March 25, 1924. 1,487,811

E. S. SAVAGE

FEEDING SHEETS

Filed Oct. 26, 1921 3 Sheets-Sheet 1

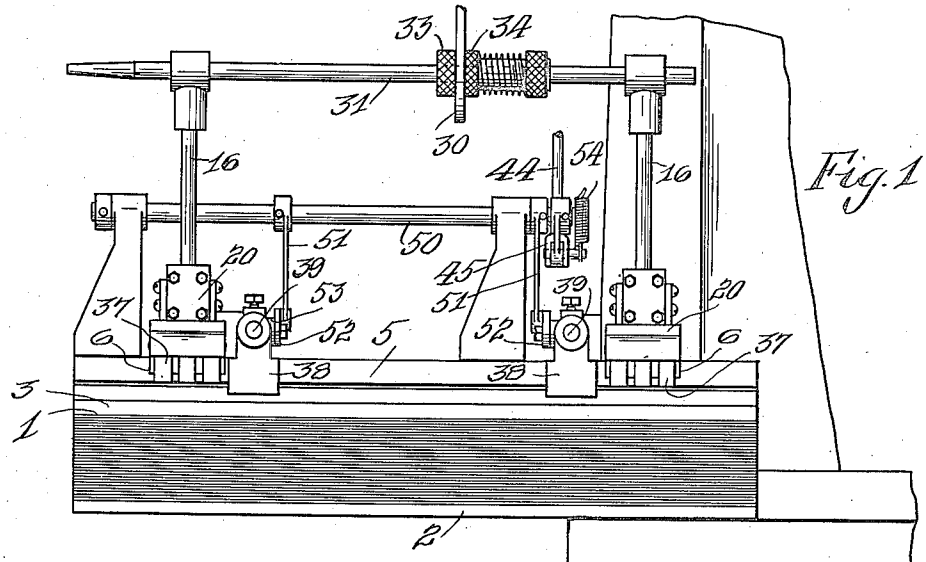


Fig. 1

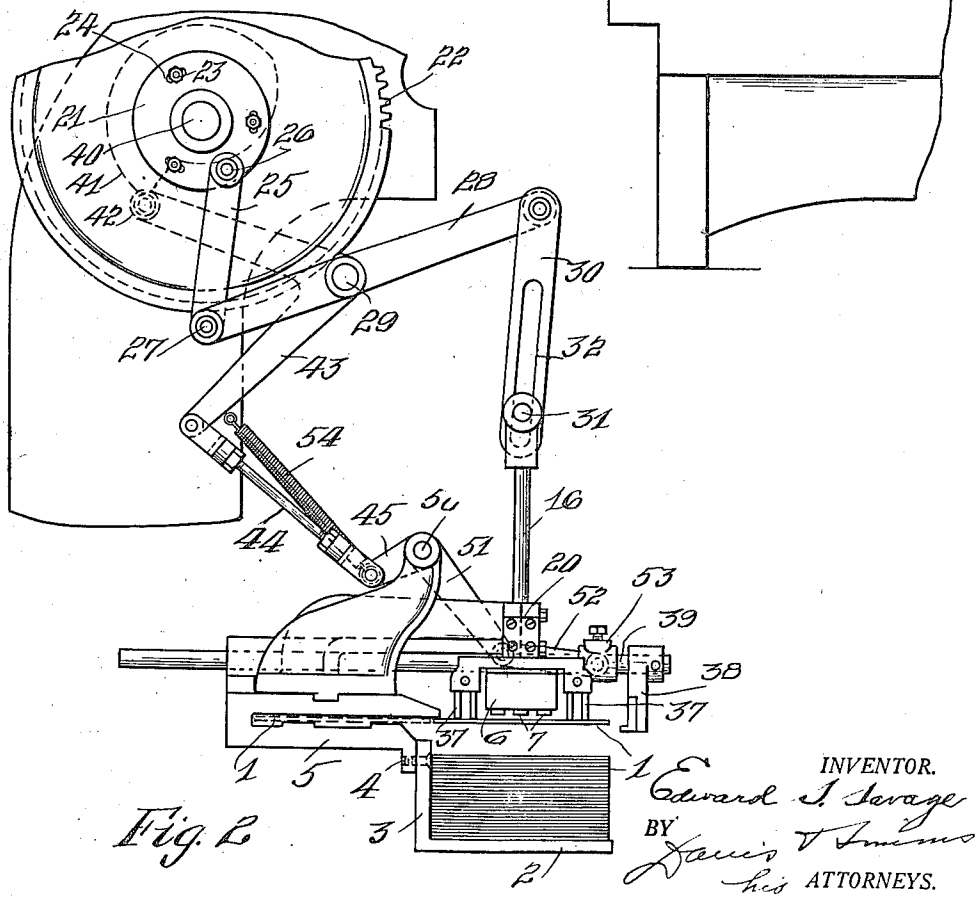


Fig. 2

INVENTOR.
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BY
Davis & Simmons
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E. S. SAVAGE

