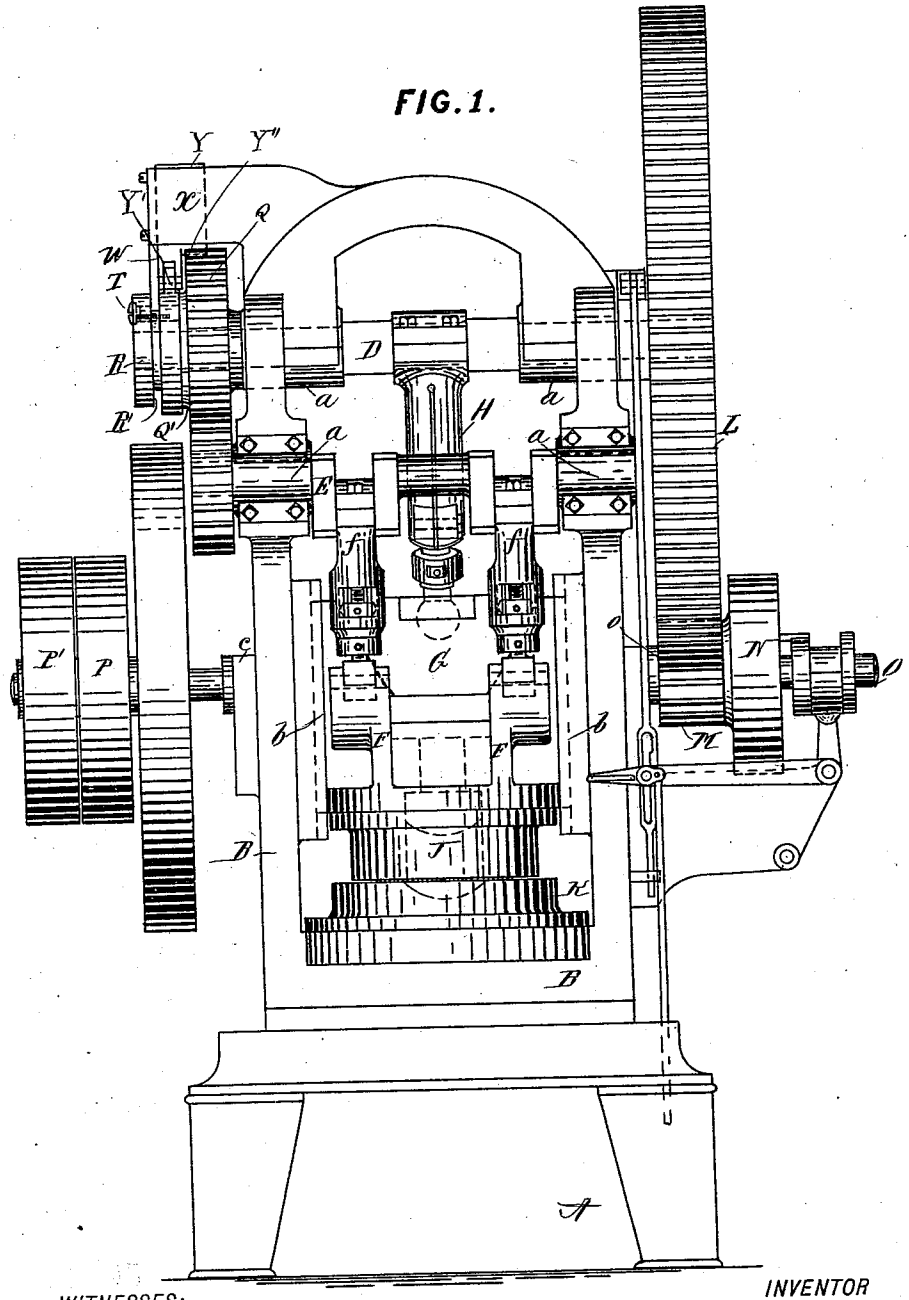
(No Model.) 3 Sheets—Sheet 1.

