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DRAWING PRESS.

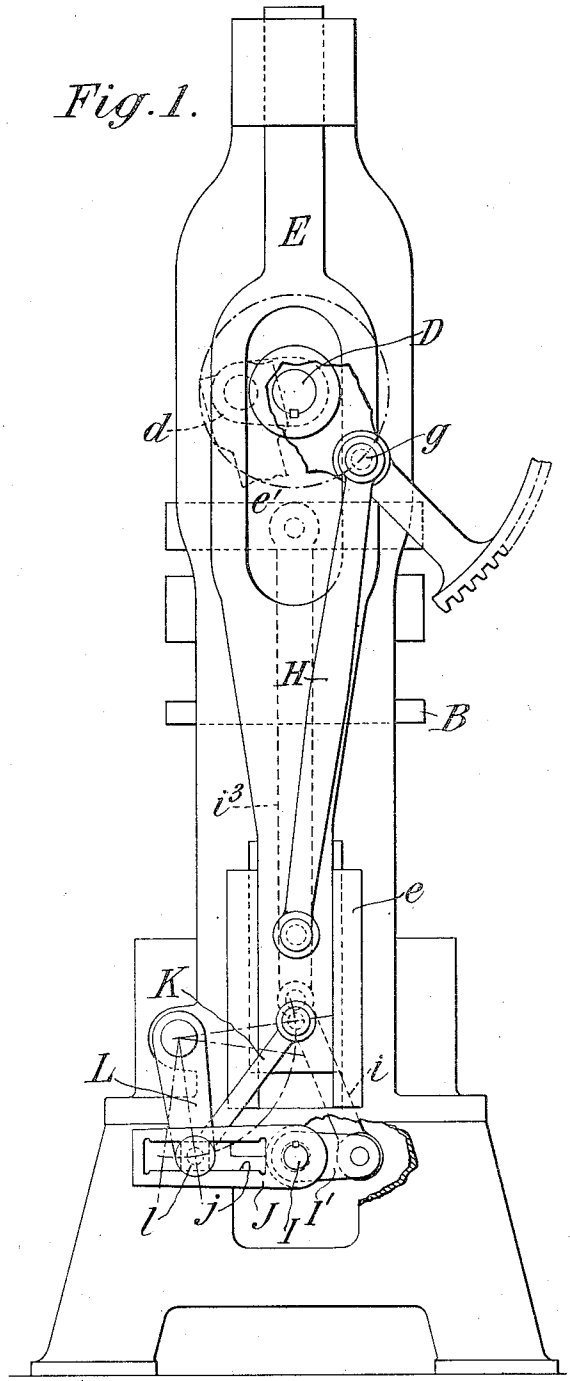
APPLICATION FILED MAR. 6, 1916.

1,212,230.

