R. S. SMITH.

MAGNETIC FEEDING DEVICE FOR BLANKING PRESSES.

APPLICATION FILED JUNE 9, 1919.

1,343,648. Patented June 15, 1920.

Fig. 1

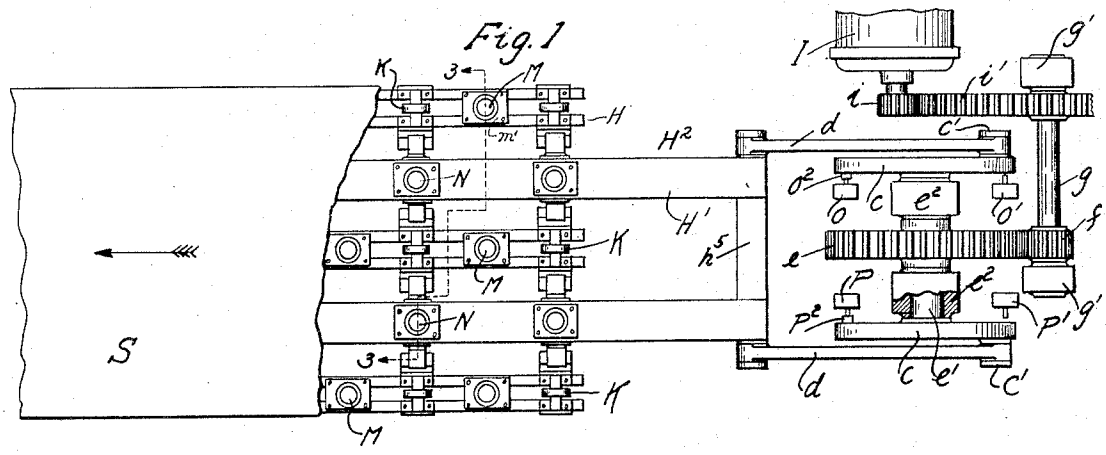


Fig. 2

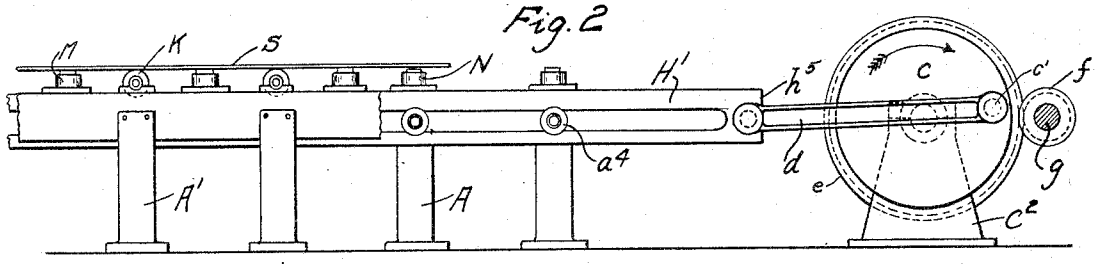


Fig. 3

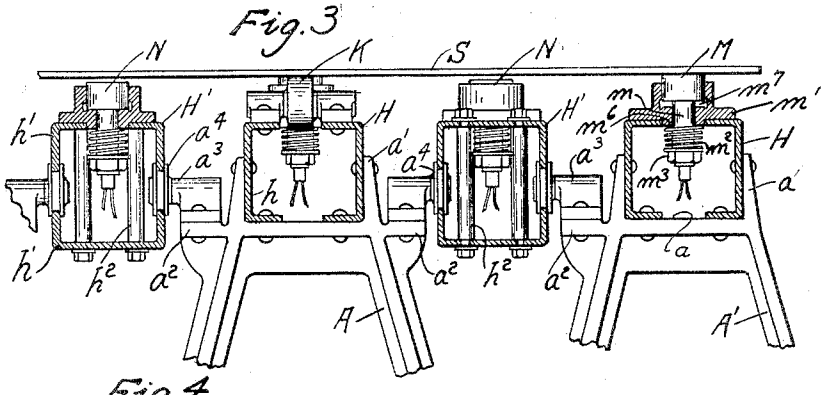
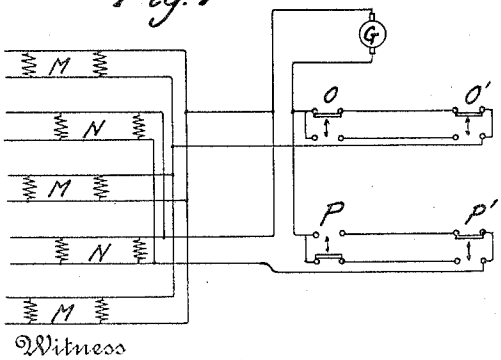
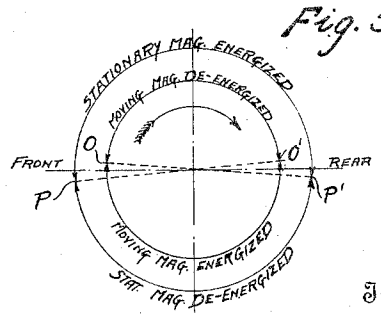


Fig. 4



Witness

Fig. 5



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UNITED STATES PATENT OFFICE.

