No. 622,282. Patented Apr. 4, 1899.

C. N. SMITH.

METAL PLATE BENDING MACHINE.

(Application filed May 10, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

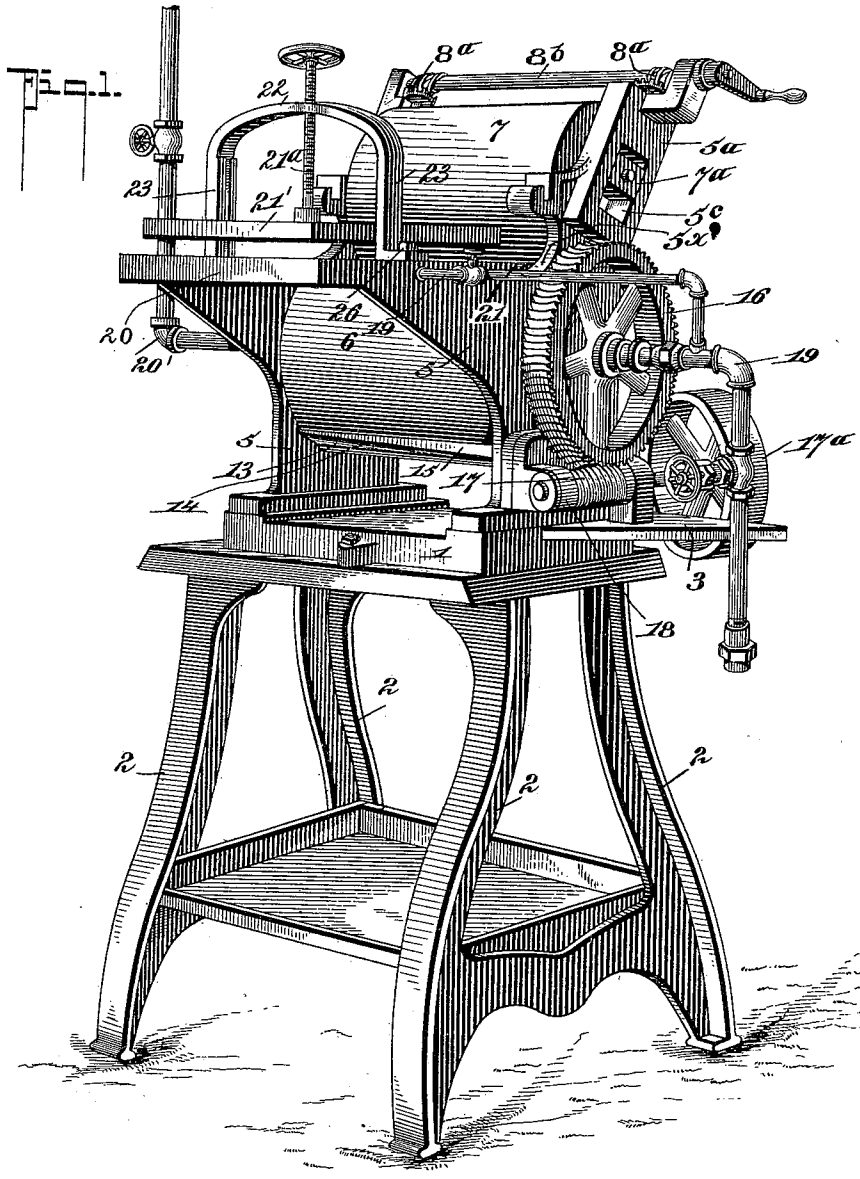
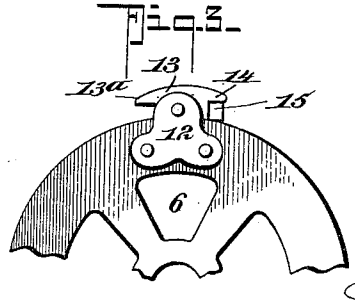


Fig. 3.



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Fig. 2.