Patented Jan. 16, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



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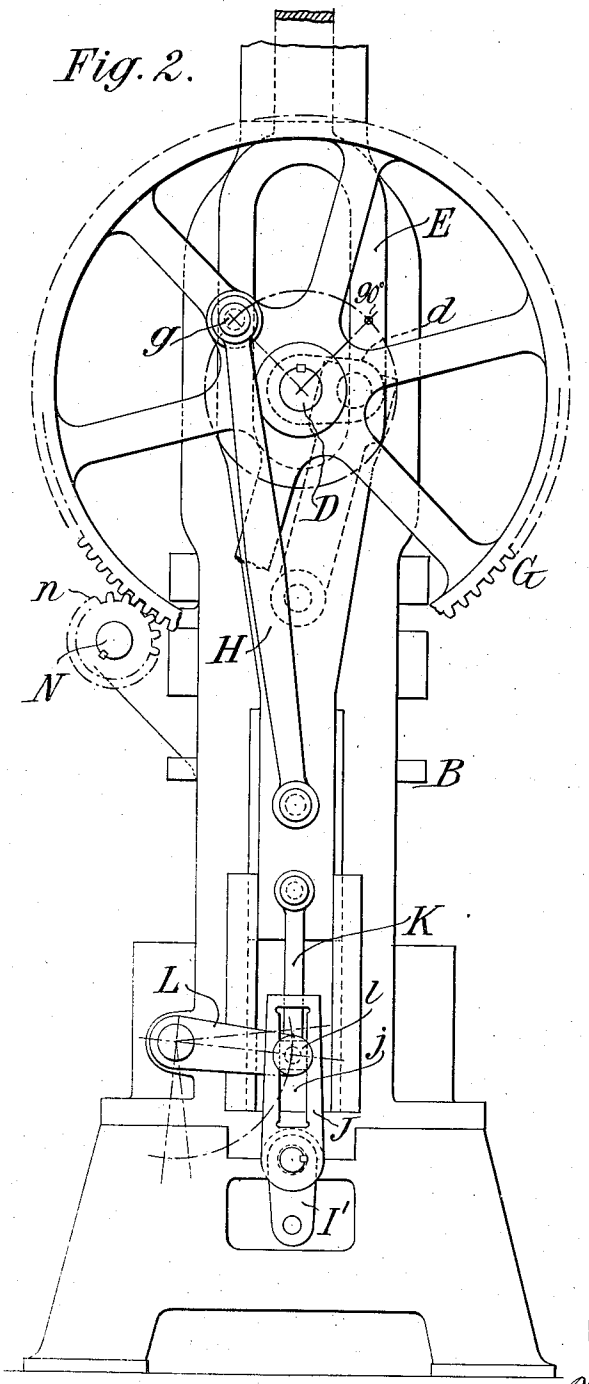
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4 SHEETS—SHEET 2.

Fig. 2.



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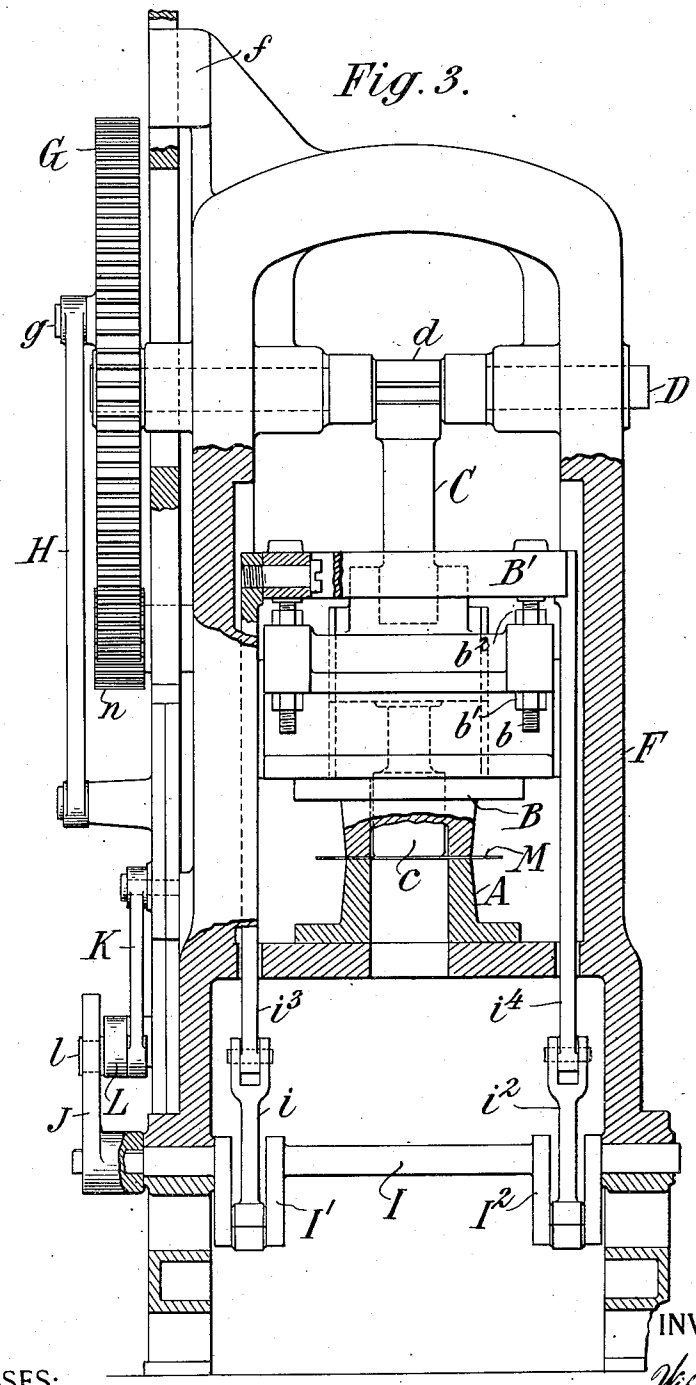
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