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MAGNETIC FEEDING DEVICE FOR BLANKING-PRESSES.

1,343,648. Specification of Letters Patent. **Patented June 15, 1920.**

Application filed June 9, 1919. Serial No. 302,776.

To all whom it may concern:

Be it known that I, REUBEN STANLEY SMITH, a citizen of the United States, residing in the city of Milwaukee, county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Magnetic Feeding Devices for Blanking-Presses, and do declare that the following is a full, clear, and exact description thereof, such as will enable persons skilled in the art to which the invention pertains to make and use the same, reference being had to the drawings hereto attached for disclosure as to details of construction and arrangement of my improvement.

This invention relates to a device for conveying materials. It comprises means for moving a sheet metal plate a predetermined distance in the operation of feeding such metal plates to a blanking press, which punches out of the said plate, the desired blanks, or other articles, such feeding continuing step by step, until the plate is passed entirely through the blanking press, and all available areas thereof are utilized.

The machine embodying this my present invention is designed to form an element of the assemblage of machines disclosed in my pending application Serial No. 212,934, filed Jan. 21, 1918, such assemblage including machines which by their related and successive operations, punch from metal sheets the side and cross bar and other blanks used in constructing an automobile or other vehicle frame, shape such blanks according to the particular requirements pertaining to each, perform the necessary milling operations thereon, assemble the several constituent parts, and secure all of such parts in their respective positions, so that in a continuous operation of mechanical devices a completed automoble or other vehicle frame is automatically produced.

The invention resides in a structure having a novel arrangement of electro-magnets, of which there are two series, one of such series being movable at times to feed the sheet metal plate into the blanking press, and the other series of which magnets is stationary, the last mentioned series of magnets acting to hold the sheet metal plate in the position to which it has been moved by the first series of magnets and during the blanking operation.

Devices have been provided whereby the electromagnets are energized and deënergized in regular timed alternation, the movable magnets being energized at the commencement of their movement into the machine to attach themselves to the sheet metal plate and impart a feeding movement to the plate. At the conclusion of the feeding movement, the movable magnets are deenergized to release the sheet metal plate to the influence of the stationary magnets, which latter magnets are energized at the moment and serve to hold the plate in the position to which it has been moved by the first named magnets, and during the resumption by the movable magnets of their position to perform another feeding operation.

In my construction the magnets of each series are shifted into the plane in which they are effective, upon magnetization; and are automatically withdrawn from such plane upon de-magnetization. Novel circuit making and breaking devices for the electromagnets have been provided.

My invention will be more clearly understood by reference to the accompanying drawings, in which:—

Figure 1 is a plan view of my conveyer and its actuating mechanism, a sheet metal plate, partly broken away, being in position thereon.

Fig. 2 is a view in side elevation of the arrangement shown in Fig. 1, a portion of the frame being broken away to show the mounting of the stationary and the movable housings.

Fig. 3 is a cross sectional view on the line 3—3, Fig. 1, showing, among other things, details of construction and the manner of mounting the stationary and movable magnets in their housings.

Fig. 4 shows diagrammatically the wiring employed in my machine.

Fig. 5 is a diagram of the cycle of movements of the cams for operatng the switches.

In the construction illustrated in the drawings, supporting standards A and A^1, having at their upper ends yokes formed by the top plate a and the side pieces a^1, are arranged in longitudinal order, and receive in their yokes the housings H. These housings are conveniently formed from two channel bars h, standing on edge, and riveted to the standards in the angles of the yokes. The bars h are arranged with their channels opposed, and are separated from each other a short distance to form at

their upper sides, a slot for the reception of supporting rollers K, disposed at measured points throughout the length of the housings H.

The rollers K projecting into the slots mentioned, are mounted on short shafts journaled in bearings on the upper part of the housings, and inasmuch as such rollers are distributed over the surface of several parallel housings, they serve to support throughout its dimensions the sheet metal plate S resting thereon, and by their free rotation, facilitate the movement of the sheet metal plate thereover, while the latter is being advanced, as hereinafter described.