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Filed Oct. 26, 1921 3 Sheets-Sheet 2

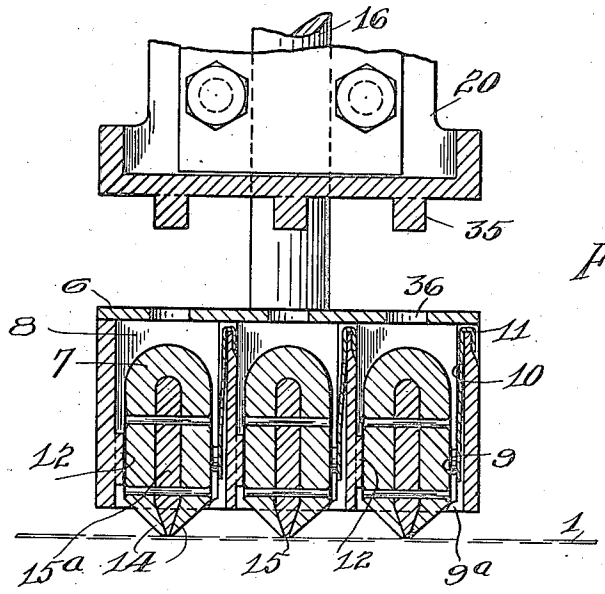


Fig. 3

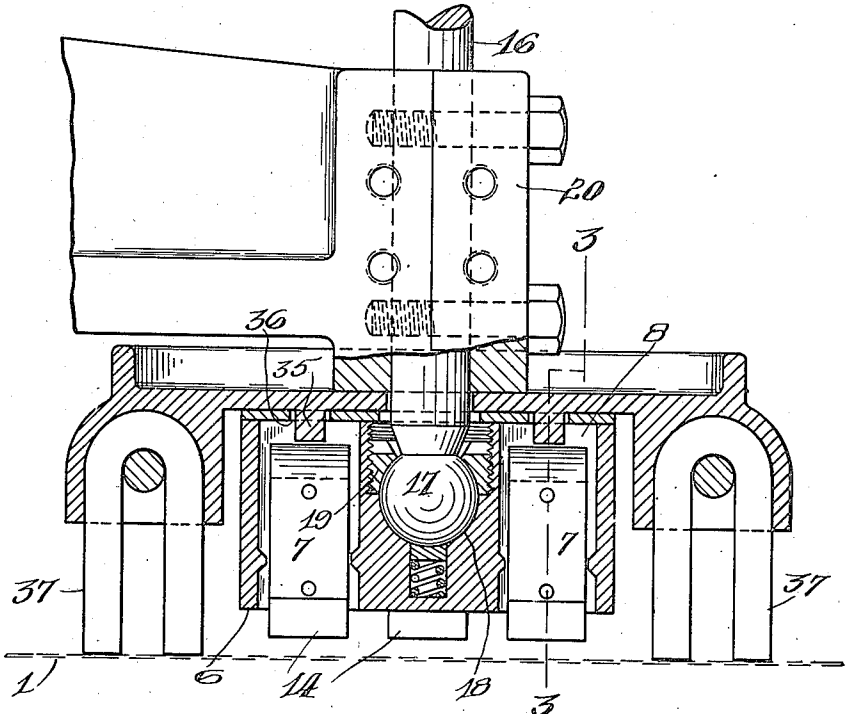


Fig. 4

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FEEDING SHEETS

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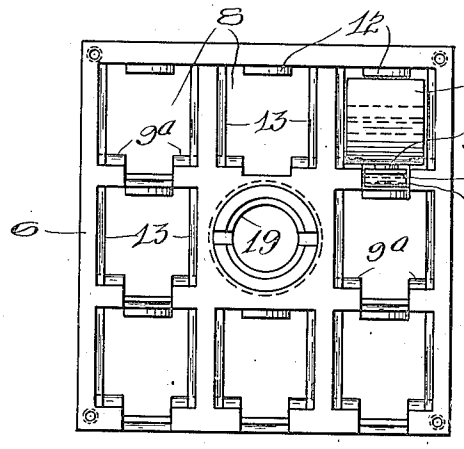


