No. 832,359. PATENTED OCT. 2, 1906.

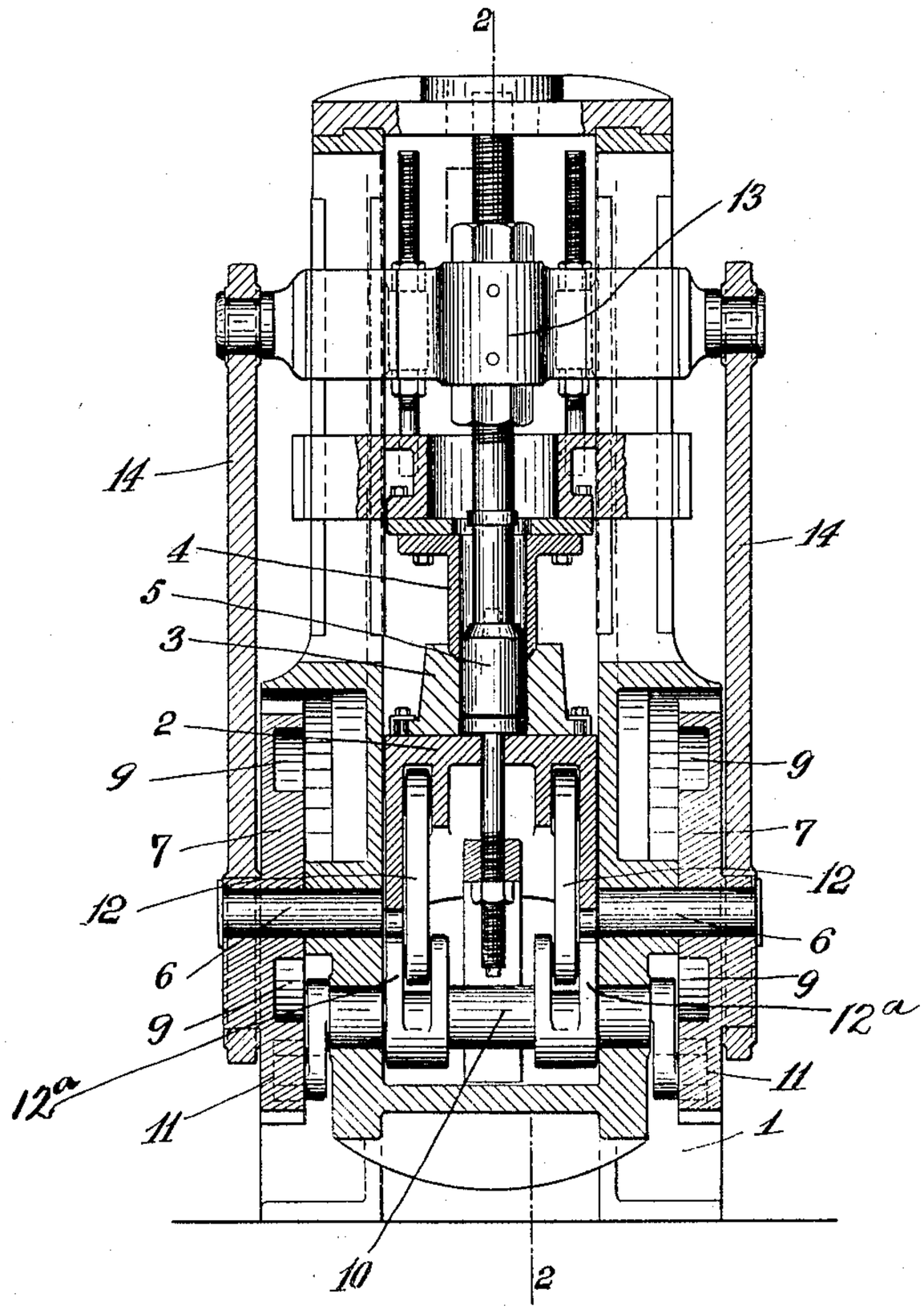
O. S. BEYER.

DRAWING PRESS.

APPLICATION FILED JAN. 18, 1905.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses
Ivan Konigsberg.
Annie Nibsemann.

