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APPARATUS FOR EMBOSSED SHEET METAL SECTIONS

Filed March 28, 1940

2 Sheets-Sheet 1

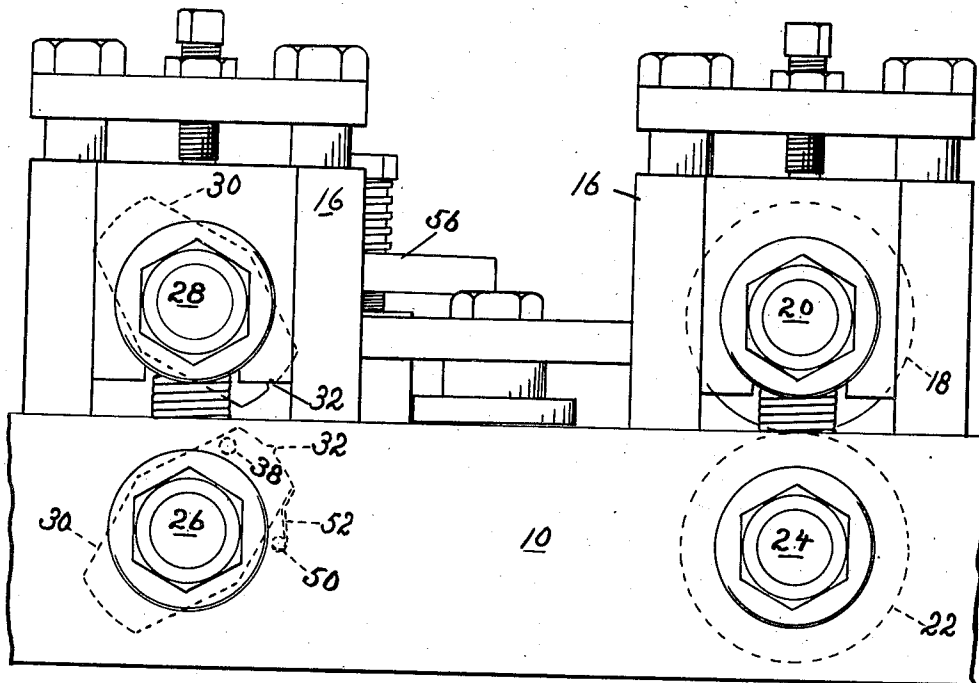


FIG. 1

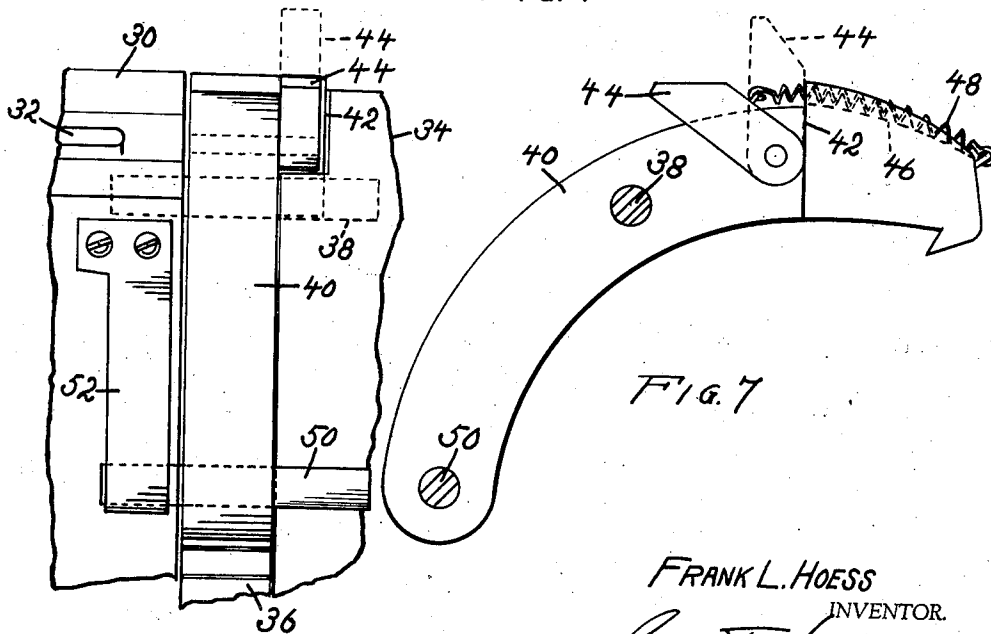


