

Feb. 17, 1953

R. VAN SCHIE
SHEET METAL FEEDER

2,628,726

Filed Sept. 19, 1949

2 SHEETS—SHEET 1

FIG. 1.

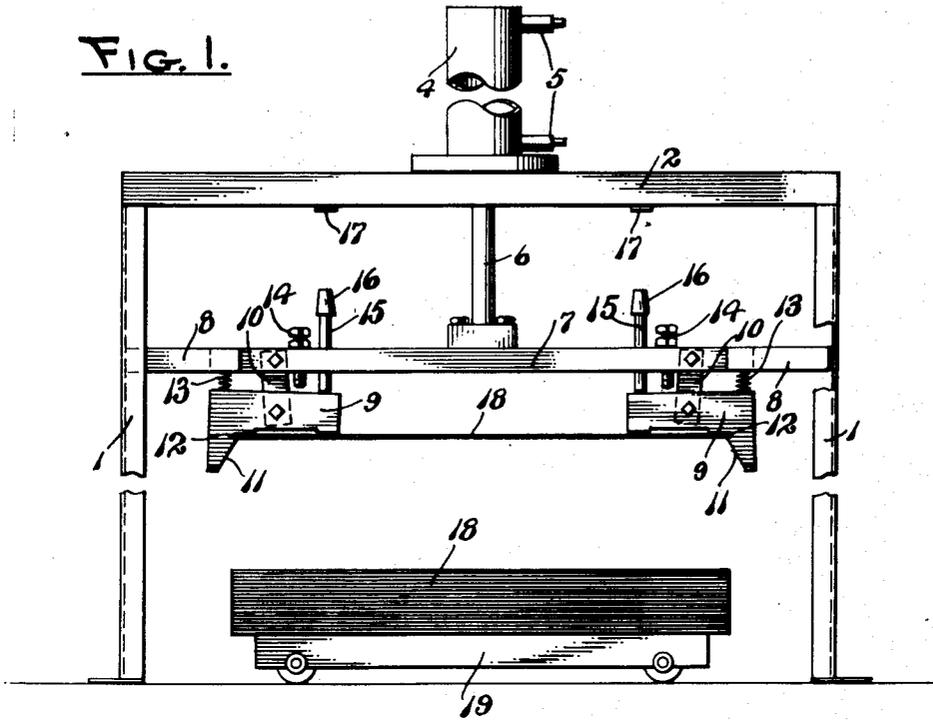


FIG. 2.

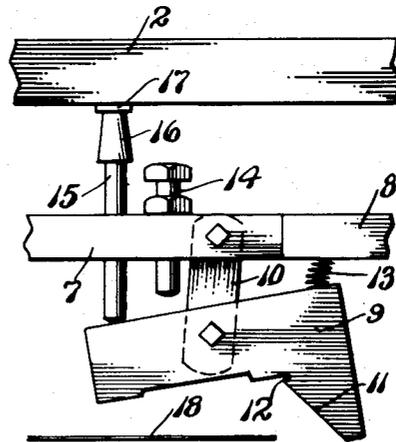
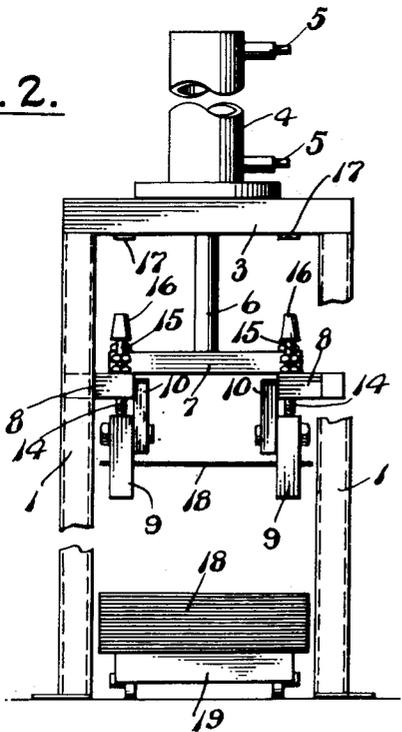


FIG. 3.

INVENTOR
ROBERT VAN SCHIE
BY *Liverance and*
Van Antwerp
ATTORNEYS

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2 SHEETS—SHEET 2

FIG. 4.