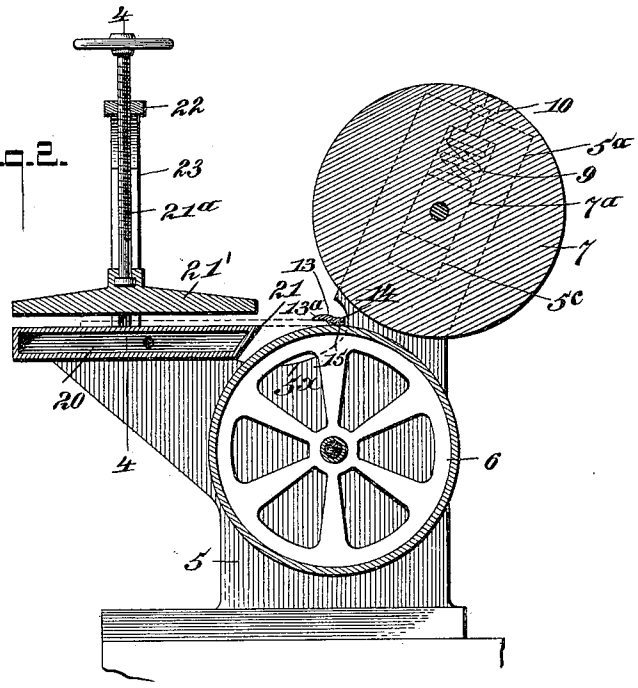


Fig. 4.

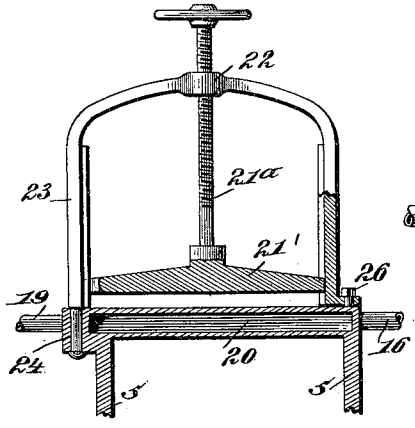
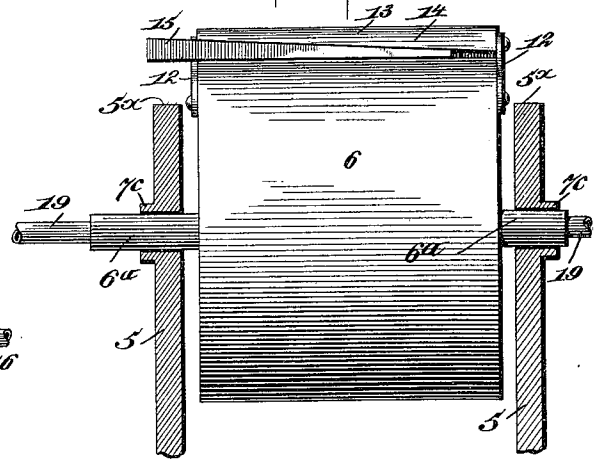


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHRIS N. SMITH, OF ELGIN, ILLINOIS.

METAL-PLATE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 622,282, dated April 4, 1899.

Application filed May 10, 1898. Serial No. 680,298. (No model.)

To all whom it may concern:

Be it known that I, CHRIS N. SMITH, residing at Elgin, in the county of Kane and State of Illinois, have invented a new and Improved Metal-Plate-Bending Machine, of which the following is a specification.

This invention has for its purpose to provide a machine for bending metal plates—such as, for example, stereotype, zinc, copper, letter, or cut plates for rotary printing-presses—and it seeks to provide a machine of this character numbering among its characteristic features simplicity of construction, stability, effectiveness in use, and including the no less desirable quality of bending plates quickly and uniformly and without the least danger of injury to their faces.

This invention also comprehends a novel and simple means for quickly detaching and connecting the plates to the bending mechanism and also for adjusting the pressure and softening the plates to render them sufficiently pliable to obtain the results desired.

This invention also has for its purpose to provide an initiatory heating means, whereby the plate is thoroughly heated before it is subjected to the bending action to render it the more pliable and admit of a more uniform bending thereof with a minimum danger of affecting their faces or rendering them irregular in any shape.

In its subordinate features this invention comprises certain novel details of construction and peculiar combination of parts, such as will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a machine constructed in accordance with my invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a detail view of the face of a part of the combined bending and heating roll and the plate-holder device. Fig. 4 is a transverse section on the line 4 4 of Fig. 2. Fig. 5 is a detail view illustrating the corelation of the heating-roll and the holder device and a portion of the frame.

