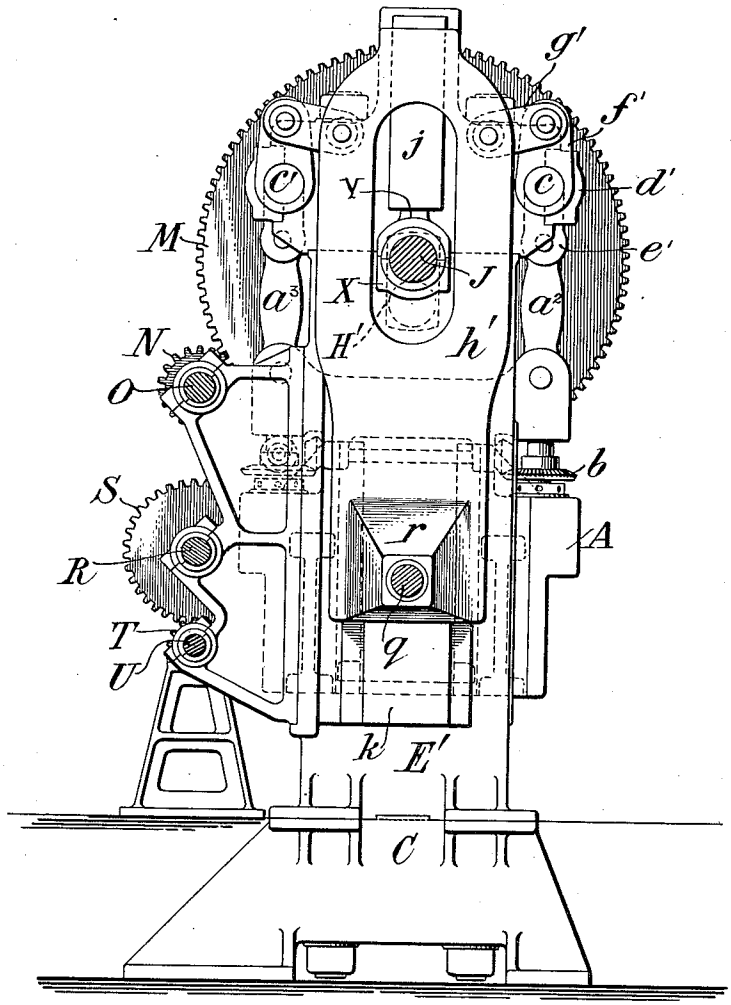
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM KLOCKE, OF NEW YORK, N. Y., ASSIGNOR TO E. W. BLISS COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF WEST VIRGINIA.

DRAWING-PRESS.

955,173. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed May 4, 1909. Serial No. 493,784.

To all whom it may concern:

Be it known that I, WILLIAM KLOCKE, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Drawing-Presses, of which the following is a specification.

In a prior patent of F. M. Leavitt, No. 451,224, dated April 28, 1891, is described a common type of a press for drawing sheet metal, cutting out, embossing, punching, &c. It comprises a blank holder which is first pressed down to hold the edge of the sheet, and a plunger which moves through the blank holder to act upon the sheet after it is held. The plunger is actuated by cranks on a shaft and this shaft in turn operates a toggle mechanism for moving the blank holder at appropriate intervals. The plunger-operating shaft is driven by a gear and pinion at one side of the machine. The opposite end of this shaft carries the connections which actuate the toggle mechanism.

The present invention provides improvements in drawing presses and is especially directed toward presses of the general character described in said patent, and aims to lessen the strain on the shafts, permitting them to be made much lighter, to obtain an even pressure of the plunger and blank holder upon the work, and to secure other advantages referred to in detail hereinafter.

The accompanying drawings illustrate a machine embodying the invention.

Figure 1 is a front elevation; Fig. 2 a left hand side elevation, and Fig. 3 a vertical section on the line 3—3 of Fig. 1.

Referring to the embodiment of the invention illustrated, the blank holder, or the carrier upon the lower face of which the blank holder is mounted, is indicated at A. Within it is the plunger B upon the lower face of which the upper die or punch is mounted. The bed C carries the lower die upon which the material is clamped and worked. These parts may be of any usual or suitable construction, and therefore are not illustrated in detail. The blank holder A is guided upon guides D on the side frames E E′ of the machine, and the plunger B is guided within the blank holder.