Fig. 5

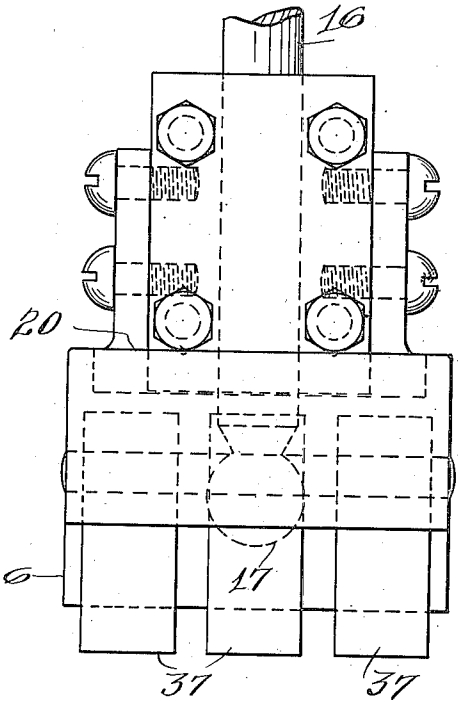


Fig. 6

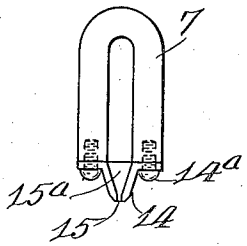


Fig. 7

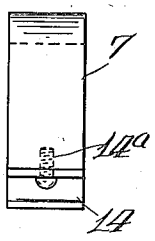


Fig. 8

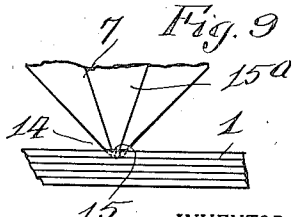


Fig. 9

INVENTOR.

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ATTORNEYS.

Patented Mar. 25, 1924. 1,487,811

UNITED STATES PATENT OFFICE.

EDWARD S. SAVAGE, OF ROCHESTER, NEW YORK.

FEEDING SHEETS.

Application filed October 26, 1921. Serial No. 510,527.

To all whom it may concern:

Be it known that I, EDWARD S. SAVAGE, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Feeding Sheets, of which the following is a specification.

The present invention relates to a method of separating, one at a time, sheets of metal lying in abutment and to a feeding mechanism used in such method, an object of this invention being to provide for separating, one at a time, metallic sheets lying in abutment by one or more magnets. A further object of the invention is to provide a picking device employing one or more magnets whose lines of force are confined to the individual sheet being picked from the others of a stack, pile or the like so that the adjacent sheets will not be lifted by the picking magnets. Another object of the invention is to provide a gang of picking magnets, so mounted, that they cooperate simultaneously with the surface of a sheet notwithstanding slight unevenness in the sheet. Still another object of the invention is to provide a gang of picking magnets which have relative movement to cooperate simultaneously with a sheet, provision being made by which the magnets are reset or restored to normal positions after the sheet is freed from the magnets. Still another object of the invention is to provide in connection with a picking means, a magnetic stripping means which will move a sheet from the picking means and sustain the sheet for movement to a suitable receiver. Another and still further object of the invention is to associate with the stripping magnets, a push-off device which will push the sheet from the stripping magnets to a suitable receiver.

To these and other ends, the invention consists of certain parts and combinations of parts, all of which will be hereinafter described, the novel features being pointed out in the appended claims.

In the drawings:

Fig. 1 is a fragmentary view in elevation of a machine embodying the present invention:

Fig. 2 shows in elevation another side of the mechanism illustrated in Fig. 1;

Fig. 3 is a sectional view on the line 3—3, Fig. 4, showing the picking means moved away from the resetting means;

Fig. 4 is a view in section showing the picking means and the magnetic stripping means associated therewith, the picking means being illustrated in its uppermost position;

Fig. 5 is a top view of the picking means with all of the picking magnets removed except one;

Fig. 6 is a view in side elevation of the picking means;

Figs. 7 and 8 are two side views at right angles to each other of another embodiment of the picking magnets; and

Fig. 9 is a detail view showing the manner in which the lines of force are concentrated in a single sheet.