FIG. 6

FIG. 7

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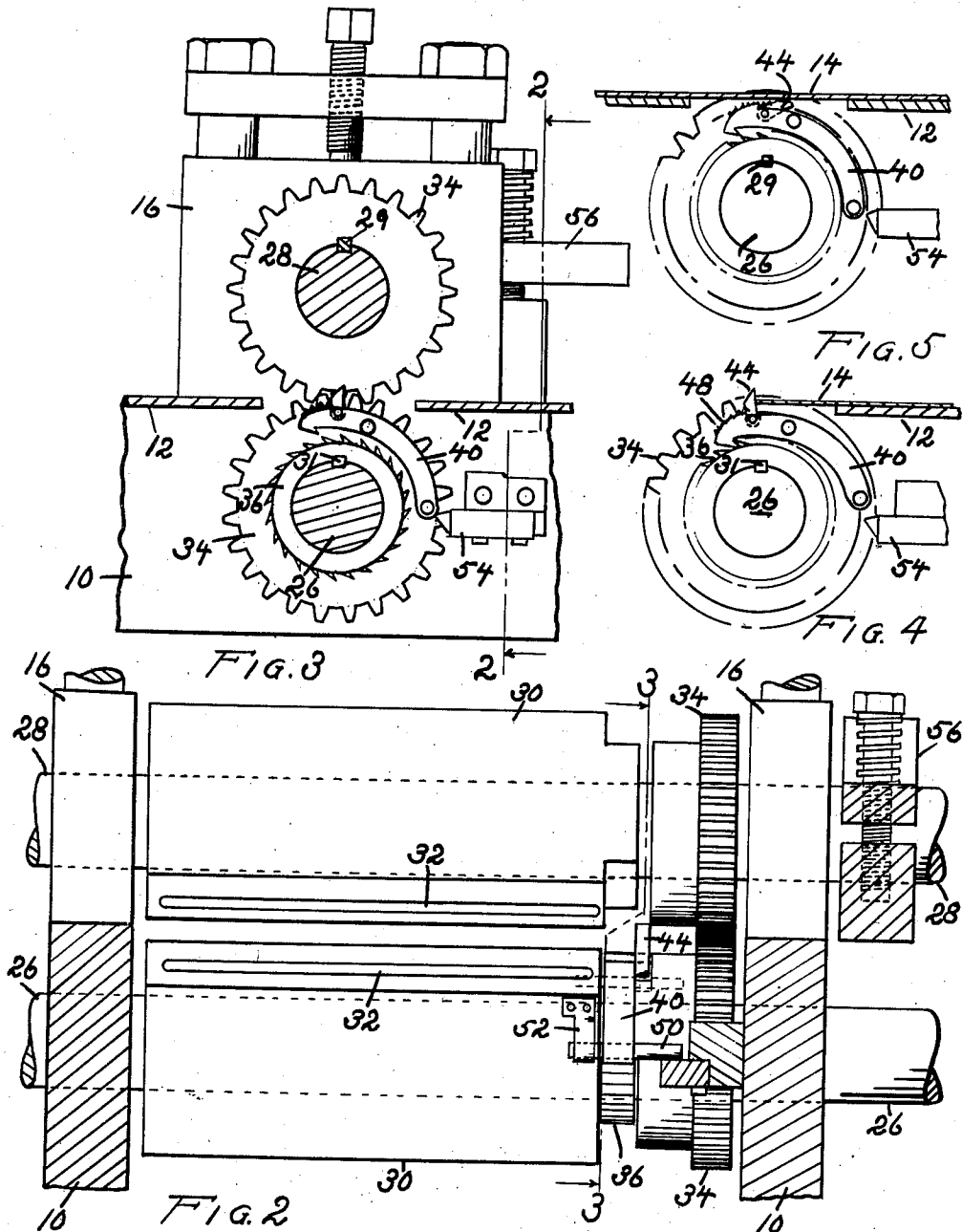
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APPARATUS FOR EMBOSSEING SHEET METAL SECTIONS