A. CALLESON.

PRESS FOR WORKING SHEET METAL.

No. 561,090. Patented June 2, 1896.

FIG. 1.



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(No Model.) 3 Sheets—Sheet 2.

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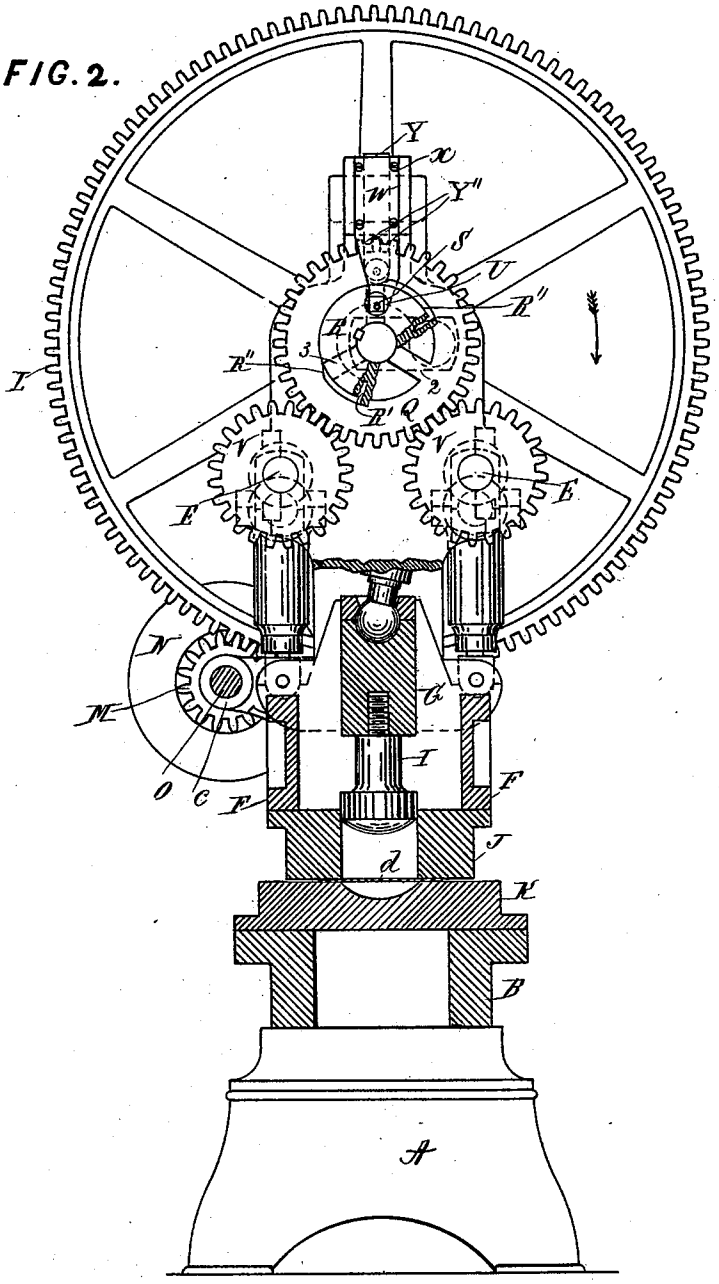
PRESS FOR WORKING SHEET METAL.

No. 561,090. Patented June 2, 1896.

FIG. 2.



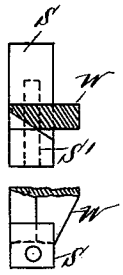


FIG. 6.

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(No Model.) 3 Sheets—Sheet 3.

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FIG. 5.