Otto S. Beyer. Inventor
By his Attorneys
Dewey & Spanedi

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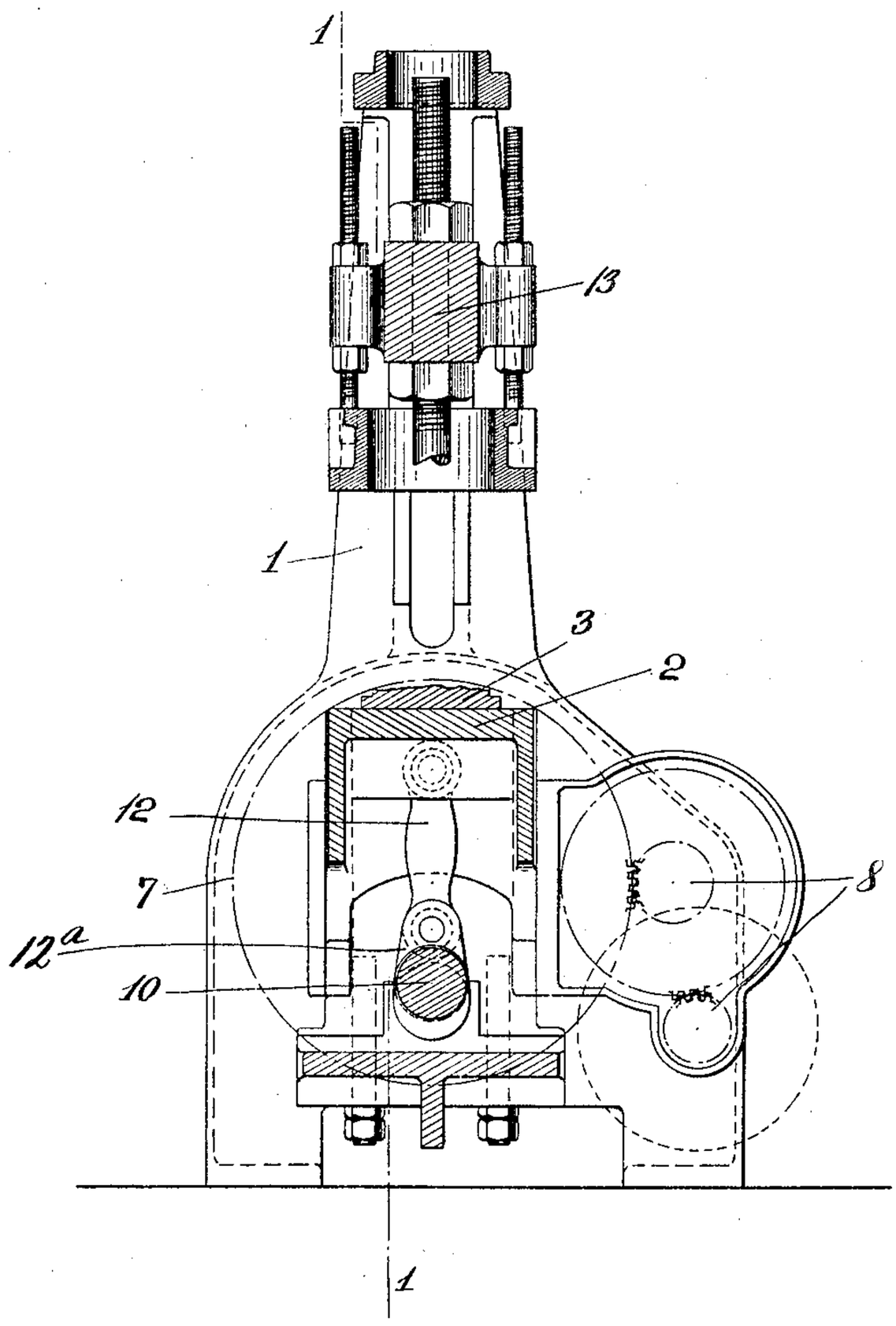
3 SHEETS—SHEET 2.

Fig. 2



Witnesses
Ivan Konigsberg.
Annie Wiesemann

Otto S. Beyer. Inventor

By his Attorneys
Dewey & Spaulding

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3 SHEETS—SHEET 3.