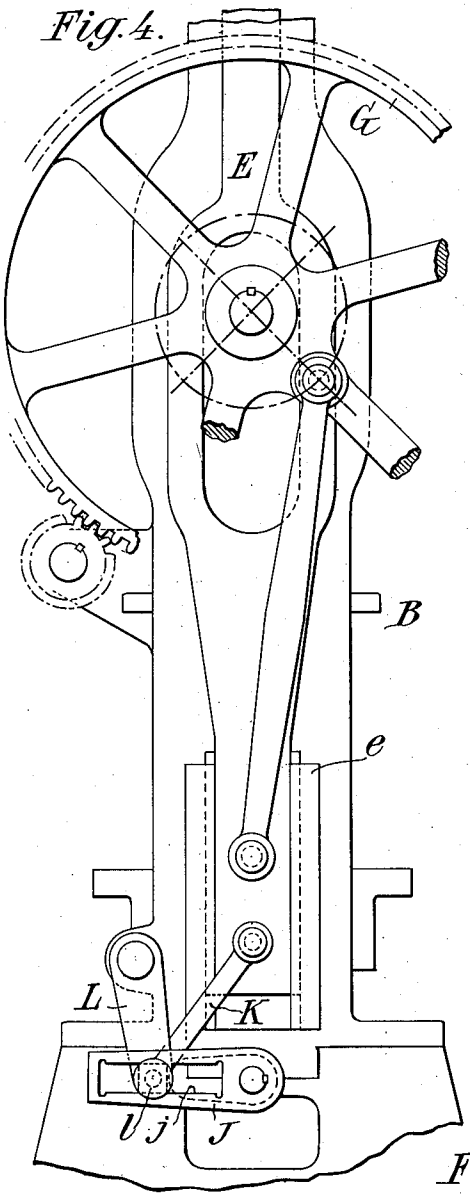


Fig. 5.