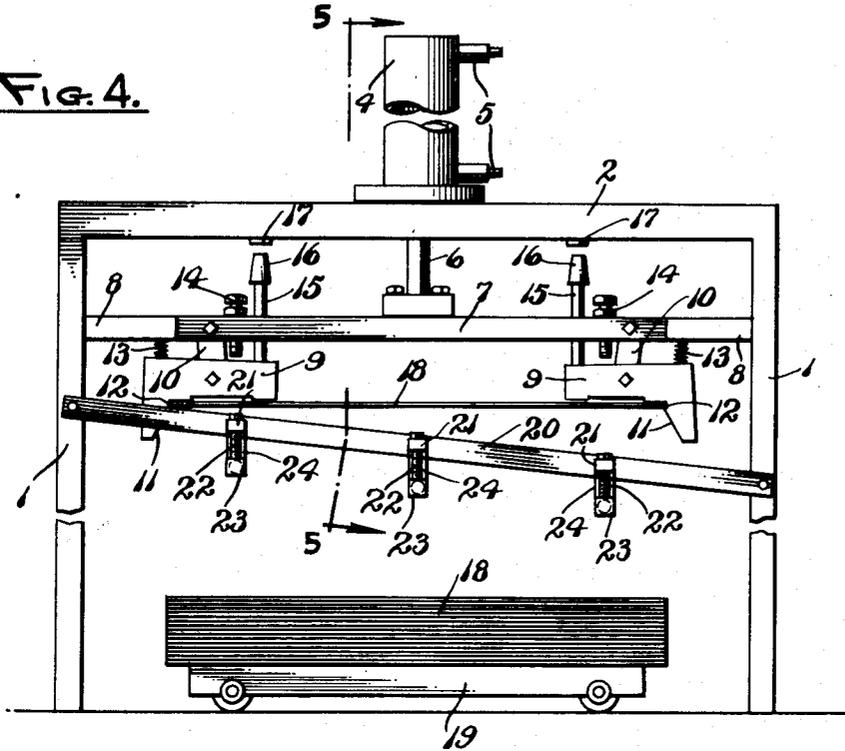


FIG. 5.

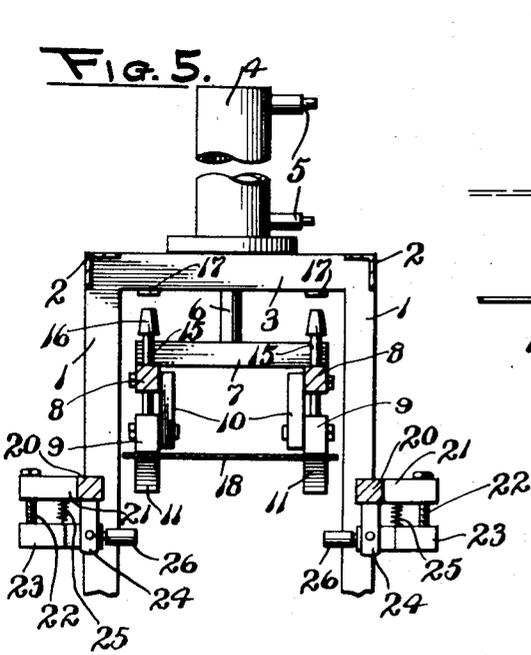
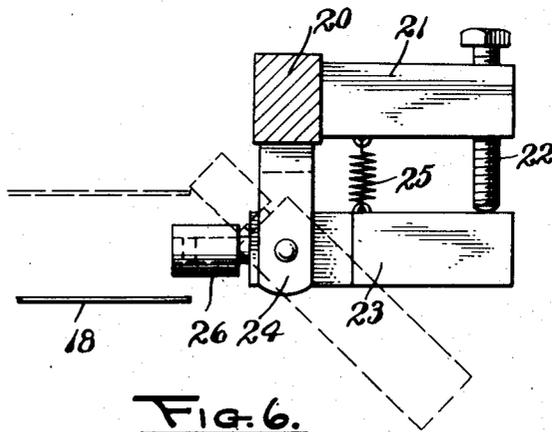


FIG. 6.



INVENTOR
ROBERT VAN SCHIE
BY *Liverance and*
Van Antwerp
ATTORNEYS

UNITED STATES PATENT OFFICE

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SHEET METAL FEEDER

Robert Van Schie, Grand Rapids, Mich.

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8 Claims. (Cl. 214—8.5)

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This invention relates to a novel, very useful, practical and efficient feeder for sheet metal plates or the like which is primarily for use in lifting, in succession, the uppermost plate of a stack of plates disposed one over the other to a higher level, and automatically releasing said lifted plate when it has reached a predetermined upper position so that the released plate may be removed and taken away, the cycle of operations being repeated until all of the plates have been thus separately and individually handled. The plates stacked one upon the other may be moved to position underneath the device of my invention on a truck or other carrying means, and after the load carried by one truck has been handled another truck similarly loaded with a large number of sheet metal plates superimposed one over the other put in its place for a continuation of operations.

