MAGNETIC STACKING DEVICE

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This invention relates to a stacking device and more particularly to a magnetic stacking device used primarily for stacking sheet metal and similar products into a neat and manageable stack without manually handling the individual pieces forming the stack.

In cutting, handling, and forming sheet metal, large machines are often used to do the operation on the individual pieces and to then discard or convey them to a pallet to be stacked for transportation by a lift truck. However, the machines generally discard them in an uneven pile and they must be transported in such a manner or they may be manually stacked in an even pile. Sheet metal creates certain hazards in handling due to its sharp edges. Therefore, for safety reasons as well as to improve economy it is desirable that sheet metal be stacked neatly without any protruding edges and in an automatic manner.

It is therefore the primary object of the present invention to provide a new and novel stacking device that receives an edge of each of the sheet metal pieces and holds the edge by magnetic attraction against an upright post or housing. Consequently as the sheet metal pieces are received, they are stacked neatly in a pile against the post.

More specifically it is the object of the invention to provide a novel upright post with an upright magnetic pole plate structure contained within it. Adjacent the stack the post is provided with a front stainless steel wall so that magnetic attraction of the pole plate structure extends through the wall. Consequently, as the sheet metal pieces move against the post, their edges will be held against the wall and stacked neatly. Furthermore, the object of the invention it is proposed to provide pivot support means within the post that permits the pole plate structure to move toward or away from the stainless steel wall. Upon its being spaced away from the wall, the magnetic attraction to the sheet metal is considerably reduced so that the entire device may easily be removed from adjacent the stack.

It is a further object of the invention to provide a novel wheel support and transport arrangement that permits the device to be easily moved and repositioned for further service.

Other objects and advantages of the invention will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a perspective view taken from one side of the magnetic stacking device.

FIG. 2 is a rear view of the magnetic stacking device.

FIG. 3 is a top view of the magnetic stacking device.

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3.

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 2.

FIG. 6 is a sectional view taken substantially along line 6—6 of FIG. 2.

Referring now to the drawings, the entire device is supported on a base structure including a laterally disposed base plate 10 that normally lies on the floor. On the rear portion of the plate there is provided a pair of upwardly projecting angle iron tabs 11, 12 having welded to their respective upper edges a pair of round studs 13, 14. The studs 13, 14 have portions projecting outwardly of the outer edges of the plate and carry a pair of transversely spaced transport wheels 15, 16 respectively. The wheels 15, 16 normally are above the level of the lower surface of the base plate 10 and rearwardly of its rear edge.

Supported on the front portion of the plate and projecting upwardly therefrom is an upright housing structure or post 20 composed of a pair of front and rear upright U-shaped panels 21, 22 respectively welded at their lower edges to the top surface of the plate 10. An angle iron member 23 is welded to the front edge of the plate 10 and has its vertical flange facing against the front transverse wall of the front U-shaped panel 21. The two panels 21, 22 telescope slightly and are fixed together by screws 24. The transverse bight portions or walls of the panels 21, 22 may be treated as front and rear upright walls and the interconnected leg portions of the panels 21, 22 may be treated as fore and aft extending walls interconnecting the front and rear transverse walls. The U-shaped panel 21 is of stainless steel so as not to block magnetic attraction of a pole plate structure 30 retained within the housing 20.

The entire post or housing 20 forms a column or casing for the upright pole plate structure 30. The structure 30 is composed of a pair of transversely spaced upright angle iron pole plates 31, 32 having a plurality of vertically spaced permanent horseshoe magnets 33 bolted at 34 thereto. A pair of hinge plates 35, 36 are welded to the lower ends of the pole plates 31, 32 and base plate 10 respectively and are pivotally interconnected by a transverse horizontal hinge pin 37 so as to permit the plate structure to move fore and aft within the casing or post 20. The hinge pin 37 is closely adjacent the transverse wall or bight portion of the panel 21 and consequently the transverse portions of the angle iron pole plates 31, 32 may lie closely adjacent thereto. This is important since the magnetic attraction of a pole plate structure weakens considerably as the structure is moved from a magnetically attracted article. It is considered that the magnetic attraction between a magnet and attracted article reduces at a rate of the square of the distance of the gap between the article and magnet.