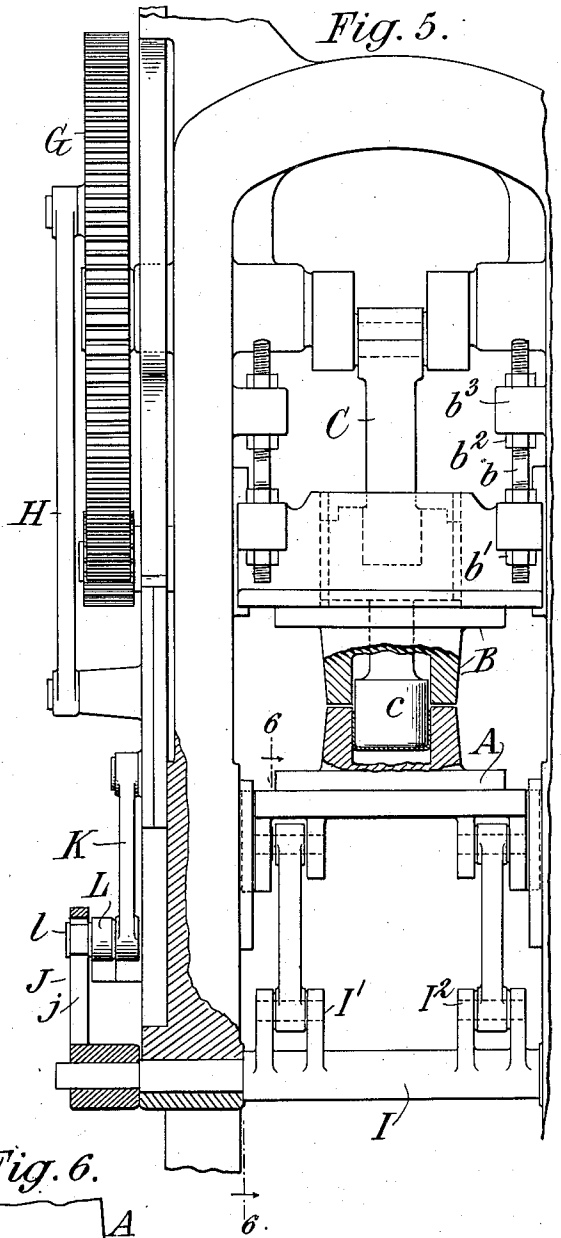
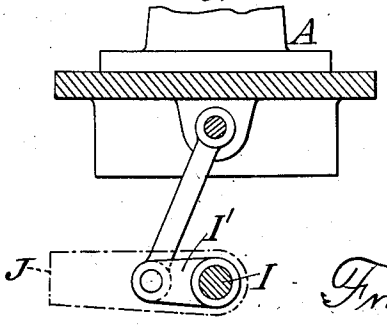


Fig. 6.



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UNITED STATES PATENT OFFICE.

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DRAWING-PRESS.

1,212,230. Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed March 6, 1916. Serial No. 82,427.

To all whom it may concern:

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

This invention relates to drawing presses, and has for its object to produce a drawing press wherein the moving member of the press for holding the work during drawing will travel at a slow rate of speed during the beginning and end of its movements.

A further and most important object of my invention is to produce a drawing press wherein toggles are dispensed with and the large number of parts that are necessary in a toggle drawing press are dispensed with.

A further object accomplished by my invention is that of relieving the tie rods or frame of the machine from longitudinal stress during the drawing operation.

Other objects of the invention will appear as the description proceeds.

Desirable forms in which my invention may be embodied are illustrated in the accompanying drawings, wherein,—

Figure 1 is a side elevation, partly broken, of a drawing press containing my invention. Fig. 2 is a similar view illustrating the parts in a different position. Fig. 3 is an end elevation of the press of Figs. 1 and 2, parts broken and partly in section. Fig. 4 is a side elevation of a modified form of my invention, partly broken, wherein the movable member is in the base of the press. Fig. 5 is an end elevation of the machine of Fig. 4 partly broken and parts being in section. Fig. 6 is a detailed cross section on the line 6—6, Fig. 5.

In Figs. 1, 2 and 3 I have illustrated my invention as applied to a drawing press having a stationary bed A, a movable blank holder B, and a movable plunger C which is operated from crank shaft D.

The invention relates to the means whereby the blank holder B is operated from the crank shaft D so as not only to provide for an easy stopping and easy starting of the said blank holder, but so as to produce a perfect dwell during the drawing operation of the punch *c* without the use of any toggle mechanism. In accomplishing this result I not only achieve the advantage of relieving the tie rods or frame of the machine from longitudinal stress during the drawing operation but by the aid of the construction shown a large number of parts that are necessary in a toggle drawing press are dispensed with. These parts include usually two rock shafts, two short toggle arms, four long toggle arms, one outer crank and all the crank and connecting pins that are usually employed. Dispensing with these parts lightens the press and makes its construction simpler and more economical, and produces a less number of parts to get out of order.