In its general features my invention embodies a suitable stand or frame, on which is mounted a pair of rolls, one of which is rotated by direct drive-power, while the other is rotated by frictional contact, the latter being also adjustable in relation to its opposing roll, whereby to regulate the pressure on the plates to be bent. One or both of the rolls are made hollow or provided with an annular internal steam or heat space, whereby the outer face of the rolls can be kept hot, heating the electrotype or other metal plate held thereon to render them sufficiently pliable to the more readily and uniformly bend, one of such rolls, preferably the lower or directly-driven one, having conveniently-arranged means for detachably securing the plates thereto, which can be readily adjusted without requiring any special manipulation of the rolls or drive means and the construction of the supporting-frame. In the practical use of metal-plate-bending means of this character comprising substantially a pair of rolls, one or both of which are heated, it has been found that the results have not been entirely satisfactory, for the reason that unless the plates are sufficiently heated and rendered pliable to a certain degree as they pass between the rolls the bending operation is not entirely uniform or of such character as to produce a plate having uniform curvature and its front or print face left in a condition to make such imprints as is required. To overcome this objectionable feature, I have provided in connection with the combined bending and heating rolls a supplemental support in the nature of a steam-chest, which is arranged in advance of the bending-rolls and which forms a support upon which to lay the plate preparatory to clamping it to the carrier-roll and which also serves to heat such plate to render it sufficiently pliable to accurately and quickly bend as it is passed between the bending and heating rolls.

Referring to the accompanying drawings, in which like numerals indicate like parts in all the figures and in which is shown a preferred construction of mechanism embodying my improvements, 1 indicates a bed-frame having suitable supporting-legs 2 and at one end a lateral extension 3, the purpose of which will presently appear. Upon the bed-frame is mounted a subframe comprising the opposing ends 5 5, the upper portions of which pro-

ject at an angle of approximately thirty degrees from the lower or body portion 5, as clearly shown in Fig. 2.

6 indicates what I term the "main" or "bending" roll or cylinder, which is made hollow, as shown, or with an annularly-disposed heat-space (not shown) and has hollow trunnions 6^a 6^a, which communicate with the interior heat-space of such roll, said trunnions being journaled in bearings 7^c, fixedly held on the lower or body portion 5 of the end supports, whereby the roll can be held to turn in a fixed position.

7 indicates a presser-roll which is journaled in bearings 7^a, held in the slideway 5^c in the upper diagonal extension 5^a and adjusted either by direct adjusting means, (illustrated in Fig. 1,) consisting of a feed-screw having a gear cut to mesh with a worm-gear 8^a on the hand-operated drive-shaft 8^b, or such device may be of the nature of spring-presser followers, as shown in Fig. 2, which consist of stout springs 9, held in the slideway 5^c, and the hand-regulated tension devices 10, it being obvious that any means for adjusting the upper roller may be provided, and such means may have yielding or unyielding bearings, as may be desired.

When the spring devices are used, the upper roll serves constantly as a combined guide and presser roll; but when the adjusting means shown in Fig. 1 is used such roll serves more in the nature of a fixedly-held guide-roll.

As will be clearly seen in Fig. 2, the upper roll 7 is held to oppose the lower roll not directly from its center, but diagonally and to the rear thereof. The purpose of so arranging the upper roll is to admit of the employment of a horizontally-disposed steam-chest 20, the inner edge 21 of which projects over the front face of the lower roll, its upper face being in the same plane as the upper edge of the said lower roll and in such close relation thereto that the plate will readily slip off the steam-chest or horizontal support when the plate is drawn forward after it has been clamped to the aforesaid lower roll.

By providing a heated supporting member in advance of the lower roll it is manifest that the plate can be readily pushed forward to engage the clamp devices, presently referred to, and its free end be supported whereby to take off any undue lateral or pull strain on the clamp devices, it being obvious that as the lower roll is rotated forward the forward portion of the plate will be bent as the rear or front end is drawn forward in a horizontal plane and out of engagement with the said roll, thereby positively relieving the clamp from back-pull strain, which might cause the plate to become detached from the clamp in part or in whole and become uneven and irregularly bent.

The clamp devices are relatively so arranged in relation to the lower or heating roll of the frame that the same can be quickly and conveniently removed and applied. For this purpose the lower or directly driven roll has side bearings 12, in which is held a rocker-clamp 13, the front end of which terminates in a clamping lip or flange 13^a, while the rear edge has a longitudinally-extending wedge-flange 14, dovetailed in cross-section, to receive a correspondingly-shaped wedge-key 15, as clearly shown in Fig. 5, by reference to which it will be observed that when the lower roll is turned to bring the clamp 13 in line with the cut-away portion $5^\times$ of the end members of the frame 5 the wedge-key can be quickly and conveniently drawn out endwise.