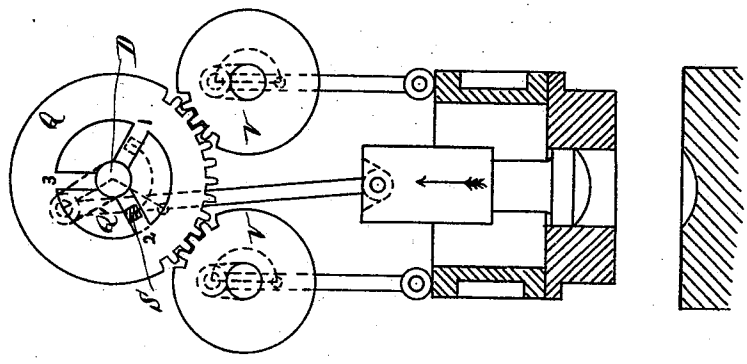


FIG. 4.

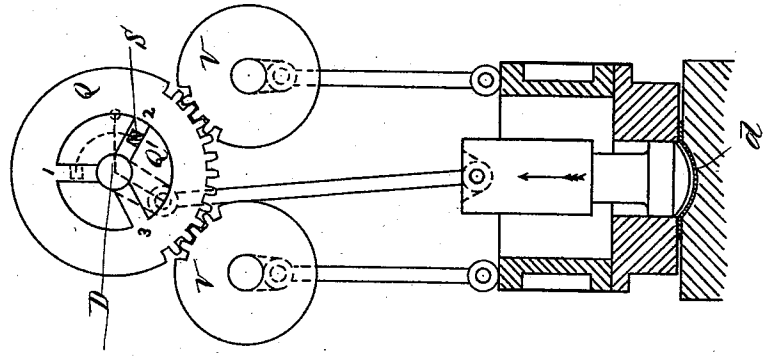
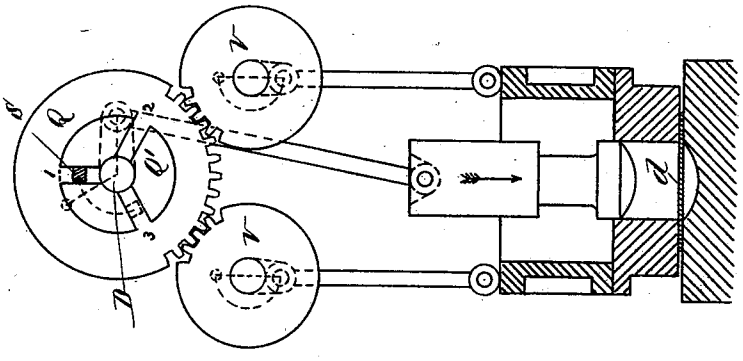


FIG. 3.



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UNITED STATES PATENT OFFICE.

AMOS CALLESON, OF BROOKLYN, NEW YORK.

PRESS FOR WORKING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 561,090, dated June 2, 1896.

Application filed June 29, 1895. Serial No. 554,429. (No model.)

To all whom it may concern:

Be it known that I, AMOS CALLESON, a citizen of the United States, and a resident of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Presses for Working Sheet Metal or other Material, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar letters and figures of reference indicate corresponding parts.

This invention relates to presses for working sheet metal or other material, wherein the blank or sheet to be operated upon is gripped against a die by a blank-holder and held there during the operation of a plunger or punch, whereby the sheet metal is or may be drawn into various shapes, which in this invention is done by two distinct mechanisms, one of which is designed for gripping the sheet with a certain pressure which is adjustable to suit varying requirements and the other of which is designed for drawing the sheet into the required shape while being held as before mentioned. In this class of machines the mechanism for gripping the sheet is usually called the "blank-holder" and the one for drawing the sheet or forcing it into the required form is called the "drawing punch or plunger," and the blank-holder is also sometimes used for cutting the blank immediately before the gripper is applied, in which case both operations are performed at the same time, thus saving time and expense. The drawing punch or plunger works inside of the blank-holder in suitable guides and is generally operated by a crank through a direct connection therewith and which on being rotated gives it the required reciprocating motion. The blank-holder has a motion precisely the same as that of the plunger and is generally guided in suitable ways formed in the frame of the main frame of the press or machine.