According to my invention I provide operating means for the clamping member B, which include an operating arm J that is adapted to rock, and this arm is rocked from a source of power and preferably from the plunger shaft, by a reciprocating connection such as a link K which has a sliding engagement with the operating arm. I provide means connected to said link so that as it is reciprocated its end connected to said operating arm shall slide on said arm and such means preferably rock and cause said link end to travel in the arc of a circle, and the said parts are so arranged and combined that during the drawing operation the link slides on the operating arm and a substantially perfect dwell of the clamping member is obtained. The construction and arrangement of said parts also provide that the link shall operate the operating arm at a slow speed during the beginning and ending of a stroke, so that a slow start and stop of the clamping member B or blank holder are provided.

In the accompanying drawings I have illustrated my preferred manner of constructing my invention as applied to two types of machines. In Figs. 1, 2 and 3 the upper member is movable, and this I regard as the most desirable machine upon which to use my invention, for reasons hereinafter set out. In Figs. 4, 5 and 6 the lower member is movable.

In carrying my invention into effect, as illustrated in the accompanying drawings, I provide a connection between the clamping member or blank holder B and the plunger operating crank shaft D, whereby the said clamping member is operated from the said crank shaft without toggles. A slide E is illustrated as mounted to reciprocate verti-

cally in the frame and, as shown, is guided at its upper end in extension *f* of the frame F, and at its lower end is guided in ways *e* fixed to the side of the frame. The said slide is shown as situated between gear G on crank shaft D and the frame A and is slotted at e^1 for the crank shaft. The slide is reciprocated by suitable means as by a pitman H which is pivoted to the slide at one end and at the other end is journaled upon a crank *g* on the gear G.

The blank holder B or other clamping member is reciprocated vertically by suitable means such as rock shaft I having double rocking arms I^1, I^2, connected by links *i*, i^2 through draw bars i^3, i^4 to the blank holder. At the end of the rock shaft I is fixed as by being keyed thereon an operating arm J which has a slot *j*. A link K is pivoted to the slide E at its lower end, and the outer end of the said link is pivoted to the outer end of a rocking arm L which is mounted in a fixed part of the device as in a part of the frame F. The connected outer ends of the link K and rocking arm L are mounted to slide in the slot *j* as illustrated. This may be accomplished by providing a short hub *l* (Fig. 3) to which the outer ends of the link K and arm L are journaled and which hub is mounted in the slot *j* and is free to slide therein.

In Fig. 1 the parts are represented with the blank holder B in its raised position wherein it is out of contact with the work on the bed A. At this time the plunger C is raised as is seen from the dotted line position of the plunger operating crank *d* in said figure. The crank *g* for reciprocating the slide at this time is near the bottom of its stroke. The slotted arm J is turned to a position substantially at right angles to the rocking arm L and the slot *j* is in substantial alinement with the movement of the end of said rocking arm L in its path which is caused by the passage of the crank pin *g* from its position shown in Fig. 1 to its position on the other side of its low point that is, during the time the plunger is in its raised position. During this time the blank holder is also in its raised position. It will be seen that during the period the blank holder is at this point it experiences substantially no movement, for the slight vertical movement of the crank pin *g* in passing from its position shown in Fig. 1 to a position about 90° in advance will cause a very slight movement of the slide, and the consequent movement of the link K will produce such a slight vertical movement of the slotted arm J and of the rocking arms I^1 that the blank holder B will be substantially unaffected.

In Fig. 2 the position of the parts is changed so that the rocking arms I^1, I^2 are pointing down, in which position the blank holder B is in operative relation to the blank M. At this time the operating arm J has swung to a substantially vertical position where its slot *j* is substantially in line with the link K. The rocking arm L is swung to a position substantially at right angles to that of Fig. 1, and again the slot *j* is in substantial alinement with the path of travel of the end of said rocking arm. The crank *g* is nearing the upper portion of its stroke and the plunger crank *d* has brought the plunger into contact with the blank and a further movement of 90° of the crank shaft will cause the drawing operation to take place. During this time the crank pin *g* will pass from the full line position of Fig. 2 to the point marked 90°. The vertical movement imparted to the slide by the passage of the crank pin through this 90° will be very slight and during this time the slight deviation from the vertical line which will occur to the hub *l* will be insufficient to affect the blank holder in its relation to the work, and a perfect dwell of the blank holder during the drawing operation will take place.

