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F. J. RODE

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DRAWING PRESS FOR HEATING AND DRAWING SHEET METAL

Filed Dec. 17, 1926

2 Sheets-Sheet 1

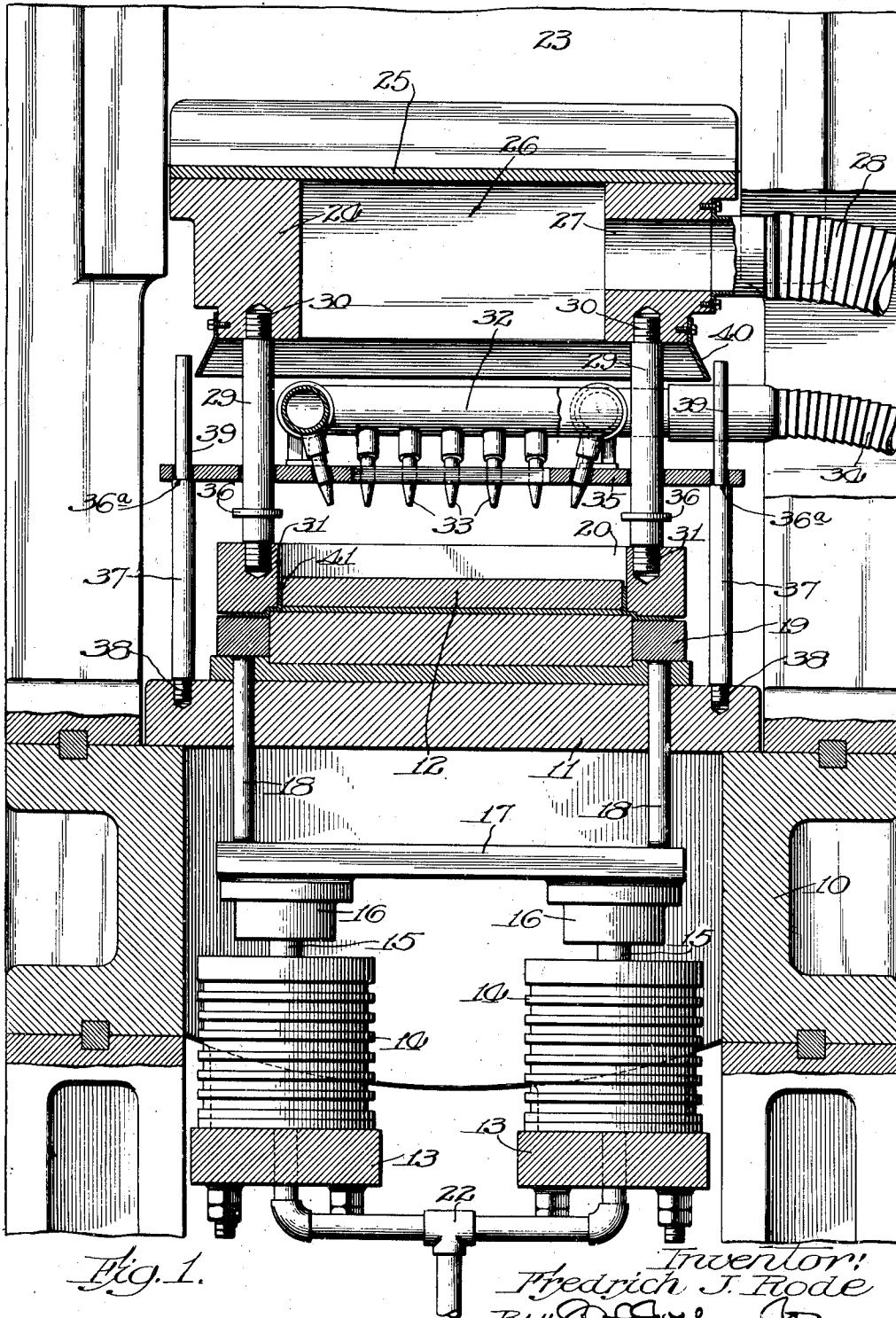


Fig. 1.

Inventor:
Friedrich J. Rode
By: *[Signature]* Atty.