It is a primary object and purpose of the present invention to provide a lifter and feeder for handling plates of sheet metal substantially in the manner described which is automatic in the connection of the lifter with the plates and in the release of the plates on elevating such lifter with a plate carried thereby to an upper position, and which is sturdy and durable in structure and very effective in operation.

An understanding of the invention may be had from the following description, taken in connection with the accompanying drawings, in which

Fig. 1 is an elevation of the sheet metal handling device of my invention.

Fig. 2 is an end view thereof,

Fig. 3 is a fragmentary enlarged elevation similar to Fig. 1 illustrating the manner in which a metal plate is released at a predetermined and selected upper position.

Fig. 4 is an elevation, similar to Fig. 1, with the addition thereto of a novel means for automatically carrying a plate from the machine after it has been lifted and released.

Fig. 5 is a fragmentary transverse vertical section, substantially on the plane of line 5—5 of Fig. 4, looking in the direction indicated, and

Fig. 6 is a fragmentary enlarged transverse section, upon the same plane, at one side of the machine.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction of the sheet metal handling device, a frame is provided having four corner posts 1, preferably of channel or angle form, one at each of the four corners of the frame, the posts at opposite sides of the frame being con-

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nected at their upper ends by horizontal sides 2 and at the ends by horizontal ends 3 as shown in Figs. 1 and 2. This upper rectangular open frame of the supporting structure has a vertical cylinder 4 thereon, substantially mid-way between its ends, which has inlets and outlets 5 for the entrance and exhaust of fluid pressure for operation alternately at opposite sides of a piston within the cylinder (not shown). A rod 6 connected with such piston extends downwardly and is alternately raised and lowered by a controlled entrance and exhaust of pneumatic fluid or hydraulic fluid under pressure alternately at opposite sides of the piston within the cylinder.

At the lower end of the rod 6 a rectangular head 7 of any suitable design is secured in a horizontal plane, from which stabilizing and guiding arms 8 extend, one adjacent each corner of the frame, the arms 8 reaching at their outer ends to the posts 1 and being guided by the flanges thereof so that the head 7 is maintained steady against lateral shifting movement as it is moved up and down by the movements of the rod 6.

Plate grippers 9 are mounted, one adjacent each corner of the head 7 and thereunder, being suspended from the head 7 by short generally vertical links 10 pivotally connected at opposite ends to the grippers 9 and to the frame as shown. Each of the grippers 9 at its outer end portion has a downward extension which, at its inner edge, is inclined upwardly and inwardly at an angle to the vertical as indicated at 11. At the upper ends of the inclined edges 11 short slots or recesses 12 are made into which edges of a sheet metal plate to be handled are adapted to be received. The slots are of approximately the same thickness as the sheets to be handled as illustrated so that the edges of the sheets are closely received in the slots. The grippers 9 are pivotally suspended on the links 10 between their ends and normally are moved to a horizontal position by compression springs 13 bearing against the upper sides and outer ends of the parts 9, so as to swing the inner ends of the grippers upwardly until stopped by coming against the lower ends of screws 14 which are adjustably threaded through the head 7, one adjacent each corner thereof.

On said head 7 over the inner end of each of the grippers 9 a vertical rod 15 is slidably mounted which, at its upper end above the head 7, has a somewhat enlarged and preferably conical head 16. Upon the upward movement of the rod 6 and the connected head 7 the heads

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16 of the rods 15 at uppermost position come to stop or abutment members 17, which are secured to the upper frame having the sides 2 and the ends 3. Upon the heads 16 coming against such stops a continuation of upward movement of the rod 6 causes the rods 15 to be moved downwardly against the inner ends of the grippers 9 to turn them from the horizontal position which they normally assume (Fig. 1) to tilted positions as shown in Fig. 3.

The sheet metal plates 18 which are to be handled are shown on a truck 19 directly below the four grippers. With such grippers in horizontal position and maintained in such position by the springs 13, when the mechanism is lowered by moving the rod 6 downwardly, the inclined edges at 11 contact the ends of the uppermost plate 18 of the stack and at the lowermost position of the mechanism the grippers 9 will have been tilted about their pivotal connections to the links 10 so that the end edges of the uppermost plates 18 are received in the notches or recesses 12, whereupon the springs 13 return the grippers 9 to horizontal position. Engagement of the top surfaces of the notches 12 with the top surface of the top sheet stops the grippers 9 with noses at the intersection of the lower edges of the notches 12 and the upper edges of the inclined surfaces 11 closely adjacent to the lower edges of the top sheet. If the action of the spring 13 is insufficient to force these noses between the top and second sheet, the upward pull of the links 10 on the inner portions of the grippers 9 causes the outer ends of the grippers to press inwardly of the sheets with considerable force so that the edges of the top sheet are forced into the notches. The rod 6 is then lifted by reversing the flow of pressure fluid in the cylinder 4. When such rod has been elevated to sufficiently high position that the rods 15 are forced downwardly when their heads strike the abutments at 17, the grippers 9 are turned, as shown in Fig. 3, against the force of springs 13, releasing the uppermost plate which has been lifted above the others.