The plunger is driven from links F F′, adjustable in length by any usual or suitable adjusting mechanism such as is indicated diagrammatically at G. The links are connected at their upper ends to cranks H H′ upon the plunger actuating shaft J, which is provided with end bearings in the side frames E and E′, and with an intermediate bearing K depending from a web L extending across at the top between the side frames. The shaft J is provided at its opposite ends with gears M M′ which are driven from pinions N N′ on opposite ends of a cross shaft O; which cross shaft carries a gear P on its left hand end by which it is driven from a pinion Q mounted on a shaft R extending across the rear of the machine parallel with the shaft O, and having at its right hand end a gear S which is driven from a pinion T on the driving shaft U which carries the usual fast-and-loose pulleys V and W at its left hand end.

The end bearings of the crank shaft J are made as long as possible by means of extensions on the outer faces of the side frames. Similar extensions are provided on the inner faces of the side frames, so as to support the shaft close to the cranks. The lower removable portions X and Z of each bearing are preferably in one piece passing through the side frame of the machine and fastened to an upper fixed portion Y formed as an integral lug on the outer face of the side frame, which lug together with the adjacent portion of the frame constitutes the upper part of the complete bearing. (The side frames E and E′ are divided by a horizontal joint adjacent to the upper edge of the parts X and Z and their upper portions are integrally connected through the top cross-bar of which the web L is a part.) These long end bearings, the provision of two cranks H and H′ with an intermediate bearing for the shaft between them, and the driving of the shaft from both ends, permit an extraordinary lightening of the shaft as compared with that of machines of the previous type, contribute greatly to the durability of the bearings and other parts of the machine in accurate condition, and result in a uniformity of distribution of the pressure not previously attainable. There is practically no bending strain upon the shaft, a consideration which permits a great reduction in its weight. The twisting strains are reduced to a minimum, being exerted only from each of the gears M M′ to the corre-

sponding crank H or H′, so that the intermediate bearing K and the portion of the shaft passing therethrough are subjected to little or no strain. Because of the reduction in weight of the shaft and in twisting and bending strains which the driving mechanism has to exert in addition to its effective work, the power required for any given class of work is materially lessened.

Similar principles are applied to the mechanism for actuating the blank holder. The movement of the latter is effected through links a^2 a^3, Fig. 2, and a pair of similar links, only one of which, a, Fig. 1, is shown in the drawings, said links being connected to the four corners of the blank holder A through any known or suitable individual adjusting devices such as are indicated at b. These links are operated with a sort of toggle action by cranks upon rock shafts overhead. The front rock shaft c actuates the links a and a^2 and the rear rock shaft c' actuates the opposite links one of which is shown at a^3. The driving and the driven connections are substantially the same for these two rock shafts, and a description of the forward one will serve for both.

The rock shaft c is supported in end bearings d d' and provided with cranks e e' closely adjacent to the bearings and connected to the driven links a a^2; and is driven from both ends, so that the intermediate portion of the shaft is subjected to no twisting strain and but little or no bending strain, and can be made of extreme lightness. It can thus be made of considerable length for presses of large size and without the necessity of an intermediate bearing.

The rock shaft c is driven by means of arms f f' at its opposite ends and close to the side frames of the machine, these arms being connected by links g g' to slides h h' which reciprocate vertically. As the slides h h' approach their upper ends, the links g g' approach a horizontal position. When the links g g' are approximately horizontal and the arms f f' and cranks e e' are approximately vertical, the blank holder is pressed to its final position. During the slight subsequent upward movement of the slides, there is only sufficient movement of the toggles to lock them firmly, and the upward reaction is taken entirely by the bearings without substantial strain on the shaft operating mechanism. The driving links g g' and the driven links a a^2 and the crank arms, are arranged at such angles as to work practically as toggles at the ends of their strokes. This arrangement, and the provision of driving means at both ends of the rock shaft, enable the latter to be actuated with a minimum amount of power, and to be held with perfect firmness in position for locking down the blank holder.