The blank holder B, as illustrated, is adjustably supported from a cross head B^1 by bolts and nuts *b*, b^1, b^2, of which a suitable number are provided, and the draw bars i^3, i^4 are connected to said cross head B^1. The gear G is keyed on the shaft D as shown, and the operating arm J is also shown as keyed on the rock shaft I. Suitable means are provided for driving the main gear G as for instance by pinion *n* keyed on driving shaft N.

In the type of machine in which my invention is preferably employed the movable clamping member is the blank holder B and this is drawn down to the work. This form of the invention possesses advantages in that thereby the frame of the machine is relieved from stresses and strains by reason of the fact that when the blank holder is in its working position the links and rocking arms connecting it to the rock shaft I are substantially vertical and in line, and thereby the frame of the machine is relieved of the usual stresses.

It is not essential to the employment of my invention that the movable member should be located above the work and pulled down to it, and in Figs. 4, 5 and 6 I have illustrated a modification wherein the lower portion or bed is the movable member and the upper portion or blank holder is stationary. In this form of my invention the parts are the same as in the preceding form with the exception that the rock shaft I in the base has the rocking arms I^1, I^2 projecting in the same direction from the said shaft as does the slotted operating arm J whereby when the parts are in the position illustrated in Fig. 5 with the said slotted operating arm in line with the link K the bed A is clamping the work for the draw-

ing operation. This alined position of these parts is illustrated in Fig. 6. It will be apparent therefore that my invention is equally applicable to a press wherein the lower part is the movable clamping member as to a press where the upper part is the movable clamping member.

In the form of machine illustrated in Figs. 4, 5 and 6 the blank holder B is adjustable as previously stated by nuts and bolts b, b^1, b^2 but the bolts in place of being threaded in the movable cross head B^1 engage lugs b^3 where they are held by nuts which give an additional capacity for adjustment. The punch c carried by the plunger C reciprocates vertically through the blank holder in both forms of machine.

I have illustrated in the foregoing drawings the most desirable manner of constructing my invention now known to me, but the same is not limited to the precise form illustrated but may be modified within the limits of the appended claims.

What I claim is:—

1. In a drawing press, a moving member, a device for reciprocating the same, slotted operating means for said device, a reciprocating slide, a link pivoted to said slide and having at its outer end a sliding connection with said slot, and means whereby the outer end of said link is moved in the arc of a circle as said slide is reciprocated.

2. In a drawing press, a moving member, a device for reciprocating the same, slotted operating means for said device, a slide, a link pivoted thereto, a rocking arm, and a pivotal connection between said link and arm having a sliding connection with said slot.

3. In a drawing press, a movable clamping member, an operating slide therefor and connections between the same comprising a rock shaft for reciprocating said clamping member, a slotted operating arm for said rock shaft, a link pivotally connected to said slide, a rocking arm, a pivotal connection between the said link and rocking arm, the said connected parts adapted to slide in the slot in said operating arm.

4. In a drawing press, a moving member, and means for moving same comprising a slide, a link pivoted thereto, a device connected to said moving member for reciprocating the same, and a slotted operating arm for said device, said link having a sliding connection in said slot and a rocking arm journaled in a fixed part and pivotally connected to the sliding end of said link.

5. In a drawing press a reciprocating clamping member, operating means for reciprocating the same including a slotted operating device, a plunger, operating means for the plunger and connections between said respective operating means including a reciprocating slide, a link pivoted to said slide and having at its outer end a sliding connection with said slot, and means whereby the outer end of said link is moved in the arc of a circle as said slide is reciprocated, said parts so arranged and combined that the slot in said operating device is substantially alined with the link during the working stroke of the plunger whereby a dwell of the clamping member is obtained during the drawing operation.