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6 Claims. (Cl. 153—77)

This invention relates to an improved apparatus for embossing sheet metal sections. The apparatus may be associated with and become a part of a forming mill, as disclosed in my co-pending application, Serial No. 274,941, filed August 19, 1939.

The improved device of this invention is adapted to be associated with a forming mill in such a manner that material may be embossed transversely of its passage through the mill. Thus, material fed into the mill may be formed longitudinally and transversely during a single passage therethrough. The sections of material thus formed are especially adapted for use in covering sides and roofs of buildings.

One of the principal objects of advantage and importance of the improved apparatus of this invention is the provision of means for embossing sections of metal, especially transversely of their direction of travel.

Another and further object of advantage and importance resides in the provision of means for operating the improved apparatus as the leading edge of the section being passed through the apparatus reaches a predetermined point or contacts a certain portion of the structure.

Still another and further object of advantage and importance is the provision of means for arresting the movement of the cooperative embossing members at a given point after each embossing operation is completed.

A still further object of advantage and importance resides in the provision of means for allowing the intermediate and trailing portions of the material to pass through the apparatus while the embossing elements thereof remain stationary.

Additional objects of advantage and importance will become apparent as the following detailed description progresses, reference being had to the accompanying drawings, wherein

Fig. 1 is a side elevational view of a fragmental portion of a forming mill showing an embossing apparatus which embodies the invention associated therewith.

Fig. 2 is a vertical section taken on line 2—2 of Fig. 3, looking in the direction indicated by the arrows.

Fig. 3 is a vertical section taken on line 3—3 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 4 is a sectional view of a portion of the apparatus showing the forward end of the operating pawl depressed.

Fig. 5 is a similar section showing the forward

end of the pawl raised and the tripping dog broken rearwardly.

Fig. 6 is a slightly enlarged rear elevational view of the pawl with the tripping dog broken rearwardly.

Fig. 7 is a slightly enlarged side elevational view of the pawl, as shown in Fig. 6.

As shown in the drawings:

The reference numeral 10 indicates generally the frame or bed of a metal forming machine. The bed 10 preferably includes spaced parallel side members which extend from one end of the machine to the other.

Positioned between the spaced parallel side members of the bed 10 are floor or guide members 12. The floor members 12 are adapted to support and guide sheet metal sections 14 passing through the machine.

Secured to the side members of the bed 10 at spaced intervals are adjustable bearing blocks 16. The bearing blocks 16 are aligned both transversely and longitudinally.

In the forming portion of the machine suitable forming rolls 18 are positioned on the upper shafts 20 which are journaled in the adjustable bearing blocks 16. Cooperative forming rolls 22 are mounted on the lower shafts 24 which are journaled in the side members of the bed 10. The upper and lower shafts 20 and 24 respectively, and also the upper and lower rolls 18 and 22 respectively are in vertical alignment. The shafts 20 and 24 are geared together for movement in unison. The shaft 20 is adapted to rotate clockwise and the shaft 24 rotates anticlockwise.

Journaled in the side members of the bed 10 is a driven shaft 26. The shaft 26 is in alignment with the lower shaft 24. Positioned thereabove and journaled in two of the adjustable bearing blocks 16 is a shaft 28. The shaft 28 is in alignment with the upper shafts 20. The shafts 26 and 28 are in vertical alignment.

Positioned on each shaft 26 and 28 is a member 30 each of which is adapted to carry one of a pair of coacting embossing dies 32. The embossing dies 32 are removably secured to the members 30, thus may be removed or replaced at will.