Fig. 3

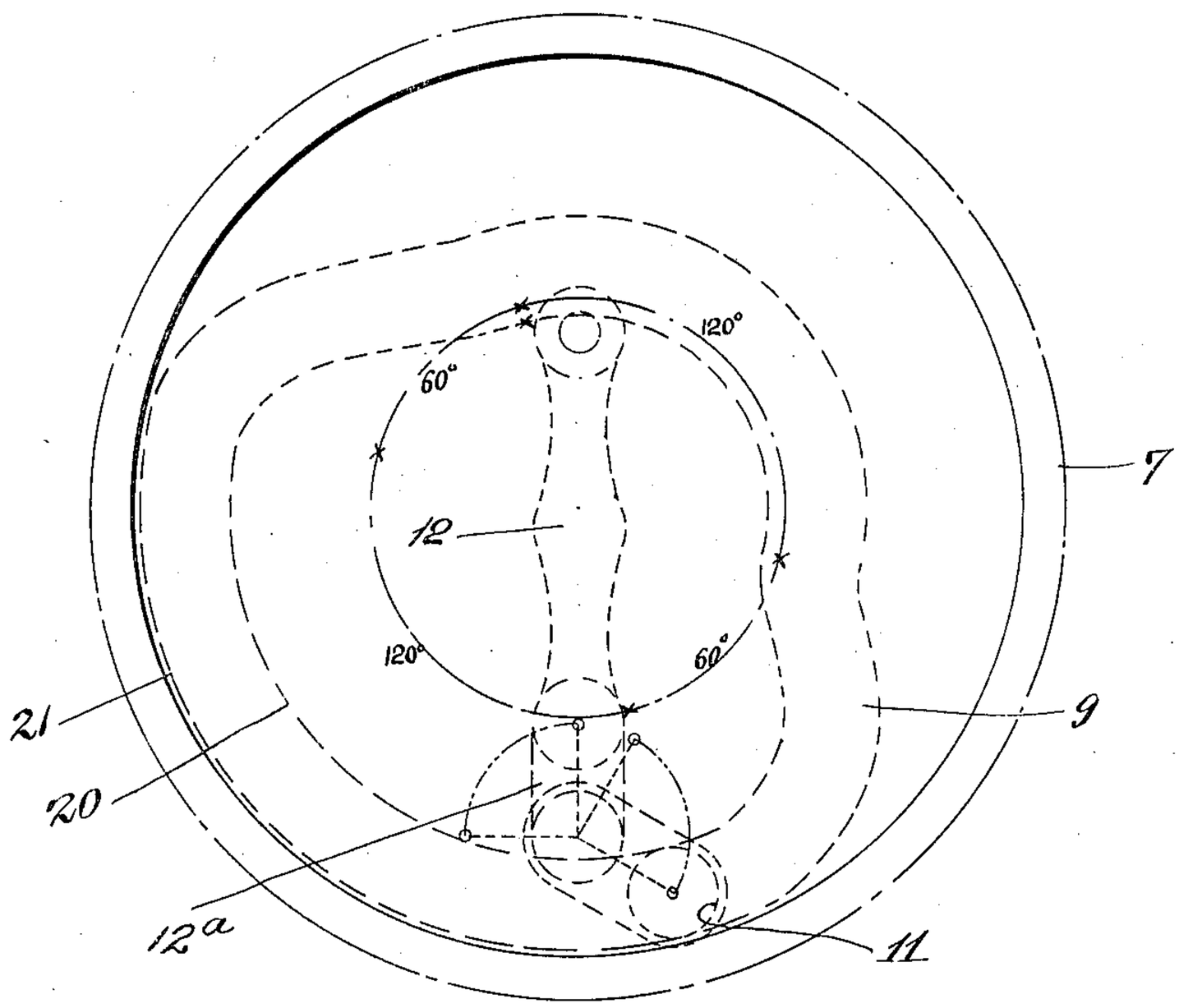
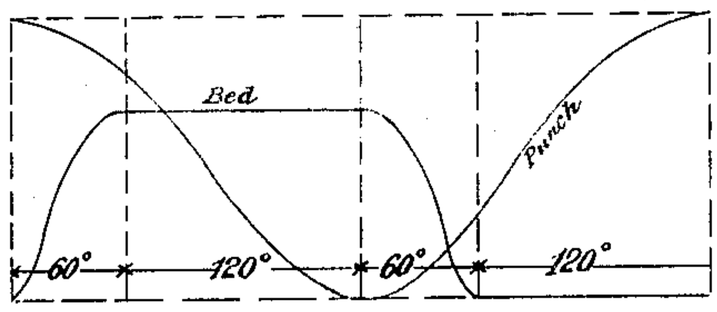


Fig. 4



Witnesses
Joan Konigsberg.
Anne Wissemann

Otto S. Beyer Inventor

By his Attorneys
Dewey & Spaulding

UNITED STATES PATENT OFFICE.