6. In a drawing press, a movable clamping member, a plunger, operating means for the plunger, operating means for the clamping member and connections between said respective operating means including a slide, a link pivoted thereto, a rocking arm, the rocking end of which is pivotally connected with the outer end of said link, and a slotted operating arm and means operated thereby for reciprocating the clamping member, the connected ends of said link and arm having a sliding connection with said slot.

7. In a drawing press, a movable clamping member, a plunger, operating means for the plunger, operating means for the clamping member and connections between said respective operating means including a slide, a link pivoted thereto, a rocking arm, the rocking end of which is pivotally connected with the outer end of said link and a slotted operating arm, and means operated thereby for reciprocating the clamping member, the connected ends of said link and arm having a sliding connection with said slot, the said parts so constructed and arranged that the slot in said arm is substantially alined with said link during the working stroke of the plunger, whereby the clamping member is permitted to dwell during the drawing operation.

8. In a drawing press, a moving member, a device for reciprocating the same, slotted operating means for said device, a slide, rotary operating means therefor, a link pivoted thereto, a rocking arm, a pivotal connection between said link and arm having a sliding connection with said slot, said parts so arranged and operating that said slot is substantially alined with said link and with the path of movement of said rocking arm at one extremity of movement of said moving member, and said slot is substantially at right angles to said position and again in substantial alinement with the path of movement of said rocking arm at its other extremity of movement, whereby easy starting and stopping movements of said moving member are obtained.

9. In a drawing press, a clamping member, a device for reciprocating the same, slotted operating means for said device, a plunger, rotary operating means therefor, a slide reciprocated from said rotary operating means, a link pivoted to said slide, a rocking arm, a pivotal connection between

said link and arm having a sliding connection with said slot, said parts so arranged and operating that said slot is substantially alined with said link and with the path of movement of said rocking arm, when said moving member is in operative position and during the working stroke of the plunger, and said slot is at right angles to said position and again in substantial alinement with the path of movement of said rocking arm when said moving member is in its opposite extreme position, the rotary operating means for the plunger being at the upper and lower parts of its arc of rotation when the clamping member is in its extreme working and non-working positions respectively, whereby a dwell of said clamping member at the end of each movement is obtained and an easy start and stop thereof.

10. In a drawing press, a movable clamping member, a shaft, and connections therefrom to said clamping member for reciprocating the same, a plunger, a plunger crank shaft, and operating connections between said shafts including a slide driven from one of said shafts, a link pivoted thereto, a rocking arm, a pivotal connection between the outer ends of said link and arm, an operating arm for the other crank shaft, said operating arm provided with a slot wherein the connected ends of said link and rocking arm are adapted to slide.

11. In a drawing press, a movable clamping member, a shaft and connections therefrom to said clamping member for reciprocating the same, a plunger, a plunger crank shaft, and operating connections between said shafts including a slide driven from one of said shafts, a link pivoted thereto, a rocking arm, a pivotal connection between the outer ends of said link and arm, an operating arm for the other crank shaft, said operating arm provided with a slot wherein the connected ends of said link and rocking arm are adapted to slide, said parts so constructed and arranged that the said slot is substantially in line with said link during the working stroke of the plunger whereby a dwell of the clamping member is obtained during the drawing action.

12. In a drawing press, a movable clamping member, an operating shaft therefor, a plunger, a plunger crank shaft, and operating connections between said shafts, including a slide, a crank on said crank shaft for said slide, a slotted operating member, a link pivotally connected to said slide, a rocking arm, a pivotal connection between the outer ends of said link and rocking arm, the connected ends of said parts having a sliding connection with said slot, said parts so arranged and combined that the slide operating crank is at the top or bottom of its arc of rotation when the clamping member is in one or the other of its extreme positions, whereby the said clamping member is traveling at a reduced rate during the beginning and ending of each movement.