It is apparent that the invention is not limited to the type of machine herein illustrated and that certain features of the invention are capable of being embodied in machines of any type where it is desired to separate one at a time metallic sheets lying in abutment. In the illustrated embodiment of the invention, the sheets 1 are supported in abutment in a stack or pile upon a support 2 which is in the form of a shelf having a rear wall 3 secured by bolts 4 to the lower wall of the receiver 5, the latter having a side entrance way in which the sheets 1 may be inserted, suitable means (not shown) being employed for feeding the sheets longitudinally in said receiver.

The picking means in this embodiment comprises two heads 6 each supporting a plurality of relatively movable magnets 7 and having for this purpose a number of chambers or compartments 8 in which the magnets are mounted, the magnets being preferably held in the chambers by frictional retaining devices 9 in the form of projections on spring arms 10, which are anchored at 11 to the head, these frictional retaining devices engaging the magnets and holding them frictionally against a surface 12 formed in the chambers, thus permitting the magnets to move longitudinally and in the chambers. The magnets may also be adapted to rock or swing laterally in the chambers, and to this end, fulcrum ribs 13 are provided on two other opposite walls of the chambers to engage the two other opposite sides of the magnets. It will be seen that by this arrangement that the magnets are not only adapted to move relatively to each other but, at the same time, they have an individual rocking movement

which permits their pole pieces to adapt themselves to the surface of a sheet of metal. Projections 9a at the mouths of the chambers may limit the outward movement of the magnets.

The magnets are of novel construction being formed so that the effective lifting lines of force are concentrated and confined to the sheet with which the magnet engages. This result is secured, in this instance, by employing a magnet, permanent or otherwise, of U shape form and providing pole pieces 14 on said magnet of novel construction. These pole pieces may, as shown in Fig. 3, be integral with the body of the magnet, or as shown in Figs. 7 and 8, be in separate pieces secured by screws 14a to the body of the magnets 7. The pole pieces are reduced to provide parallel elongated engaging faces, one dimension of each face being very small. The pole pieces are deflected toward each other to provide a small gap 15 and a piece 15a is interposed between the arms of the magnet and extends into this gap, this piece being made of non-magnetic material, such as brass, and serving to support the reduced pole pieces 14. The pole pieces and the gap are so formed that the effective lifting force of the magnetic field between them will not extend materially beyond the thickness of a single metallic sheet 1 and, in this way, only one of the sheets will be materially affected by the magnet at one time. The rocking movement of the magnet is transverse of the smaller dimensions of the engaging faces of the pole pieces so that the engaging faces of a magnet may accommodate themselves to the surface of the sheet. The up and down movement of the magnets relatively to the head prevents any one magnet interfering with the engagement of the sheet by the other magnets.

The heads 6 are, in this instance, supported for movement toward and from the stack of sheets 1 by means of plungers 16 and in order to still further permit the proper cooperation between the magnets and the sheet these heads each have a universal joint connection with its plunger 16. In this instance, the plunger is formed with a ball 17 received in a socket 18 in the head and held therein by a nut 19.

Operation of the heads toward and from the sheets 1 may be effected in any suitable manner. In this instance, the plungers 16 are guided in arms 20 and are operated from a disk 21 which is adjustably secured to a gear 22 by means of bolts 23 operating in slots 24 in the disk. This disk in turn is connected by a link 25 pivoted thereto at 26 and also pivoted at 27 to one arm of a double arm lever 28 which rocks about the axis 29. The other arm of this double arm lever is, through a link 30, connected to a bar 31, which connects with plungers 16, the link 30 being slotted at 32 and having the bar 31 operating in the slot, a rigid collar 33 bearing against one side of the link 30 and a spring pressing collar 34 bearing against the other side. It is apparent that the heads 6 with the picking devices will move toward the stack of sheets 1 and that the movement in the opposite direction will be effected by the wall at the lower end of the slot 32 cooperating with the bar 31 on the upward movement of the link, thus always returning the heads 6 to their extreme upper positions.