The slots described as being formed by the juxtapositioning of the channel bars h, also receive stationary magnets M, arranged in alternation with the rollers K. As shown in Fig. 3, each of the stationary magnets M is provided with a stem m, which passes through an opening in a plate m^1, bolted or riveted to the housing H, the said plate m^1 having a rib m^6, upon its under side, to fit the slot formed in the top of the housing. An expansion spring m^2, is coiled about the stem of each magnet, and is confined between the rib m^6 and a nut m^3, threaded on the end of the said stem. The function of the spring is to withdraw the magnet from its elevated position into a recess m^7, formed in the top of the plate m^1. In such retracted position, the magnets of the series will rest in a plane slightly below the plane of the upper surface of the rollers K, and out of contact with the sheet metal plate resting upon the said rollers.

The standards A are provided near their upper ends with shoulders a^2, one on each side, and the two outside standards A^1, have a like shoulder on one side thereof. Secured upon each of the said shoulders is a bearing a^3, for a short shaft carrying at its outer end a flanged guiding roller a^4. A housing H^1, formed, like the housing H, of flange bars h^1, but one inverted over the other, spaced apart and secured together by shouldered bolts h^2, is mounted upon the guiding rollers a^4 of the two adjoining standards, so as to have longitudinal reciprocation, the said rollers a^4 being received in the slots formed by the separation of the channel bars. Magnets N, of like construction and mounted as are the magnets M, are fixed at desired points in bores in the top channel bar h^1 of the housing H^1.

A motor I drives a pinion i, which pinion engages a gear i^1, fixed upon a shaft g, mounted to rotate in suitable bearings g^1. Fixed also upon the shaft g, is a pinion f, intermeshing with a gear e, upon a shaft e^1, journaled in standards e^2. The shaft e^1 has fixed upon each end thereof, a crank disk c, carrying crank pins c^1 to which are connected links d. The other ends of these links d are connected to a cross bar h^5, which is attached to one end of the housing H^1, whereby the latter is longitudinally reciprocated by the rotation of the crank pins c^1. The plurality of housings H^1, constitutes a carrier H^2.

When a sheet metal plate S, is placed upon the machine, such plate rests upon the rollers K, and is out of contact with the magnets M and N, by reason of the retraction of the latter through the action of the expansion springs with which they are provided, as has been described.

The stationary magnets M, constituting one series, and the movable magnets N, constituting the other series, are successively and alternately energized and deënergized, in the operation of my invention. A sheet metal plate S, having been placed upon the rollers K, in position to be fed into a blanking press, the movable magnets N are energized by an electrical current from the generator G. At this time, the carrier H^2, is at its extreme position at the right, Figs. 1 and 2, the cranks have approached the rear or outer dead center, after crossing which they commence their inward or feeding throw. The gap between the magnets N and the sheet S is closed upon such energization, and the magnets are moved into engagement with the sheet, the springs m^2 coiled about the stems of the magnets being compressed by the movement of the magnets under the magnetic force thus created. Movement of the carrier H^2 and the magnets N, will now carry the plate S forward over the rollers K, a distance equal to the throw of the cranks. Upon the said cranks crossing their front or inner dead center, the movable magnets N are deenergized and are retracted to the plane slightly below the under surface of the sheet S, by the expansion springs m^2.

Just before the cranks reach the front dead center, the stationary magnets M are energized. In like manner and operation to that described with reference to the magnetic action of the movable magnets N, the magnets M are now engaged with the sheet S, to hold the said sheet fixed in the forward position into which it has been moved by the magnets N. The cranks continue their movement, and upon crossing their rear dead center, the stationary magnets M are deënergized and released from contact with the sheet S, and are retracted as before, through the means and in the manner described. As the cranks approach the rear dead center, the movable magnets N are again energized, to feed the sheet S forward a second step. The cycle of movements described will continue until the sheet S has been fed through the blanking press. The extent of the feeding movement of the plate

S, will depend upon the setting of the crank pins c^1 in their supporting disks c. It will be seen that both sets of magnets are energized during the time that the cranks are passing their dead centers, one set of magnets not releasing the plate until after the other set has taken hold thereof, and that the transfer is made at such times.

The circuit for controlling the action of the stationary or holding magnets M is provided with switches P and P^1, of the single push, double pole, double throw type, and like switches O and O^1, are provided for the circuit for controlling the action of the movable or carrier magnets N. One crank disk c is provided with a projecting wiper c^2, for actuating in succession the push buttons of the switches O—O^1, and the other crank disk c is likewise provided with a like projecting wiper p^2, for actuating in succession the push buttons of the switches P—P^1.

My invention may be varied in details of construction, without departing from the spirit thereof, and may be used for conveying and feeding materials other than metal plates, for instance, blanks and metal parts which are required to be subjected to machining or other operations.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:—

1. In a feeding mechanism, a fixed set of magnets and a movable set of magnets, in combination with means for moving the latter magnets toward and from the former, to advance a metal plate from one set of magnets to the other.

2. In a feeding mechanism, a fixed set of electro-magnets, a movable set of electro-magnets with actuating means for the latter, to move them to and from the fixed magnets, and devices for energizing the magnets of both sets in regular alternation.