The main roll 6 is driven by suitable gear—as, for example, a large worm-gear 16, held to mesh with the horizontal worm-shaft 17, journaled on the bearing 18 on one of the end frames 5, and a journal-post on the lateral extension 3 of the bed-frame, one end of the shaft having a drive-pulley 17^a.

One of the hollow trunnions 6^a of the roll 6 connects with the steam-pipe 19, while the other trunnion has a valve-offtake 20′.

In connection with the combined horizontal support and steam-chest is used a vertically-reciprocating presser-follower 21′, which serves to hold the plate flatly down against the steam-chest as it receives its initiatory heat to prevent buckling or warping and also to form a suitable detent or guide for holding the rear end of the plate in a proper horizontal longitudinal alinement as it is being drawn forward by the carrier or lower roll face. The presser-follower 21′ has a screw-shank 21^a, operating in the bridge-piece 22 on the straddle-frame 23, one leg of which is journaled in a bearing portion 24 of the steam-chest or horizontal support, while the other has an angle member adapted to engage with a lock-nut 26, which when loosened will admit of the bridge-frame, together with the presser-follower, being swung to one side, such operation being necessary to admit of the plate being laid upon the steam-chest or horizontal support.

I am aware that it is not new to bend metal plates by pressing them between rollers and heating one or both of such rollers as the plate is being bent. This I do not claim. My invention differentiates from such form of heating and bending mechanism, first, in providing a means for heating the plates before they are entered between the rolls; second, for holding such plates from buckling or warping as they just receive an initiatory heating; third, in providing a support for the free end of the plate to relieve the clamp from pull or twist strain; fourth, in providing a peculiarly-arranged clamping mechanism for engaging and holding the plate and relieving such clamping means from undue lateral or pull strain, and, fifth, in the general relation of the several parts, whereby the advantageous results specified are attained.

In operation the presser devices over the steam-chest are swung to one side and the plate on such chest and the presser devices

being then turned back and adjusted to hold the plate securely down against the steam-chest. After the plate has been sufficiently heated the presser-plate is slightly released and the end of the plate pushed forward and made fast by means of the clamping devices to the lowermost or carrier roll, which as it is rotated forward serves to pull the plate between the presser-roll 7, the end of such plate being held from either dropping down or flying upward by reason of its engagement with the top of the steam-chest and the follower 21'.

It will be noted that no special adjustment or detachment of any of the parts of the machine is necessary other than the adjustment of the wedge-key and the throwing back and forward of the initial presser devices, it being also clear that as the plate is rendered pliable before it engages the hot roll, which roll is slowly turned, such plate will be easily bent with uniformity and without danger of distorting or otherwise mutilating its face.

While I have described that the steam-support on which the plate is laid is in the nature of a steam-chest and that the lower roll be heated by steam, it is obvious that, if desired, the lower roll, as also the fronts or support, may be heated by electrical or other means.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the combined heating and bending rolls, the lowermost one of such rolls having clamp devices for gripping the front edge of the plate; of a support held in advance of such rolls and means for keeping such support hot; and vertically and laterally adjustable presser devices for holding the plate down on the said supports, substantially as shown and for the purposes described.

2. The combination with the combined heating and bending rolls, of the supplemental combined heating and supporting member arranged in advance of the bending and heating rolls, and a presser mechanism comprising a follower and guide-frame therefor, said frame being pivotally connected to the supplemental heating support to swing laterally thereover, substantially as shown and for the purposes described.

3. In a plate-bending machine as described, in combination; with the frame and the lower roll journaled therein with its peripheral edge projected beyond the front edge of its end bearings; of the clamping means consisting of ears fixedly secured to the opposite edges of the lower roll; a rocker-clamp journaled in such ears, having a grip or clamp-lip at one edge and having its opposite edge provided with an undercut wedge-groove, and a wedge-key endwise movable in such groove, as specified.

4. In a machine as described; a combined presser and bending roll, having plate-clamping means, said means consisting of a rocker-clamp journaled transversely on the peripheral face of such roll, said clamp having a gripping-lip at one edge, and an undercut wedge-groove on its opposite edge, and a wedge-key endwise movable in such groove, as specified.

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