The slides h h' are driven from the plunger-actuating shaft or gears, and are located at opposite ends of the shaft so as to distribute the load evenly and symmetrically. These slides are guided at their upper and lower ends upon guideways j k embraced by flanges l and m respectively at the upper and lower ends of the slides, and formed on the upper projecting rib Y, and a similar lower projecting rib n. The slides h h' are located between the gears M M′ and the corresponding side frames and are driven therefrom by means of links o connected at their upper ends to crank pins p upon the outer faces of the gears, and at their lower ends to pins q upon bosses r constituting extensions of the lower portions of the slides. This arrangement of the connecting mechanism between the plunger actuating gears and the rock shafts, not only balances perfectly the strains at opposite ends of the plunger actuating shaft, but provides supports which are close to the main frame of the machine and to the ends of the rock shafts, so as to be comparatively unyielding and to remain true in spite of long and hard usage, and also keeps down the power required for driving the machine.

What I claim is:—

1. A drawing press having a plunger and a blank holder, a rotary shaft actuating said plunger, a pair of rock shafts actuating said blank holder, and mechanism at each end of said plunger-actuating shaft for transmitting the motion thereof to each end of each of said rock shafts.

2. A drawing press having a plunger and a blank holder, a rotary shaft actuating said plunger, a pair of rock shafts actuating said blank holder, and mechanism at each end of said plunger-actuating shaft for transmitting the motion thereof to each end of each of said rock shafts, and gearing at each end of said plunger-actuating shaft for driving it with equal pressure at each end.

3. A drawing press having a plunger-actuating shaft, a driving gear at the end thereof, and a blank-holder-actuating slide h driven from said gear, located between said gear and the side frame of the machine and guided upon the side frame of the machine.

4. A drawing press having a plunger-actuating shaft and driving gears M M′ at opposite ends thereof, and blank-holder-actuating slides h h' driven from said gears, located between said gears and the side frames of the machine, and guided upon the side frames of the machine.

5. A drawing press having a plunger, a shaft J, cranks H H′ on said shaft, links F F′ between said cranks and opposite portions of the plunger, end bearings for the shaft located closely adjacent to said cranks, gears M M′ upon the opposite ends of said shaft, a shaft O carrying pinions N N′ en-

gaging the respective gears M M′ whereby said shaft is driven with equal force at its opposite ends, and the strain is evenly distributed upon the plunger and at opposite parts of the shaft, a blank holder, a pair of rock shafts for actuating it, and links transmitting the motion of said rock shafts to opposite portions of the blank holder, said rock shafts also being driven with equal force at their opposite ends.

6. A drawing press having a plunger, a shaft J, cranks H H′ on said shaft, links F F′ between said cranks and opposite portions of the plunger, end bearings for the shaft located closely adjacent to said cranks, gears M M′ upon the opposite ends of said shaft, and a shaft O carrying pinions N N′ engaging the respective gears M M′, whereby said shaft is driven with equal force at its opposite ends and the strain is evenly distributed upon the plunger and at opposite parts of the shaft, a blank holder, a pair of rock shafts *c c′* for actuating the same, and means for transmitting the motion of said gears M and M′ to said rock shafts, said transmitting means being located at opposite sides of the machine so as to positively actuate the opposite ends of each of the shafts *c c′* from the gear at the corresponding side of the machine, so as to maintain a uniform load upon said gears and to exert a uniform strain upon said rock shafts.

7. A drawing press having a plunger, a shaft J, cranks H H′ on said shaft, links F F′ between said cranks and opposite portions of the plunger, bearings for the shaft located closely adjacent to said cranks, gears M M′ upon the opposite ends of said shaft, and a shaft O carrying pinions N N′ engaging the respective gears M M′, whereby said shaft is driven with equal force at its opposite ends and the strain is evenly distributed upon the plunger and at opposite parts of the shaft, a blank holder A, a pair of rock shafts *c*, *c′*, for actuating it, links transmitting the motion of said rock shafts to opposite portions of the blank holder, and means for transmitting the motion of the gears M M′ to both ends of each of said rock shafts so as to drive them with equal force at opposite ends.

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

WILLIAM KLOCKE.

Witnesses:
D. ANTHONY USINA,
FRED WHITE.