Various devices have been invented for operating the parts of this machine, most of which have been found objectionable either on account of being unreliable in their operation or because of their complicated and costly construction; and the object of my present invention is to provide a simple and reliable mechanism in which the aforesaid difficulties are entirely overcome. This object I accomplish by providing one or more auxiliary crank-shafts besides the main crank-shaft hereinbefore mentioned for operating the drawing plunger or punch, said auxiliary shafts being suitably mounted on the main frame of the press and connected directly with the blank-holder by adjustable connecting-rods. The motion of these crank-shafts is continually in one direction and the descending and ascending of the blank-holder requires one complete revolution of each crank-shaft, and this motion of the crank-shafts is controlled by a gear or main crank-shaft which engages other gears fixed on the auxiliary shafts and causes them to make one-half of a revolution downward, thus causing the blank-holder to grip the sheet to be drawn, then to pause the required length of time while the sheet is being drawn, and then to make another half-revolution, lifting the blank-holder to its extreme height.

The invention consists in the novel construction, combination, and arrangement of parts by which the foregoing objects are accomplished and is fully disclosed in the following specification, of which the accompanying drawings form a part, and in which—

Figure 1 represents a front elevation of my improved press; Fig. 2, a left-hand side elevation showing the lower part of the machine in mid-section, including the blank-holder, dies, and drawing-punch, the side frame being partly broken away. Figs. 3, 4, and 5 are diagram views, in which Fig. 3 shows the position of the shaft D at mid-stroke, Fig. 4 shows the position of the parts after the drawing is completed and when the blank-holder starts to ascend, and Fig. 5 the position of the parts when they are automatically stopped with the blank-holder at its highest position; and Fig. 6 is an enlarged view of the clutch-pin and clutch-lever.

In the practice of my invention I provide a properly-proportioned base A, on which is mounted the frame B of the press, which is provided with suitable bearings *a* at the top of the sides thereof for the main crank-shaft D and auxiliary crank-shafts E. The frame B is also provided with suitable vertical

guides *b* on the inner surfaces of the opposite sides thereof for the blank-holder F, as shown in Figs. 1 and 2, and the vertically-movable plunger G works inside of the blank-holder F and is operated by a crank-shaft D, mounted between the sides of the frame B at the top thereof, through a connection H, which carries the male die or drawing-punch I, which passes through the die fastened to the blank-holder F into the male die K, which is secured to the frame B.

The shaft D is driven by a large gear-wheel L at the right of the machine, as shown in Fig. 1, which is also shown in Fig. 2, and which is keyed onto the said shaft and which in turn is driven by a pinion M, with which is connected or which forms part of friction-clutch N and which normally revolves freely upon a shaft O, which, when the press is not in use, is constantly revolving in bearing *c*, being driven by a belt connected with a pulley P, and on the shaft O is also a loose pulley P′, designed to receive the belt when the machine is not in use.

By establishing the connection between the clutch N and the shaft O, which usually is done by a foot-lever in the usual manner, the press is started and all the crank-shafts make one complete revolution, stopping at the normal position, as shown in Fig. 5, the clutch being at that point automatically disengaged by suitable mechanism, well understood in this class of devices, and thus far all the parts of the machine shown and described are well known and constitute no part of my invention and are not therefore clearly shown in section and described in detail, and the operation thereof is also well understood by practical pressmen.

I will now describe the new and novel features of my invention which constitute an improved mechanism for properly operating the blank-holder, which consists of the following construction:

The gear-wheel Q is mounted on the shaft D and revolves freely thereon and is held in position by a bearing *a* and a clutch-collar R, which is keyed to the shaft D. The clutch-collar R carries a clutch-pin S, as shown in Fig. 2, which slides freely in the collar R and is held in place by a screw-plug T, as shown in Fig. 1, and is forced against a hub Q′ of the gear-wheel Q by a spring U, which is pocketed or secured in a hole or opening bored into the clutch-pin S and which bears on its outer end against the plug T.