The upper end of the pole plate structure 30 may be adjusted fore and aft by level structure 40 composed in part of an L-shaped lever member 41 that extends through the side walls of the casing 20, reinforcing plates 42, 43 being provided as bearings for journaling the lever 41. Internally of the casing 20 and supported on the horizontal portion of the lever 41 is a T-shaped rocker arm 44 having a tubular cross piece 45 fixed to the lever 41 by set screws 46, and a depending arm 47 that extends centrally between the pole plates 31, 32, and in a fore and aft direction, between the upper edge of the horse shoe magnets 33 and a cross piece 48. The lower end of the arm 47 is curved to place it in close proximity to the horseshoe magnet 33. However, an upper cross piece 49 is fixed to and across the top of the pole plates 31, 32 and to the rear of the arm 47, the purpose being to cause initial contact when the arm moves rearwardly so as to break or reduce the magnetic attraction between the pole plates 31, 32 and material stacked against the panel 21. The horseshoe magnets 33 are normally very brittle and it is desirable to place initial and large loads against other parts of the pole plate structure 30 before bearing against a permanent magnet 33. The cross pieces 48, 49 are of non-magnetic material and therefore will not shunt or short the flux between the plates 31, 32.
A pair of extensions 50, 51 are welded to the upper ends of the respective angle iron pole plates 31, 32 and are offset slightly rearwardly therefrom. Fixed to the front wall of the panel 21 is a pair of carbon steel tabs 52 in fore and aft alignment with the extensions 50, 51. The extensions 50, 51, being magnetized by the pole plates 31, 32 are magnetically attracted to the tabs 52. Consequently, when the pole plate structure 30 approaches its vertical position, as shown in FIG. 2, the magnetic attraction between the extensions 50, 51 and the tabs 52 will cause the structure to be retained in such position and will magnetically latch the structure 30 in its vertical position.

As is clearly apparent, the pole plate structure 30 is raised to and from the upright position by the lever 41. Assuming the structure 30 is in the upright position, as shown in FIG. 2, the lever 41 is turned to cause the arm 47 to first cross the piece 49 and then the upper horseshoe magnet 33 and to thereby move the entire structure 30 rearwardly. The external vertical portion of the lever will contact an abutment 54 at the top and on the outside of the housing 28 so as to limit movement thereof in a rearward direction. To again move the structure 30 to an upright position, it is necessary only to swing the lever 41 forwardly. The arm 47 will then contact the brace 48 and drive the structure 30 to its vertical position.

A cap or lid 60 is provided over the top of the housing 21 and is fixed thereto by cap screws 61. Provided on the housing cap 60 is a U-shaped bracket having a pair of upwardly projecting ears 62, 63 interjoined at their upper ends by a gripping member or handle 64. It should be clearly understood that entire housing 28, its cap 60, and base plate 10 are all rigidly unified and the gauge of the metal used is sufficient to effect a strong structural unit.

In operation the stacking device is moved to an area of a machine that is discharging sheet metal or other pieces on a skid or pallet. The device is positioned most often in a position in which the front wall of the panel 21 is bearing against the skid or pallet receiving the pieces. As the sheet metal pieces leave the machine their edges contact the upper portion of the post and are magnetically held against the post. The magnetic attraction will hold the pieces, but will permit the pieces to gravitate to the top of stack. The edges of the pieces will, however, be retained against the post. The stacking devices may be used in pairs or other multiple groupings as desired.

Upon the stack being completed, there is a strong magnetic attraction between the side of the stack and the front of the magnetic pole structure 30. To relieve the magnetic grip in order to move either the pallet or device, the lever 41 is operated to drive the pole structure 30 rearwardly to create a sizable air gap between the stack and structure 30 to thereby greatly reduce the magnetic pull between them. At this time the device may be removed by pulling rearwardly on the handle 64 and causing the device to rock on the wheels 15, 16 where it may easily be pushed or pulled to a new or desired location.