It is desirable to reset the picking devices or magnets 7 in the heads after each sheet has been removed therefrom and before the magnets engage another sheet and with this end in view, resetting means is employed. This resetting means, in this instance, embodies a number of resetting projections 35 projecting downwardly from the under side of each guide bracket 20 and adapted to pass through openings 36 in the top of the adjacent head 6, so as to engage with the upper portions of the magnets 7 and return the magnets to their normal positions on the head, the magnets passing out of engagement with the resetting means as the head moves toward the sheets, thus permitting the magnets to adjust themselves in the head for proper cooperation with the sheet to be picked up.

Any suitable stripping means may be employed for removing the sheets from the picking means. In this instance, the stripping means is in the form of a plurality of magnets 37 permanent or otherwise of horse shoe form depending from the bracket arm 20 on opposite sides of the line of movement of each lifting head 6, the lower portions of the pole pieces of the magnets 37 depending below the lower portions of the magnets 7 when the latter have been carried to their uppermost positions, so that as the lifting magnets 7 approach their uppermost position or position most remote from the sheets 1, the sheet supported by the lifting magnets is brought in contact with the stripping magnets 37 which strip the sheet from the magnets 7 and sustain such sheet until the latter is removed therefrom.

For transferring the sheet from the stripping means 37 to the receiver 5 any suitable means may be employed. In this instance, a transfer means in the form of two pushers 38 is arranged to engage the outer edge of a sheet 1 held by the stripping magnets 37 and push such sheet into the receiver 5 and off the magnets 37. These pushers, in this instance, are carried by rods 39 which are guided on the receiver 5. Operation of these pushers may be effected in any suitable manner. In this instance, a

shaft 40 on which the gear 22 is mounted has a cam 41 which cooperates with a roller 42 on one arm of a bell crank lever 43, the latter being pivoted on a shaft 29 and having its other arm, through a link 44, connected to an arm 45 on a rocking shaft 50, said rocking shaft having two arms 51 thereon connected by links 52 to collars 53 adjustably secured to the rods 39 of the two pushers. A spring 54 is anchored at one end to the arm 45 and to its other end to the frame of the machine and serves normally to move the pushers in the direction opposite that which they are moved by the cam 41.

In the operation of the illustrated form of the invention, the sheets 1 are arranged on the support 2 in a stack. The picking heads 6 move toward the uppermost sheet of the stack and the magnets thereof cooperate simultaneously with the sheet, adjusting on the heads automatically so that proper engagement between their engaging faces and the sheet is secured. The lines of force from these magnets are such that they pass mainly through the uppermost sheet, and when the heads 6 move upwardly only such sheet is lifted from the stack. The sheet is carried upwardly until it engages the stripping magnets 37 which hold the sheet and permit the heads to continue their upward movement until the magnets 7 are re-set by the re-setting means 35 which return the magnets to their normal positions on the head 6. After the sheet has been released from the lifting magnets, and before the latter can again engage said sheet, the pushers 38 operate to shift the sheet off the stripping magnets 37 and into the receiver 5 from which it is moved in any suitable manner.

From the foregoing it will be seen that there has been provided a magnet of novel construction, so designed that effective lifting lines of force thereof are confined to the sheet to be lifted, so that sheets next to such sheet will not be affected by the magnet. This result is secured by providing pole pieces of such dimensions and spaced apart by a gap of such a size that the lines of force between the pole pieces pass mainly through the sheet to be lifted and not through the adjacent sheet with such strength that the latter will be affected. It is preferred to use the magnet with a number of other magnets of similar construction supported in such a manner to each other that relative movement between them may take place in order that they may engage simultaneously an uneven surface. The head which carries the gang of magnets or picking devices is also mounted so that it may rock to permit the gang as a whole to be accommodated to an inclined surface. There is also employed in connection with a picking means, stripping means which strips the sheet from the picking means and sustains such sheet for transfer to another position. The stripping means employs magnets which are situated on opposite sides of the field of movement of the picking means so that the latter carry the sheet to the stripping magnets. It has been found that the lines of force of the lifting magnets are so concentrated that the shifting of the sheets edgewise thereon will scratch the sheets. Furthermore owing to the small engaging faces of the lifting magnets the edge shifting of the sheets will soon wear them out. The strength of the stripping magnets may be greater than that of the lifting magnets, yet their wide surfaces do not scratch the sheets. Means is provided for resetting the lifting or picking magnets in the head after the sheet has been stripped therefrom, and means is also provided which transfers the sheet from the stripping magnets to the receiver, this means being operated in timed relation to the picking means so as to operate after the latter has carried the sheet to the stripping magnets.