Positioned on each shaft 26 and 28 is a gear 34. The gears 34 are operably associated for movement in unison as is clearly shown in Figs. 2 and 3.

The upper member 30 and the upper gear 34 are preferably fixed to the upper shaft 28 by means of a key 29. The upper shaft 28, the gear

34, and the member 30 rotate in unison. The member 30 and the gear 34 are not keyed or otherwise fixed to the lower shaft 26. The lower shaft 26 may rotate independently of the member 30 and the gear 34.

Positioned on the lower shaft 26 and fixed for rotation therewith by means of a key 31 is a ratchet gear 36. The ratchet gear 36 is preferably positioned intermediate the lower gear 34 and the lower member 30.

Secured to the lower gear 34 and extending into an aperture in the lower member 30 is a pin 38. The pin 38 serves as a means for joining the gear 34 and the member 30 for rotation together.

Rockably positioned on the pin 38 intermediate the gear 34 and the member 30 is a segmentally shaped pawl 40. The undersurface of the leading end of the pawl 40 is shaped for engagement and association with the teeth of the ratchet gear 36, as is clearly shown in the drawings.

Formed near the front end of the pawl 40 is a vertical shoulder 42. The horizontal thickness of the pawl 40 at the shoulder 42 is greater than the thickness of the pawl at any other point.

Pivotally secured to the pawl 40 rearwardly of and closely adjacent the shoulder 42 is a tripping dog 44. The forward edge of the tripping dog 44 is adapted normally to engage the rear surface of the shoulder 42. It will be apparent that the tripping dog may be swung on its pivot rearwardly, but that movement of the dog in a forward direction is barred by the shoulder 42.

Formed in the upper portion of the pawl 40 and extending from the shoulder 42 forwardly thereof is a spring receiving groove 46. The groove 46 is adapted to maintain a spring 48 in proper operating position. The spring 48 is secured to the forward end of the pawl 40 and extends and is secured to the tripping dog 44. The function of the spring 48 is to urge the tripping dog 44 into an upright position with the leading edge thereof in engagement with the rear surface of the shoulder 42. However, the spring 48 allows the tripping dog 44 to be pivoted or broken rearwardly to allow material 14 to pass thereover, as is best shown in Fig. 5.

Secured to the pawl 40 closely adjacent the trailing end thereof is a pin 50. The pin 50 is positioned at right angles to the pawl 40 and extends a considerable distance each side thereof as is best shown in Figs. 2 and 6.

Secured to the lower member 30 is a leaf spring 52. The free end of the leaf spring 52 is curled around the pin 50 as is best shown in Fig. 6. The leaf spring 52 functions to urge the trailing end of the pawl 40 toward the lower shaft 26 and the leading end of the pawl away from the ratchet gear 36. However, the tension on the spring 52 is not sufficient to disengage the leading end of the pawl from the ratchet gear 36 when the two are operably engaged.

Adjustably secured to the inner surface of one of the side members of the bed 10 is a releasing member 54. An end of the releasing member 54 is positioned to be engageable with a portion of the pin 50. The engagement between the releasing member 54 and the pin 50 rocks the pawl 40 on the shaft 38. By this action the trailing end of the pawl 40 is forced toward the shaft 26 and the leading end thereof is moved outwardly from the ratchet gear 36. Operative engagement between the ratchet gear 36 and the pawl 40 is thus terminated.

Operably positioned on the shaft 28, as is best shown in Figs. 2 and 3, is an adjustable brake assembly 56. The brake assembly 56 may be adjusted and set to produce accurate stopping of the members 30 when the pawl 40 is disengaged from the ratchet gear 36.

In operation materials, such as sections of sheet metal, are adapted to be passed from right to left through the improved machine, as shown in Figs. 1, 3, 4, and 5. The members 30 and the coacting embossing dies 32 are normally positioned at a starting point as shown in Fig. 1. As the leading edge of the material passes between the embossing dies, it engages the tripping dog 44. By reason of the continued forward movement of the material 14 as it engages and pushes the tripping dog 44 the leading end of the pawl 40 is depressed sufficiently to engage the ratchet gear 36. The constantly moving ratchet gear 36 through the pawl 40 moves the members 30 and the coacting embossing dies 32 through the embossing operation. This operation consists of moving the embossing dies at the same rate of speed and with the material being embossed, from their starting points into and out of coacting association with the said material therebetween.