3. In a feeding mechanism, a set of holding magnets and a set of carrying magnets, with devices for actuating the latter to move a plate magnetically attached thereto and deposit such plate upon the holding magnets.

4. In a feeding mechanism for presses, a series of rollers for guiding and supporting a metal plate, a set of fixed electro-magnets and a set of movable electro-magnets, the magnets of both sets resting normally below the plane of the metal plate supported by the rollers, means for energizing the sets of magnets in alternation to cause the movable magnets to carry the plate to the fixed magnets which hold the plate during the operation of the press, and actuating means for the set of movable magnets.

5. A transferring feeding conveyer comprising holding magnets and movable magnets, crank actuated means for the latter to deliver a plate or other metal part to the holding magnets, and means to energize the magnets in alternation to effect the transfer as the cranks cross their dead centers.

6. A transferring feeding conveyer comprising fixed devices for holding the work, movable magnetic devices for conveying the work to the holding devices, crank actuated means for the said movable devices, and connections whereby the transfer is made from the movable devices to the fixed holding devices as the cranks cross their dead centers.

7. A transferring feeding conveyer provided with devices for holding the work when presented thereto, movable magnetic carrier devices for the work, crank actuated means for operating the said movable devices to present the work for transfer to the holding devices, and actuating connections from the cranks to effect the transfer as the cranks cross their dead centers.

8. A step by step feeding mechanism for feeding metal plates to a blanking press, comprising a set of movable magnets with means for moving such magnets, a set of stationary magnets for receiving and holding the plate when fed to the press by the movable magnets, means for energizing the movable magnets during their feeding movement, and means for energizing the stationary magnets during the reverse movement of the movable magnets.

9. A feeding conveyer for blanking presses comprising a movable carrier provided with a series of magnets, means for reciprocating the carrier, a series of fixed or holding magnets, means for energizing the magnets of each series in alternation, and means for retracting the magnets of each series when deënergized.

10. A feeding conveyer for blanking presses comprising a movable carrier provided with a series of magnets, means for reciprocating the carrier, a series of fixed or holding magnets, and means for energizing the magnets of each series in alternation.

11. A transferring feeding conveyer provided with movable magnetic carrier devices for presenting the work to the holding devices, devices for holding the work when presented thereto by the said movable magnetic carrier devices, and actuating means for operating said movable carrier devices to effect the transfer of the work to the holding devices.

12. A transferring feeding conveyer provided with fixed devices for holding the work when presented thereto, movable magnetic carrier devices for presenting the work to the said holding devices, and actuating means for operating said movable carrier devices to effect the transfer of the work at the end of their throw.

13. In a blanking press, a series of rollers for supporting the blank, in combination

with a movable series of magnets, and means for moving them to feed the blank step by step into the blanking press, means for energizing the magnets in their feeding movement and for deënergizing the magnets at the end of such movement, and means for retracting the magnets when deënergized.

14. A step by step feeding mechanism for feeding metal plates to a blanking press, comprising a movable set of magnets with means for moving such magnets, a set of stationary magnets for receiving and holding the plate when fed to the press by the movable magnets, rollers for supporting the plates as fed to the press, means for energizing the movable magnets during their feeding movement, and means for energizing the stationary magnets during the reverse movement of the movable magnets.

15. A feeding conveyer for blanking presses comprising a series of rollers for sustaining the blank in the plane of its movement into the blanking press, in combination with a movable carrier and means for moving it to feed the blank to the press, said carrier being provided with a series of electro-magnets adapted to hold the blank in the feeding movement of the carrier, and means for deënergizing the said magnets at the end of such feeding movement.

16. A feeding conveyer for blanking presses comprising a series of rollers for sustaining the blank in the plane of its movement into the blanking press, in combination with a movable carrier and means for moving it to feed the blank to the press, said carrier being provided with a series of electro-magnets adapted to hold the blank in the feeding movement of the carrier, means for deënergizing the said magnets at the end of such feeding movement, and means for withdrawing the said magnets from the plane of movement of the blank.

17. A feeding conveyer for blanking presses comprising means for supporting the blank in the plane of its movement into the press, in combination with feeding devices comprising a movable series of magnets, means to energize the magnets to cause them to engage the blank during the feeding movement and to deënergize them at the end of such movement, and means for withdrawing the magnets from the plane of the blank when so deënergized.

18. A conveyer for feeding a metal plate to a blanking press, such conveyer comprising a movable series of magnets, means for energizing the magnets during their feeding movement and for deënergizing them at the end thereof, and means for retracting the magnets from the plane of the plate when deënergized.

In testimony whereof I have signed my name at Milwaukee, Wisconsin, this 5th day of June, 1919.

R. STANLEY SMITH.

Witnesses:
W. F. WOOLARD,
C. THEO. OSTERBERG.