13. In a drawing press, a movable clamping member, an operating shaft therefor, a plunger, a plunger crank shaft, and operating connections between said shafts, including a slide, a crank on said crank shaft for said slide, a slotted operating member, a link pivotally connected to said slide, a rocking arm, a pivotal connection between the outer ends of said link and rocking arm, the connected ends of said arms having a sliding connection with said slot, said parts so arranged and combined that the slide operating crank is at the top or bottom of its arc of rotation when the clamping member is in one or the other of its extreme positions, and said slot is substantially in line with said link during the working stroke of the plunger and is substantially at right angles thereto when the plunger and clamping member are withdrawn, said slot in both of said positions being substantially alined with the path of movement of said rocking arm, whereby a dwell of the clamping member is obtained at both its extreme positions and it has a slow start and stop.

14. In a drawing press, a plunger, a crank shaft therefor, a stationary bed, a movable blank holder above said bed and operating means therefor including a rock shaft located near the base, connections between said rock shaft and blank holder for drawing the blank holder down to its work, a slotted operating arm on said rock shaft, a slide, a crank on said crank shaft for reciprocating said slide, a link on said slide, a rocking arm journaled in a fixed part, the outer ends of said link and rocking arm pivotally connected and having a sliding engagement with said slot.

15. In a drawing press, a plunger, a crank shaft therefor, a stationary bed, a movable blank holder above said bed and operating means therefor including a rock shaft located near the base, connections between said rock shaft and blank holder for drawing the blank holder down to its work, a slotted operating arm on said rock shaft, a slide, a crank on said crank shaft for reciprocating said slide, a link on said slide, a rocking arm journaled in a fixed part, the outer ends of said link and rocking arm pivotally connected and having a sliding engagement with said slot, the said parts so arranged and operating that the slotted arm is substantially alined with the link when the blank holder is working whereby a dwell is obtained.

16. In a drawing press, a plunger, a crank shaft therefor, a stationary bed, a movable blank holder above said bed and operating means therefor including a rock

shaft located near the base, connections between said rock shaft and blank holder for drawing the blank holder down to its work, a slotted operating arm on said rock shaft, a slide, a crank on said crank shaft for reciprocating said slide, a link on said slide, a rocking arm journaled in a fixed part, the outer ends of said link and rocking arm pivotally connected and having a sliding engagement with said slot, the said parts so arranged and operating that the slotted arm is substantially alined with the link when the blank holder is working, whereby a dwell is obtained and is in substantial alinement with the path of movement of said rocking arm when the blank holder is in its upper and lower positions whereby an easy start and stop are obtained.

17. In a drawing press, a plunger, a crank shaft therefor, a stationary bed, a movable blank holder above said bed and operating means therefor including a rock shaft located near the base, connections between said rock shaft and blank holder for drawing the blank holder down to its work, a slotted operating arm on said rock shaft, a slide, a crank on said crank shaft for reciprocating said slide, a link on said slide, a rocking arm journaled in a fixed part, the outer ends of said link and rocking arm pivotally connected and having a sliding engagement with said slot, the said parts so arranged and operating that the slotted arm is substantially alined with the link when the blank holder is working and the plunger is performing its work and the slide crank is at the upper part of its travel whereby a dwell of the blank holder is obtained during the drawing operation.

18. In a drawing press, a reciprocating blank holder, means for reciprocating the same, including a slotted member, a rocking arm, a reciprocating link and a connection between said rocking arm and said link adapted to slide in said slot.

19. In a drawing press, a moving member, operating devices therefor including an operating arm, a link for rocking said arm, a sliding connection between said link and said arm, and means for causing the link to slide in said arm during operation.

20. In a drawing press, a reciprocating clamping member, operating means for reciprocating the same including an operating arm, a reciprocating link for rocking said arm, a sliding connection between said link and arm, and means whereby the connected end of said link is moved in the arc of a circle as the link is reciprocated.

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

WILLIAM KLOCKE.

Witnesses:
H. C. B. PAGE,
F. D. MACKAY.