After the embossing operation is finished, the embossing dies 32 are returned to their respective starting positions. As the embossing dies 32 near their starting positions, the pin 50 on the trailing end of the pawl 40 engages the releasing member 54. This engagement between the member 54 and the pin 50 forces the trailing end of the pawl inwardly and thus disengages the leading end of the pawl from the ratchet gear 36. The brake 56 arrests movement of the gears 34, the members 30, and the embossing dies 32, promptly after the pin 50 has cleared the releasing member 54. Kinetic energy carries the pin 50 beyond and clear of the releasing member 54.

As the coacting dies arrive at their starting position, the tripping dog 44 engages the undersurface of the material passing through the device. This engagement between the dog 44 and the surface of the material 14 forces the dog 44 to pivot downwardly and rearwardly. The dog 44 is maintained in depressed position as long as the undersurface of the material is in engagement therewith, but as the trailing edge of the material 14 clears the dog 44, the spring 48 moves the dog 44 into an upright position. With the passing of the trailing end of the material 14 the entire embossing mechanism is ready for another embossing operation. Thus, sections of material may be passed through the improved embossing device in rapid succession.

It will be apparent from the foregoing that herein is provided an improved machine for economically and efficiently embossing metal strips. It will also be apparent from the foregoing that herein is provided an improved and efficient device for embossing material that may be associated with and become a part of a forming mill or may be employed separately by itself.

It will be apparent to those skilled in the art to which the improved device of this invention appertains, that numerous changes and alterations covering a wide range may be made without departing from the scope or spirit of this invention. Accordingly, it is understood that the patent granted hereon is not to be limited to the specific embodiment here shown nor in any other manner except as is necessitated by the termi-

nology of the appended claims when given the range of equivalents to which they may be entitled.

I claim as my invention:

1. In an apparatus of the kind described, a frame, a pair of shafts journaled in said frame, said shafts being parallel and being positioned one above the other, an embossing die carrying member positioned on each shaft, longitudinal portions of the peripheral surfaces of said die carrying members being transversely restricted, co-acting embossing dies positioned on said members, said die carrying members being geared together for synchronous movement, one of said shafts being adapted to be driven continuously, said continuously driven shaft being movable independently of the die carrying member positioned thereon, a ratchet gear fixed to said continuously driven shaft and rotatable therewith, a pawl fixed to the die carrying member positioned on said continuously driven shaft, said pawl being operably engageable with said ratchet gear, a tripping dog pivotally secured to said pawl to describe an arc rearwardly in respect to said pawl to permit the continued feeding of material between the die carrying members after the pawl and dog have come back to the starting position, means for normally maintaining said dog in an upright position, means preventing said pawl from describing an arc forwardly in respect to said pawl, said tripping dog providing means whereby said pawl may be moved into operable engagement with said ratchet gear, means for terminating the operable association between said pawl and said ratchet gear at a predetermined point of their travel, and frictional means for arresting the movement of the embossing die carrying member after said pawl and said ratchet gear have been disengaged, the restricted portions of the peripheral surfaces of said die carrying members forming a space through which the moving material may continue to pass after the die carrying members have been stopped.

2. In an apparatus for embossing sheet metal sections, a pair of intermittently operable co-acting embossing dies, said co-acting embossing dies being synchronized so that a given point of the surface of one die is opposed to a given point of the surface of the other die during each successive operation, the peripheral surfaces of said dies being formed with radially restricted portions to provide a passageway therebetween when said dies are in starting position, means operable by the leading portion of a sheet metal section being passed through the apparatus for actuating said embossing dies, said last named means including a tripping dog disposed vertically in the path of travel of said section, said tripping dog being pivoted to describe an arc to the rear in respect to the direction of travel of a section being embossed and by engagement with the bottom surface of said section be maintained therebeneath to permit the continued feeding of a section between the embossing dies after said tripping dog has come back to the starting position, and spring means for moving said tripping dog forwardly into vertical position as the trailing end of said section passes said tripping dog.