The hub Q′ is cut away so as to form three equally-distant radial clutch-grooves 1, 2, and 3, (best shown in Figs. 2, 3, 4, and 5,) each of which is a little wider than the pin S, and the gear-wheel Q engages with gear-wheels V, which are fixed on the auxiliary shafts E, and the gear-wheels V are the same in diameter and exactly two-thirds of the diameter of the gear-wheel Q, and hence it follows that if the gear-wheel Q makes two-thirds of a revolution the gear-wheels V make just one complete revolution.

From the foregoing it will be evident that if the collar R revolves with the clutch-pin S, which is held against the hub Q′ by spring-pressure, and the gear-wheel Q is stationary it cannot at any time make more than one-third of a revolution before meeting one or the other of the grooves 1, 2, and 3, and on passing over one of said grooves and before it reaches another spring U will force it into the clutch-groove and a positive connection is established between the loose gear Q and the shaft D, or between the shaft D and the auxiliary shafts E.

It is evident that to have the shaft D and the auxiliary shafts E make one complete revolution in the same time, as before stated, the clutch connection between the shaft D and the wheel Q must be broken some time during that period, said time being exactly as long as it takes the clutch-pin S to travel from one of the clutch-grooves to the following one, with the wheel Q and consequently the auxiliary shafts E stationary, because in that case the gear Q would only make two-thirds of a revolution to one of the shaft D, and therefore the auxiliary shafts E would each make a complete revolution the same as the shaft D. The stop or pause of the auxiliary shafts E is timed so as to allow the shaft D to travel downward from the position shown in Fig. 3 to the position shown in Fig. 4, in which time the drawing of the blank or the shifting thereof is accomplished. To accomplish the aforesaid stop or pause of the auxiliary shafts E, a fixed lever W is secured to a projection X of the frame B, the lower end of which reaches down to the bottom of and fills the groove R′ in the collar R. The clutch-pin S has nearly one-half of its sectional area above the bottom of the groove R′, and that part thereof which would project up into the groove R′, with the clutch-pin S resting against the hub Q′, is cut away to the same width and depth as the groove R′. By reason of this construction it is evident that when the clutch connection is established the shoulder S′ (see Fig. 6) will project into the groove R′, and the edge of the shoulder S′ is beveled to meet or correspond with a bevel on the lever W, both bevels combined being a little more than the outer depth of the clutch-grooves 1, 2, and 3. The effect is that every time the clutch-pin passes the lever W it is withdrawn from the clutch-grooves and the connection is broken.

The operation will now be understood from the foregoing description taken in connection with the drawings and particularly the diagrams shown in Figs. 3, 4, and 5. The diagram in Fig. 3 shows the shaft D at mid-stroke, having traveled from its normal position, as shown in Fig. 5, one-third of a revolution, the auxiliary shafts E having each made one-half of a revolution, and the clutch S having traveled from the clutch-groove 1 to the clutch-

groove 2 and having dropped therein, and the auxiliary shafts E having remained perfectly at rest, and Fig. 5 shows all the parts returned to their normal position.

To overcome any tendency which the gear-wheel Q may have to rotate out of position, a slide Y (shown in Figs. 1 and 2) is arranged to move freely up and down in the projection X of the frame B, and said slide is held in place by the lever W, and its motion is controlled by a roller-contact Y′, together with a cam-surface R″ on the collar R. Formed on the slide Y is a projection Y″, on which are formed projections or teeth on the lower surface thereof, which are parallel with and are marked so as to match corresponding spaces between the teeth of the gear-wheel Q, and when the clutch-pin is withdrawn the cam R at the same time lets the slide Y drop sufficient to lock the gear-wheel Q in position and lifts it again at the proper time to let the gear-wheel rotate.