Such uppermost plate when released is kept from falling back on the stack of plates on the truck 19 in any suitable manner. In Figs. 4, 5 and 6 there is shown a carrier for the released elevated plate 18 upon which it drops when released, the plate thereupon moving by gravity on said carrier to and beyond one end of the machine.

This carrier for the elevated plate 18, after it has been released, includes two side bars 20 extending between and connected at their ends to the posts 1 and having a downward inclination from one end thereof to the other. On each of the bars 20, which are located above the stack of plates on the truck 19 and below the upper point of elevation of the uppermost plate, a plurality of roller units are mounted in spaced relation to each other. Each of said roller units comprises a fixed short bar or arm 21, secured at one end to its supporting bar 20 and extending outwardly. Through the outer free end portion thereof a vertical adjusting screw 22 is threaded which, at its lower end, serves as a stop for a tilting bar 23 located under it and pivotally suspended at its inner end from a bracket 24 connected to and extending downwardly from the bar 20. The bar 23 is normally moved upwardly to engage the top screw 22 by a tension spring 25 between the bars 21 and 23.

At the inner end of each of the bars 23 a roller 26 is mounted. The roller is of short

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length and normally occupies a horizontal plane as best shown in Fig. 6.

When an uppermost plate 18 from the stack is lifted and released, during the lifting the side edge portions of the plate come underneath the free ends of the rollers 26, tilting them and the connected bars 23 to the dash line position shown in Fig. 6, until the plate has passed by such rollers, whereupon they return to their normal horizontal positions, being pulled back by the springs 25. The rollers are thus positioned underneath the uppermost plate 18 when it is automatically released. The plate dropping downwardly on to said rollers, and the rollers from one end to the other being inclined downwardly the plate moves under the influence of its own weight over said rollers toward the end of the frame to which the lowest ends of the bars 20 are connected and in this manner is moved out of the way. It may be delivered to any suitable receiving means therefor or taken away by workmen ready to receive it.

The handling of sheet metal plates is expedited by the machine of my invention. The removal of such plates from a stack of plates by hand is slow and unsatisfactory. The machine is economical to build and is of a novel and practical structure.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a structure as described, a supporting frame having corner posts and an upper structure between and connecting the corner posts, a vertical rod mounted for reciprocating movements extending downwardly from said upper structure, means for reciprocating said rod, a head secured at the lower end of the rod, said head being of a generally rectangular form, short links pivotally connected at their upper ends to and extending downwardly one adjacent each corner of the frame, a gripper member pivotally connected between its ends at the lower portion of each link, each gripper member being normally located in a horizontal position and having at its outer end a downward extension, the inner edge of which is upwardly and inwardly inclined, each gripper member at the upper end of such inclined edge having a notch therein, spring means associated with each gripper member and portions of said head normally turning the gripper members toward a horizontal position, stop means on said head against which the gripper members engage when moved by said springs to substantially horizontal position, and members extending through said head, one for each gripper member at the inner end thereof and movable with the head, combined with abutment means on the upper structure against which said members are brought on upward movement of the rod and attached head to simultaneously swing the gripper members to depress their inner ends and elevate their outer ends.

2. A structure as defined in claim 1, each stop means for each gripping member comprising a screw threaded through said head and located in the upward path of movement of the inner end portion of each gripper member under the influence of the spring acting thereon, said screws being adjustable controlling the positions of the gripping members at which they are stopped.

3. In a structure as described, a supporting frame including four corner posts, an upper substantially open horizontal frame at the upper

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ends of said posts extending therebetween, and connected with the posts, a vertical cylinder having inlet and exhaust means at opposite ends carried by said upper frame, a piston rod entering the lower end of said cylinder and extending below said upper frame, a generally rectangular head secured to the lower end of the piston rod, said cylinder being adapted to have pressure fluid alternately entered into and exhausted at opposite ends thereof to raise and lower the rod and head, a gripping member suspended from said head adjacent each corner thereof, means for movably mounting each gripping means to turn about a horizontal axis, means associated with said head and each gripping member for normally yieldingly holding each gripping member in substantially horizontal position, means on each gripping member adapting it to engage with an edge of the uppermost sheet of a superimposed stack of sheets of material below the head to grip said uppermost sheet at opposite edges thereof, and vertically disposed rods, one for each gripper member mounted on said head and passing freely therethrough engaging at lower ends with associated gripper members, combined with stop means on said upper frame against which said last mentioned rods strike for automatically moving the gripper members to release a material sheet held thereby upon upward movement of said head and the sheet carried by said gripper members to a predetermined upper position.