3. In an apparatus of the kind described; a pair of intermittently operable, coacting, embossing rolls; said rolls being formed with interengaging peripheral portions which in operation emboss a portion near the forward end of a strip of metal and radially restricted peripheral portions to permit the trailing portion of said strip to continue

to be fed between the rolls without being embossed; means external of said coacting rolls for feeding strips of metal therebetween; means for moving said rolls from their starting point through an embossing operation and back to their starting point; said last named means including a clutch mechanism actuated by the leading edge of a strip of material passing through the apparatus; said clutch mechanism being secured to and rotatable with one of said coacting rolls; and automatic means for providing a single revolution of the rolls after said clutch has been actuated; said rolls being stopped without interfering with the travel of the strip between said rolls; said last named means including a friction brake and a clutch disengaging member; said clutch disengaging member being fixed to the apparatus closely adjacent the starting point of the roll to which the clutch mechanism is secured.

4. In an apparatus of the kind described; a pair of intermittently operable, coacting, embossing rolls; said rolls being formed with interengaging peripheral portions which in operation emboss a portion near the forward end of a strip of metal and with radially restricted peripheral portions to permit the trailing portion of said strip to continue to be fed therebetween without being embossed; means external of said coacting rolls for feeding strips of metal therebetween; means for moving said rolls from their starting point through an embossing operation and back to their starting point; said last named means including a clutch mechanism actuated by the leading edge of a strip of material passing through the apparatus; said clutch mechanism being secured to and rotatable with one of said coacting rolls; said clutch mechanism including a pawl rockably secured to one of said rolls; said clutch being engaged by having the forward portion of said pawl depressed; the forward portion of said rockable pawl being depressed by the forward portion only of a strip being fed into the apparatus; and means for arresting the movement of said rolls and said pawl when they have made a single revolution and have returned to their respective starting points; said last named means including a friction brake and a clutch disengaging member; said clutch disengaging member being positioned to engage and depress the trailing end of said rockable pawl.

5. An apparatus for embossing portions of sheet metal strips said apparatus including a pair of coacting, intermittently operable, embossing rolls; said rolls being formed to provide a passageway therebetween when said rolls are in the starting position; said rolls having coacting parts adapted to engage and emboss material when said rolls are in operation; clutch means for moving said rolls from the starting point through an embossing operation and back to the starting point; a clutch operating member interposed in the path of travel of material being fed between the rolls prior to each embossing operation; means for permitting the clutch operating member to be moved out of the path of travel of material when the embossing rolls return to the starting position after an embossing operation to permit the trailing end of material to continue to be fed between the rolls while said rolls are inoperative; and spring means for moving the clutch operating member into the path of travel of the next section of material after the trailing end of the first section of material clears said clutch operating member.

6. In an apparatus for embossing portions of

sheet metal sections; a pair of intermittently operable, coacting embossing rolls mounted to operate on independent axes; said axes being fixed to maintain the distance therebetween constant; said rolls being geared together for synchronous movement; corresponding portions of the peripheral surfaces of said rolls being irregularly shaped; means for moving said rolls from their starting point through an embossing operation and back to their starting positions; said means including a clutch assembly in operable association with one of said embossing rolls; a clutch actuating member operably secured to said clutch; said actuating member being mounted to be held

out of the line of travel of material passing between the rolls after said rolls have returned to their starting point to permit the continued feeding of a sheet metal section between the stationary rolls; spring means for moving the actuating member into the line of travel of oncoming material when the trailing end of the embossed strip clears said actuating member; and means for arresting the movement of said rolls when they are returned to their respective starting points, the irregularly shaped portions of said rolls providing an unobstructed passageway between the rolls when said rolls are in the starting position.

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