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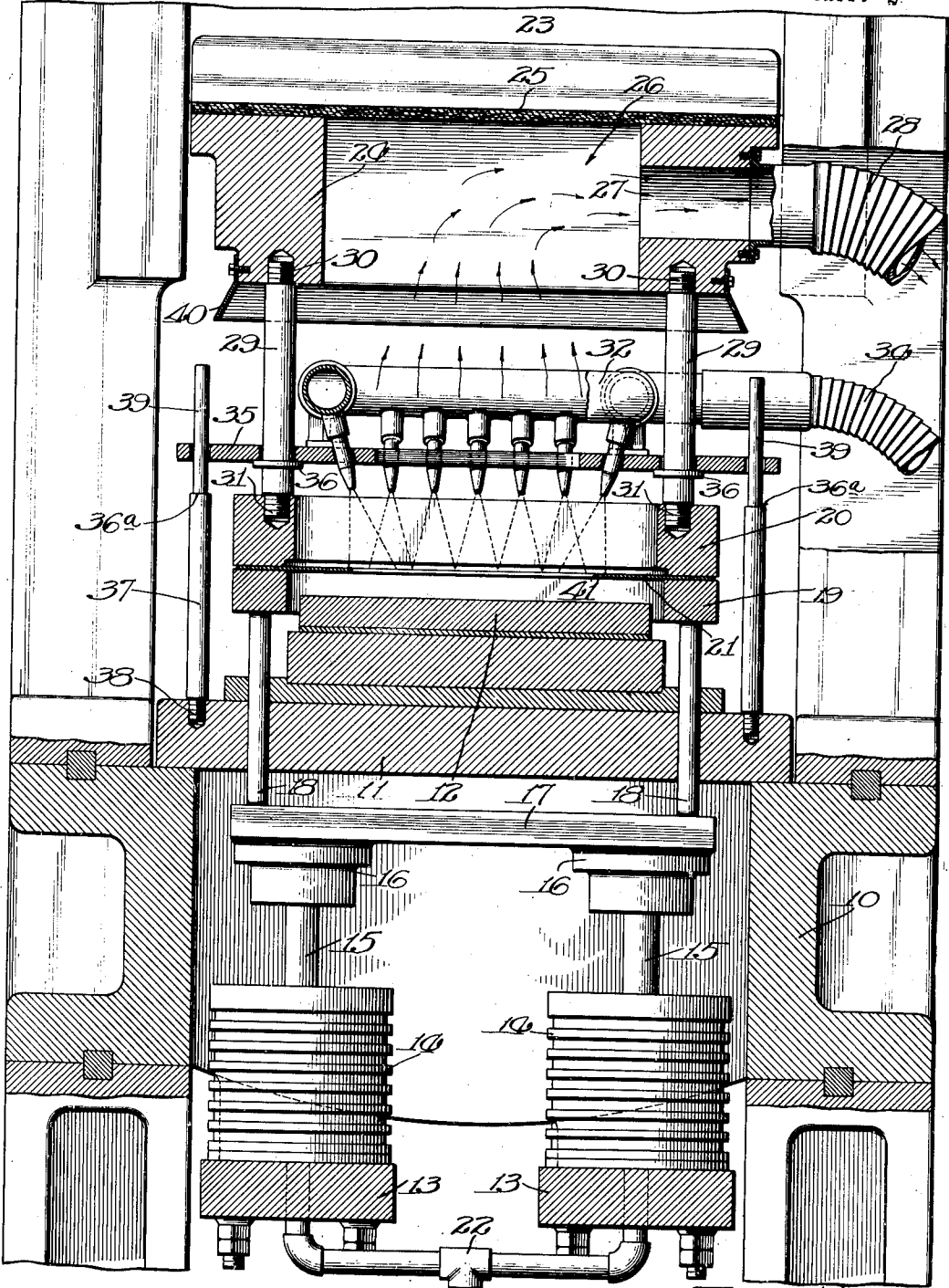


Fig. 2.

Inventor:
Friedrich J. Rode
By: *[Signature]*

UNITED STATES PATENT OFFICE.