It is further apparent that there has been provided a new method of separating by an electromagnet, one at a time, metallic sheets lying in abutment.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A picking means for separating, one at a time, metallic sheets lying in abutment embodying a magnet having its poles formed with engaging faces elongated in one direction and of such a width in the direction at right angles to the first named direction and so spaced apart as to produce lifting lines of force whose strength beyond the engaging faces are not sufficient to affect a second sheet.

2. A picking means for separating one at a time, metallic sheets lying in abutment, embodying a plurality of relatively movable magnets, each having its effective lines of force confined to the sheet to be separated from the others, and means for supporting said magnets for relative movement to permit them to adapt themselves to inequalities in the surface of a sheet to be lifted thereby.

3. A picking means for separating, one at a time, metallic sheets lying in abutment embodying a magnet having pole pieces formed with elongated parallel sheet engaging faces and mounted to rock transversely of said faces.

4. A picking means for separating, one at a time, metal sheets lying in abutment embodying a head, a plurality of magnets, each having its pole pieces formed with parallel elongated sheet engaging faces and each mounted to rock transversely of said faces and also to move bodily relatively to the other magnets.

5. A picking means for separating, one at a time, metallic sheets lying in abutment embodying a head, a plurality of chambers, magnets movably mounted in said chambers, and means for re-storing said magnets to their normal positions in the chambers after a sheet has been removed therefrom.

6. A picking means for separating, one at a time, metal sheets lying in abutment embodying a head having chambers therein, magnets relatively movable in said chambers, each of said magnets having its pole pieces formed with parallel elongated engaging faces and being mounted to rock transversely of said faces.

7. A picking means for separating, one at a time, metal sheets lying in abutment embodying a head having chambers therein, magnets movably mounted in said chambers, and friction producing means acting on said magnets.

8. A picking means for separating, one at a time, sheets lying in abutment embodying a head, a support for the head permitting the rocking of the latter in any direction, and a plurality of devices carried by said head for cooperating simultaneously with a sheet at different points.

9. A picking means for separating, one at a time, sheets lying in abutment embodying a head, a support for the head permitting the rocking of the latter in any direction, and a plurality of devices carried by said head for cooperating simultaneously with a sheet at different points, said devices being relatively movable.

10. A picking means for separating, one at a time, sheets lying in abutment embodying a head, a support for the head permitting the rocking of the latter in any direction, and a plurality of devices carried by said head for cooperating simultaneously with a sheet at different points, said devices being bodily movable.

11. A picking means for separating, one at a time, sheets lying in abutment embodying a head, a support for the head permitting the rocking of the latter in any direction, and a plurality of devices carried by said head for cooperating simultaneously with a sheet at different points, said devices being mounted to rock on the head.

12. A picking means for separating, one at a time, sheets lying in abutment, embodying a head, a support for the head permitting the rocking of the latter in any direction, a plurality of devices carried by said head for cooperating simultaneously with a sheet at different points, said devices being adapted to move bodily and to rock on the head, and means for re-setting said devices to normal positions after the sheet has been removed from the device.

13. The combination with a suitable means for sustaining the sheets, of a picking head movable toward and from the sheets and having movable devices thereon for engaging the sheet, stripping means for stripping the sheets from said devices, and means for re-setting said devices on the head after a sheet has been stripped from the devices.

14. The combination with a suitable means for supporting metallic sheets, of a picking means movable toward and from the sheets and having a plurality of relatively movable magnets for engaging and retaining the sheets, stripping magnets to which the sheets are moved by the picking means, and means for re-setting the picking magnets after the sheet has been stripped therefrom.

15. The combination with a suitable means for holding metallic sheets, a receiver, and a picking magnet movable toward and from the sheets, of stripping magnets arranged on opposite sides of the path of movement of the picking magnet and adapted to strip the sheet from the picking magnet after the latter moves away from the sheets, and transfer means for moving the sheets from the stripping magnets to the receiver.

16. The combination with a suitable means for sustaining metallic sheets and a receiver, of a picking magnet movable toward and from the metallic sheets on the support, a stripping magnet to which the sheet is carried by the picking magnet, and a pusher arranged to move the sheets from the stripping magnet to the receiver.

EDWARD S. SAVAGE.