OTTO S. BEYER, OF EAST RUTHERFORD, NEW JERSEY, ASSIGNOR TO E. W. BLISS COMPANY, A CORPORATION OF WEST VIRGINIA.

DRAWING-PRESS.

No. 832,359. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed January 18, 1905. Serial No. 241,553.

To all whom it may concern:

Be it known that I, OTTO S. BEYER, a citizen of the United States of America, and a resident of East Rutherford, county of Bergen, and State of New Jersey, have invented certain new and useful Improvements in Drawing-Presses, of which the following is a specification.

My invention has reference to drawing-presses for drawing a sheet of metal up into cup-shaped articles and is a companion application of one filed by me on the 16th of December, 1903, Serial No. 185,345. In presses of this kind there are generally three main elements—namely, a bed which carries the die, a punch, and a blank-holder. The general construction of these presses is well known and has been developed along two distinct types, one in which the bed carrying the die is stationary while the blank-holder and punch are given a motion toward and away from the said bed and die. The other type, and the one to which my invention relates, is a construction in which the blank-holder is stationary while the bed carrying the die and the punch are movable toward and away from each other. Simple as this operation seems it presents numerous mechanical difficulties, especially when it is desired to draw up very large and deep articles at a high speed. It is obvious that when a shallow article is drawn up the distance that the elements have to separate from each other is not so very great; but when it comes to drawing up very deep cup-shaped articles the distance through which the parts have to travel without performing any work becomes very great. It will be understood that in order to withdraw the blank after it has been acted upon it is necessary to move the punch and bed away from each other a distance slightly greater than the depth of the blank which has been drawn. In order to obtain the greatest speed in turning out work, it is preferred to have a machine which is continuously operating, one article being drawn up with each revolution of the main shaft. In order to do this and to withdraw the finished blank and to replace it with another one, it is necessary that there should be a pause or dwell, in this instance of the bed, during a considerable period—in fact, twice during one hundred and twenty degrees of each revolution of the main shaft. Various means have been devised for accomplishing this object; but heretofore the result has been somewhat disappointing, inasmuch as the general construction of the machine though ingenious has been complicated and therefore cumbersome to operate and to maintain in good working order, besides being wasteful through the loss of power and the straining of the parts of the machine.

My invention does not contemplate, broadly, to embody the principle above, as that is old, but seeks rather to overcome the mechanical difficulties encountered in the building of machinery of this kind, so that the organization of the machine shall be free from the imperfection and crudeness characteristic of machines heretofore constructed.

Other improvements will appear as the specification proceeds.

In the accompanying drawings I have shown my invention in a suitable form, though I do not wish to be understood as limiting my invention to the exact structure therein set forth.

In the said drawings, Figure 1 is a sectional view on the line 1 1 of Fig. 2 embodying my invention. Fig. 2 is a sectional view on the line 2 2 of Fig. 1. Fig. 3 is an enlarged detail view of one of the cams for operating the toggles used in elevating the bed. Fig. 4 is a diagram illustrating the movements of the bed and punch.

Similar characters of reference indicate corresponding parts in the different views.

1 represents a framework of any suitable construction for properly supporting the parts.

2 represents the bed carrying the die 3.

4 is the blank-holder, and 5 is the punch.

As has been previously noted, the bed and punch are movable, while the blank-holder is stationary.

The means for operating the bed are as follows: Mounted in the framework are two studs 6, provided with the gears 7, one on either side of the machine, which are continuously driven by some suitable means, as two pinions 8, only one of which is seen, which latter in turn are operated by a suitable motor. Located in each of the said gears 7 are the cams 9. Mounted on the crank-shaft 10 are two rollers 11, one at each end, engaging each with its respective cam in the gears 7.

This crank-shaft is connected by means of two toggles, each composed of the links 12 and 12ª , to the bed 2. It will thus be seen that the crank-shaft is operated from two cams, one on either side of the machine.

The punch 5 is mounted in the movable cross-head 13 and is driven from the gears 7 by means of the eccentric-straps 14, connecting the said gears 7 and the cross-head 13.