4. A structure as defined in claim 3, and two bars one at each side of said frame connected to and extending between the posts at the sides of the frame, said bars inclining downwardly from one end to the other and being located in the same inclined plane, a plurality of short bars spaced from each other located underneath each of said inclined bars, means for pivotally mounting said short bars at their inner ends to turn on horizontal axes, said short bars being carried by said inclined bars, a roller at the inner end of each of said short bars having its inner end portion located in the path of movement of a sheet of material when said material is elevated, spring means connected with each of said short bars normally moving the outer ends of said short bars in an upward direction and stops carried by said inclined bars to stop said short bars substantially at horizontal position.

5. In a machine for removing the top sheet from a stack of stiff metal sheets, a vertically reciprocable head, opposed pairs of grippers carried by said head to be reciprocated thereby against the top of said stack, the grippers of each pair having upper body portions extending longitudinally inwardly from opposite sides of said head to overlie the opposite edges of a sheet and having depending cam portions on the outer ends thereof having opposed upwardly and inwardly inclined inner surfaces adapted to cammingly engage the opposite edges of the top sheet, said grippers having inwardly opening sheet receiving notches formed at the intersection of said cam portions and said upper portions, and links pivotally connected to said head and to said grippers inwardly of said notches, said grippers being biased relative to said head to locate said notches in generally horizontal position.

6. In a machine for removing the top sheet from a stack of stiff sheets, a vertically reciprocable head, opposed pairs of grippers carried by said head to be reciprocated thereby against the top of said stack, the grippers of each pair having

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upper body portions extending longitudinally inwardly from opposite sides of said head to overlie the opposite edges of a sheet and having depending cam portions on the outer ends thereof having opposed upwardly and inwardly inclined inner surfaces adapted to cammingly engage the opposite edges of the top sheet, said grippers having inwardly opening sheet receiving notches formed at the intersection of said cam portions and said upper portions, and links pivotally connected to said head and to said grippers inwardly of said notches.

7. A sheet separating and delivering device comprising, a frame work adapted to be supported over a stack of sheets to be delivered, a lifting head mounted for vertical movement on the frame, means for raising and lowering the head, a plurality of gripping members mounted on said head and adapted on lowering of the head to engage and grip opposite edges of a sheet to elevate the sheet on upward movement of the head, means for automatically releasing said gripping members on upward movement of said head to a predetermined position, a plurality of spaced movably mounted support elements located along inclined lines on opposite sides of said frame and between the upper and lower limits of movement of said gripping members, said support elements having inner ends extending inwardly of the outline of said frame and into the path of movement of sheets elevated by said head, said support elements being pivotally mounted for vertically upward swinging motion of their inner ends under the influence of a sheet being elevated, and means associated with each of said elements adapted to return the element to generally horizontal inwardly projecting position with respect to said frame after the sheet being elevated has passed the element and before said means for releasing said gripping members is actuated whereby the sheet released from the gripping members falls upon said support elements for delivery by gravity along the incline of said support elements.

8. A sheet separating and delivering device comprising, a frame work adapted to be supported over a stack of sheets to be delivered, a lifting head mounted for vertical movement on the frame, means for raising and lowering the head, a plurality of gripping members mounted on said head and adapted on lowering of the head to engage and grip opposite edges of a sheet to elevate the sheet on upward movement of the head, means for automatically releasing said gripping members on upward movement of said head to a predetermined position, a plurality of spaced movably mounted support elements located along inclined lines on opposite sides of said frame and between the upper and lower limits of movement of said gripping members, said support elements having inner ends extending inwardly of the outline of said frame and into the path of movement of sheets elevated by said head, said support elements being pivotally mounted for vertically upward swinging motion of their inner ends under the influence of a sheet being elevated, and means associated with each of said elements adapted to return the element to generally horizontal inwardly projecting position with respect to said frame after the sheet being elevated has passed the element and before said means for releasing said gripping members is actuated whereby the sheet released from the gripping members falls upon said support elements for delivery by gravity along the incline

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of said support elements, said support elements each comprising a roller rotatable about an axis projecting inwardly of said frame and normally to the pivot axis of the support element.

ROBERT VAN SCHIE. 5

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8

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