FREDRICH J. BODE, OF CHICAGO, ILLINOIS, ASSIGNOR TO MARQUETTE TOOL & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DRAWING PRESS FOR HEATING AND DRAWING SHEET METAL.

Application filed December 17, 1926. Serial No. 155,394.

Heretofore in forming openings, such as window openings or work of this character, by drawing the metal about the edge of a hole in a sheet metal blank, the metal cracks at the corners and in order to avoid this, it has been necessary to partially draw the opening, then the partially finished blank is removed from the machine and heated. The heated blank is then put back into the machine and the draw is finished. The blank is removed and heated and placed back in the machine or press as often as necessary to completely finish the product. Such operations are not only tedious and laborious, but necessitate considerable time, resulting in an expensive production.

It is one of the objects of the present invention to avoid all of these difficulties and objections and to embody in a press of this character improved means whereby the blank may be heated to the desired degree previous to or during the forming or shaping operation, so that a draw of any desired extent or depth may be made without cracking or injuring the material or blank and without removing the blank from the machine after it has been placed therein until the blank has been completely drawn or shaped, regardless of the depth or extent of the draw to be made.

A further object is to provide in a machine of this character improved means whereby the heating means is movable toward and away from the work so that the die will not be subjected to undue heat, and improved means for limiting the movement of the heating means toward the work, such movements of the heating means being controlled by the movement of the reciprocating ram of the press.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which

Figure 1 is a view partly in vertical section and partly in elevation of a portion of a drawing press having an attachment constructed in accordance with the principles of this invention applied thereto, and with the

parts in one position with respect to each other.

Figure 2 is a view similar to Figure 1, showing the parts in another position.

Referring more particularly to the drawings the numeral 10 designates generally the supporting structure of the press having a bed plate 11 upon which is mounted a die 12.

Below the bed plate 11 and mounted upon suitable supports 13 are cushions 14 in which pistons (not shown) reciprocate, and connected with the pistons are piston rods 15.

These rods are connected by means of suitable connections 16 with a pressure pad or pin plate 17.

Pins 18 pass through the bed plate 11 and rest upon the plate 17.

Supported by the pins 18 is a draw ring or blank holding member 19 which co-operates with a die member 20 for clamping the work 21 therebetween.

Fluid pressure is supplied to the cushions or cylinders 14 through a suitable pipe connection 22 leading from a source of supply of fluid pressure.

Mounted upon the press is a reciprocable member or ram 23 which has connected with it a member 24 preferably insulated therefrom by means of suitable heat insulation 25.

This member 24 is hollow or provided with a chamber 26 opening through the bottom thereof and is provided with an outlet 27 to which is connected a suitable conduit 28 such as a flexible pipe or the like.

Depending from the member 24 are hangers 29 preferably in the form of rods or bolts, any number of which may be employed, and which are provided with threaded extremities 30 adapted to be threaded into the member 24.

The hanger members 29 may be of the required length according to the stroke of the ram with respect to the die 12 and these members are also provided with threaded extremities 31 adapted to be threaded into the die member 20 for supporting the latter from the ram or movable member 23.

Arranged beneath the member 24 and above the die 12 is a heater preferably in the form of a manifold 32 having a plurality of jets or burners 33 connected therewith and directed toward the die 12 and preferably through the die member 20.

The burners 33 are supplied with fuel

from the manifold which in turn is connected with a suitable source of fuel supply by means of a flexible pipe or conduit 34.

The burners and manifold are supported preferably by means of a plate 35 through which the hanger members 29 pass and the hanger members are provided with shoulders 36 upon which the plate or member 35 rests (see Figure 2) when the ram is ascending, so as to raise the burners or heaters 33 during the upward movement of the ram to move them away from the work.

When the ram descends the plate or member 35, together with the burners or heaters 33 will also be lowered until the burners and plate 35 reach a predetermined position with respect to the work supported by the die 12, at which time the downward movement of the plate 35 and the burners 33 will be arrested by means of shoulders 36^a which are provided upon supports 37, the latter being preferably in the form of rods or uprights having their lower extremities 38 threaded into the bed plate 11 of the machine.