It will be observed from an inspection of Figs. 3 and 4 that the punch travels constantly during one revolution of the driving-gears 7, whereas the bed travels upward during sixty degrees, then dwells for one hundred and twenty degrees while the drawing is effected, then moves downward during sixty degrees and dwells at its lowermost point during the remaining one hundred and twenty degrees. One of the cams in the gears 7 is shown diagrammatically in Fig. 3, and the plotted curve showing the movement of the bed and punch are illustrated in Fig. 4.

It will be observed that by this construction the strain on the machine is distributed evenly, while at the same time the operating mechanism is simplified to a very considerable extent.

In some instances one of the cams 9 and crank 11 can be dispensed with, the shaft 10 being driven from one of these cams only. Another modification of the present invention resides in having one cam move the bed up while the other cam moves it down. This modification will easily be understood by an inspection of Fig. 3, where the inner dotted line 20 would indicate one cam on one side of the machine and the outer dotted line 21 would indicate the other cam on the other side of the machine. It is of course also obvious that it is not necessary to have the cam formed as part of the gear 7, but that the cam could be bolted onto the gear or caused to move with the same in some other suitable way. The construction shown in the drawings, however, is more compact and reduces the number of parts used.

What I claim is—

1. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears, and the other of which is adapted to engage with the cam in the other of the said gears.

2. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears and the other of which is adapted to engage with the cam in the other of the said gears, and means for operating the two driving-gears continuously.

3. In a drawing-press, the combination of a bed carrying a die, a blank-holder and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears and the other of which is adapted to engage with the cam in the other of the said gears, and means connecting the said gears with the punch located on either side of the machine.

4. In a drawing-press, the combination of a bed carrying a die, a blank-holder and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears, the other of which is adapted to engage with the cam in the other of the said gears, means connecting the said gears with the punch located on either side of the machine, and means for operating the two driving-gears continuously.

5. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears, and the other of which is adapted to engage with the cam in the other of the said gears, the parts being so arranged that to each revolution of the driving-gears the punch is given a constant up-and-down motion while the bed moves up during sixty degrees, then dwells for one hundred and twenty degrees, then moves down again during sixty degrees, and dwells at its lowermost point during one hundred and twenty degrees of each revolution of the said gears.

6. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-

shaft, one of which is adapted to engage with the cam in one of the said gears and the other of which is adapted to engage with the cam in the other of the said gears, and means for operating the two driving-gears continuously, the parts being so arranged that to each revolution of the driving-gears the punch is given a constant up-and-down motion while the bed moves up during sixty degrees, then dwells for one hundred and twenty degrees, then moves down again during sixty degrees, and dwells at its lowermost point during one hundred and twenty degrees of each revolution of the said gears.

7. In a drawing-press, the combination of a bed carrying a die, a blank-holder and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears and the other of which is adapted to engage with the cam in the other of the said gears, and means connecting the said gears with the punch located on either side of the machine, the parts being so arranged that to each revolution of the driving-gears the punch is given a constant up-and-down motion while the bed moves up during sixty degrees, then dwells for one hundred and twenty degrees, then moves down again during sixty degrees, and dwells at its lowermost point during one hundred and twenty degrees of each revolution of the said gears.

8. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the said crank-shaft, one of which is adapted to engage with the cam in one of the said gears, the other of which is adapted to engage with the cam in the other of the said gears, means connecting the said gears with the punch located on either side of the machine, and means for operating the two driving-gears continuously, the parts being so arranged that to each revolution of the driving-gears the punch is given a constant up-and-down motion while the bed moves up during sixty degrees, then dwells for one hundred and twenty degrees, then moves down again during sixty degrees, and dwells at its lowermost point during one hundred and twenty degrees of each revolution of the said gears.

9. In a drawing-press, the combination of a bed carrying a die, a blank-holder, and a punch, means for operating the said bed, comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, a driving-gear located on one side of the machine, a cam moving with the same, a roller mounted on the end of the crank-shaft and adapted to engage with the said cam.

10. In a drawing-press, the combination of a bed carrying a die, a blank-holder and a punch, means for operating the said bed, comprising: a crank-shaft, toggles connecting the said bed and crank-shaft, two driving-gears located one on each side of the machine, a cam moving with each of the said driving-gears, a roller at each end of the crank-shaft, one of which is adapted to engage with one cam to move the bed up, and the other of which is adapted to engage with the other cam to move the bed down.

Signed at Brooklyn, New York, this 9th day of January, 1905.

OTTO S. BEYER.

Witnesses:
W. S. SMITH,
A. D. SHINER.