Instead of the slide Y, friction may be used with the same effect, but I prefer a locking device of this character, as it means no unnecessary expenditure of power.

I am fully aware that the details of construction herein described could be greatly varied without departing from the spirit of my invention or sacrificing its advantages. For instance, almost any other reliable clutching device might be arranged to answer the purpose of that shown. The proportional position between the gears might be changed to make the stop or pause of the blank-holder longer or shorter, and instead of one clutching mechanism being used on the central shaft two might be arranged with the same effect, one for each of the auxiliary shafts E.

My invention is therefore not limited to the form, construction, combination, and arrangement of parts shown and described, and I therefore reserve the right to make such alterations therein as fairly come within the scope of the invention.

Having fully described my invention, I claim and desire to secure by Letters Patent—

1. In a press of the character described, the combination with a blank-holder of means for imparting motion thereto, consisting of a crank-shaft which revolves in one direction, and is connected with the blank-holder, a gear-wheel on the end of said shaft, another gear-wheel on the main shaft of the machine, having a clutch connected therewith and driving the first-mentioned gear-wheel, means for automatically engaging and disengaging the clutch connection, to give the required motion to the blank-holder and a locking device adapted to act when the clutch connection is broken, substantially as shown and described.

2. In a press of the character described, the combination of positively-arranged crank-shafts, rotating always in one direction, and each of which is connected with the main crank-shaft of the machine, by gear-wheels, a clutch connection between said main shaft and other shafts, devices to make or break said clutch connection, and locking devices which automatically secure the grear-wheels while said connection is broken, substantially as shown and described.

3. In a press of the character described, the combination of a fixed die, a blank-holder, a reciprocating plunger, a crank-shaft D, supported in the frame of the machine, other crank-shafts E, below the main crank-shaft in operative connection with the plunger and having connections with the blank-holder, gear-wheels fixed on said shafts E, another gear-wheel mounted on the main crank-shaft and adapted to operate with said gear-wheels and in connection with another gear-wheel Q, mounted on the main shaft and also provided with a clutch connection with said shaft, a lever for automatically breaking the clutch connection, and a slide for locking the gear-wheel Q, in position when the clutch connection is broken, substantially as shown and described.

4. In a press of the character described, the combination with the frame of a fixed die, a movable plunger in connection therewith, a main crank-shaft supported by the frame, other crank-shafts below said main crank-shaft and in operative connection with the plunger, a gear-wheel on the main crank-shaft adapted to engage with similar gear-wheels on the other crank-shafts, a clutch connection for the gear-wheel on the main crank-shaft, and a slide supported by a projection connected with the main frame and adapted to operate in connection with the gear-wheel on the main crank-shaft, said parts being constructed, combined and arranged, substantially as shown and described.

5. In a press of the character described, the combination of a fixed die a movable plunger, a main crank-shaft, other crank-shafts mounted below said main crank-shaft and in operative connection with a movable plunger, a gear-wheel mounted on the main crank-shaft, and adapted to operate in connection with gear-wheels on the other crank-shafts, a hub connected with the gear-wheel on the main crank-shaft and provided with radial grooves, a clutch mounted on said shaft, pins adapted to operate in connection with said grooves a spring adapted to operate in connection with said clutch, and a slide connected with a projection on said frame and adapted to operate in connection with said gear-wheel mounted on the main crank-shaft, said parts being constructed, combined and arranged, substantially as shown and described.

6. In a press of the character described, the combination with the blank-holder thereof, of the main driving-shaft, one or more crank-shafts driven therefrom by direct gearing, each of which crank-shafts is adapted to ro-

tate intermittently in one direction and each of which has suitable connections with said blank-holder, and means for automatically arresting or releasing the motion of said crank-shafts for periods sufficient to give the proper stop or pause to the blank-holder, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 27th day of June, 1895.

AMOS CALLESON.

Witnesses:
L. M. MULLER,
L. E. RICHTER.