The shoulders 36^a are formed by reducing a portion of the uprights or bars 37 as at 39 and the reduced portion 39 passes through suitable openings in the plate or member 35.

The shoulders 36^a are arranged at a predetermined distance above the die 12 so that the die 20 will be adapted for a downward movement toward the die 12 independently of the burners or heaters 33 and manifold 32.

If desired, a skirt 40 may be provided and secured to the lower end of the member 24 to serve as a hood for directing the products of combustion from the burners or heaters 33 into the open chamber 26 of the member 24 from where they will be conveyed through the outlet 27 and pipe 28, away from the machine.

It is thought that the operation of this improved device will be clearly understood from the foregoing description, but briefly stated it is as follows.

When the ram 23 is elevated the fluid pressure in the cushions or cylinders 14 will preferably raise the draw ring or blank holder 19 so that the upper surface thereof will be elevated above the upper surface of the die 12, as shown in Figure 2.

The work 21 having an aperture 41 is then placed upon the blank holder 19.

The ram 23 is then lowered until the die 20 contacts with the work, at which time the work 21 will be clamped or gripped between the die 20 and the blank holder 19.

A further lowering movement of the ram and of the die 20 will move the blank holder member 19 downwardly against the pressure of the cushions 14 until the work is brought into engagement with and shaped over the die 12, as shown in Figure 1.

During the descending movement of the

ram from the position shown in Figure 2, the flame from the burners or heaters 33 will be directed against the work 21 to heat the latter so that when the work is formed over the die 12, the corners of the opening 41 will not be cracked.

The burners or heaters 33 will travel downwardly with the ram 23 until the plate or member 35 contacts with the shoulders 36^a on the uprights 37. The plate or member 35 will then be arrested in its downward movement and the ram will continue downwardly independently with respect to the plate or member 35.

If desired, suitable means may be provided (not shown) whereby the flame from the burners or heaters 33 may be lowered when the downward movement of the plate or member 35 is arrested.

It will be manifest that with this construction and when the ram 23 rises the burners or heaters 33 will be moved away from the die 12 by the engagement of the shoulders 36 on the hanger members 29 with the plate or member 35 and this will not only prevent the burners from heating the die 12 to any undue extent, but will also move the flames away so as to provide ample space for the operator to insert the next blank in the machine without danger of becoming burned by the flame.

With this improved construction it will also be manifest that after the work has been once placed into the machine, the complete forming and operation thereon may be performed without necessitating a partial drawing of the work, and removal of the partially shaped work from the machine, so that it can be further heated, and the subsequent placing of the heated work back into the machine for a further operation thereon.

In other words, with the present invention a complete operation and forming of the work may be done by a single stroke of the press.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a burner associated with the press for applying heat to the work, and means responsive to the operation of the press for controlling the operation of the flame from the burner upon the work.

2. A sheet metal drawing press embodying blank holding means, a reciprocable

member with which the blank holding means co-operates to grip the work, cushioning means for resisting the movement of the blank holding means in one direction, a burner associated with a press for applying heat to the work within the press, and means whereby the amount of heat supplied from the burner to the work will be automatically controlled by the operation of the press.

3. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, and burners for applying heat to the work, said burners being movable towards and away from the work, the said burners being responsive in such movements to the movements of the said reciprocable member.

4. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, means for applying heat to the work and movable towards and away from the work, the said heat applying means being responsive in such movements to the movements of the said reciprocable member, and means for arresting the heating means in its movement towards the work to permit a predetermined degree of movement of the reciprocating member in a direction towards the work independent of the said heating means.

5. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, means associated with the press for applying heat to the work, an open chamber carried with a reciprocable member and disposed above the heating means for receiving the heated gases, and a discharge outlet leading from the chamber for conveying such gases away from the work and from the press.

6. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, heating means for the work, said heating means being movable with and with respect to the said reciprocable member, and means for causing a relative movement of the reciprocating member and heater one with respect to the other at a predetermined time in the cycle of operation of the press.

7. A sheet metal drawing press embodying blank holding means, cushioning means for resisting the movement of the said blank holding means in one direction, a reciprocable member with which the blank holding means co-operates to grip the work, heating means for the work, said heating means being movable with and with respect to the said reciprocable member, and means for causing a relative movement of the reciprocating member and heater one with respect

to the other at a predetermined time in the cycle of operation of the press.

8. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a heater arranged in the press for heating the work thus gripped, and a conduit having its inlet end arranged above the heater and in proximity thereto for receiving and carrying away excess heat.

9. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a burner arranged above and adapted to direct a flame against the work, means supporting the burner for movement with and with respect to the said reciprocating member, and means for arresting the movement of the burner with the said reciprocating member at a predetermined time in the cycle of operation of the press to cause the reciprocating member to move independently with respect to the burner.

10. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a burner within the press for directing a flame against the work for heating the latter, and means responsive in its operation to the movement of the said reciprocating member for controlling the extent of operation of the said flame upon the work.

11. A sheet metal drawing press embodying blank holding means, cushioning means for the said blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a burner within the press for directing a flame against the work for heating the latter, and means responsive in its operation to the movement of the said reciprocating member for controlling the extent of operation of the said flame upon the work.

12. A sheet metal drawing press embodying blank holding means, fluid controlled cushioning means for the said blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a burner within the press for directing a flame against the work for heating the latter, and means responsive in its operation to the movement of the said reciprocating member for controlling the extent of operation of the said flame upon the work.

13. A sheet metal drawing press embodying blank holding means, a reciprocable member co-operating with the blank holding means for gripping the work, a support connected with the reciprocable member and movable therewith and with respect thereto, a burner carried by the support, and a stop

arranged in the path of movement of the said support with the reciprocable member to arrest the movement of the support and burner and to permit the said reciprocable member
5 to continue in its movement independently of the said support.

14. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means
10 co-operates to grip the work, cushioning means for the said blank holding means, a support connected with the said reciprocable member for movement therewith and with respect thereto, a burner carried by the sup-
15 port, a stop for arresting the movement of the said support and burner in a direction towards the work at a predetermined time in the cycle of operation of the press to per-
20 mit the said reciprocable member to continue in its movement toward the work independ-
ently of the said support, and means for moving the support and burner in a direction away from the work as the reciprocable mem-
ber moves in a direction away from the work.

25 15. A sheet metal drawing press embodying blank holding means, a reciprocable member with which the blank holding means co-operates to grip the work, a supporting member movable with and with respect to
30 the reciprocating member, fixed uprights mounted upon a stationary part of the press for loosely guiding the said supporting member for up and down movements, shoulders on the uprights for arresting the movement
35 of the supporting member to permit the reciprocating member to move independently with respect thereto and in a direction toward the work, and a burner supported by said supporting member for directing a
40 flame against the work.

16. A sheet metal drawing press embodying blank holding means, a reciprocating
45 ram, a die member disposed below and spaced from the ram, hanger members for connecting the die member with the ram,

said blank holding means co-operating with the die member to grip the work, a support loosely mounted upon the said hanger mem-
bers intermediate the ram and die member and adapted for movement with and with-
50 respect to the said die member, a burner mounted upon the said support for directing a flame against the work, upright guides mounted upon a fixed portion of the press
55 for guiding said support, and shoulders on the guides beneath the support for arresting the support in its movement with the said die member towards the work, whereby the die member will be permitted to move
60 towards the work independently with respect to the said die member.

17. A sheet metal drawing press embodying blank holding means, cushioning means for the said blank holding means, a reciprocating ram, a die member disposed below and
65 spaced from the ram, hanger members for connecting the die member with the ram, said blank holding means co-operating with the die member to grip the work, a support loosely mounted upon the said hanger mem-
70 bers intermediate the ram and die member and adapted for movement with and with respect to the said die member, a burner mounted upon the said support for directing a flame against the work, upright guides
75 mounted upon a fixed portion of the press for guiding said support, shoulders on the guides beneath the support for arresting the support in its movement with the said die member towards the work, whereby the die
80 member will be permitted to move towards the work independently with respect to the said die member, and an exhaust passage having its inlet above and adjacent the burner for conveying away excess heat.
85

In testimony whereof I have signed my name to this specification, on this 7th day of December, A. D. 1926.

FREDRICH J. RODE.