While only one form of the invention has been shown, it should be recognized that other form and variations will occur to those skilled in the art. Therefore, while the preferred form has been shown and described in detail for purposes of clearly and concisely illustrating the principles of the invention, it was not the intention to limit or narrow the invention beyond the broad concept set forth in the appended claims.

What is claimed is:

1. A magnetic stacking device comprising: an upright hollow structure adapted for support at its base and having a front nonmagnetic upright side and a rear upright side; an upright magnetic structure supported within the hollow structure at the base thereof to swing fore and aft to and from a position closely adjacent the front side and when in said position being adapted and magnetically attract and hold material against the front side; and means between the hollow structure and magnetic structure for effecting movement of the magnetic structure to and from the aforesaid position.

2. A magnetic stacking device comprising: an upright structure having top and base portions and a front nonmagnetic upright side; upper and lower transverse pivots adjacent the top and base portions respectively; an upright magnetic structure supported on the lower pivot to swing fore and aft to and from a position closely adjacent the front side and when in said position to magnetically attract material against the front side; and lever means on the top pivot operatively connected to the magnetic structure for effecting movement of the magnetic structure to and from the aforesaid position.

3. A magnetic stacking device comprising: an upright structure having a front nonmagnetic upright side; means on the structure defining upper and lower pivots; an upright magnetic structure supported on one of the pivots to swing fore and aft to and from a position closely adjacent the front side and when in said position to magnetically attract material against the front side; and lever means on the other of the pivots operatively connected to the magnetic structure for effecting movement of the magnetic structure on said one pivot.

4. A magnetic stacking device comprising: a horizontally disposed base having front and rear portions; an upright structure rigidly and projecting upwardly from the front portion of the base and having a front nonmagnetic upright side; an upright magnetic structure supported on the base and behind the front side and swinging fore and aft and to and from a position closely adjacent the front side and when in said position to magnetically attract material against the front side; lever means on the upright structure operatively connected to the magnetic structure for effecting movement of the magnetic structure between the aforesaid position and a gapped position in relation to the front side, the latter position relieving the magnetic attraction to the front side; and wheel means on the rear portion of the base operatively to support the base upon rocking the base toward the vertical.

5. A magnetic stacking device comprising: a horizontally disposed base plate; an upright structure mounted on and projecting upwardly from the base plate and having a front nonmagnetic upright side; and an upright magnetic structure supported behind the front side to move fore and aft between a forward position closely adjacent the front side for magnetically attracting material against the front side, and a rear gapped position in relation to the front side for relieving the magnetic attraction to the side; means operatively connected to the magnetic structure for effecting movement thereof between the aforesaid positions; and wheel means supported on the base plate normally above and rearwardly of the plate and operative to support the base plate upon rocking the plate toward the vertical.

6. A magnetic stacking device comprising: a base; an upright nonmagnetic wall extending upwardly from the base; an upright magnetic structure supported on its lower ends on the base to swing fore and aft to and from a position closely adjacent the wall and when in said position being adapted to magnetically attract material against the wall; magnetic latch means between the wall and structure for retaining the structure in the position; and means between the wall and magnetic structure for effecting movement of the magnetic structure from the aforesaid position.

7. The invention defined in claim 6 in which the magnetic structure includes a pair of parallel pole plates disposed in a plane normally parallel to the wall and interconnected by permanent magnet means, and the means for effecting movement of the structure includes a lever sup-
ported on the upright wall and adapted to engage the structure for driving it away from the latch means.

8. The invention defined in claim 6 further characterized by an upright wall parallel to and spaced from the first wall and on the opposite side of the magnetic structure, and a pair of side walls interconnecting the aforesaid walls to define therewith an upright hollow casing surrounding the magnetic structure, but permitting movement thereof within the walls.

9. A stacking device comprising: an upright rigid housing structure having a front upright nonmagnetic wall, a rear upright wall, and interconnecting transversely spaced fore and aft upright walls extending between and interconnecting the front and rear walls and defining therewith an upright casing, the housing structure further including a laterally disposed base structure rigid with the lower end of the casing; transport wheels on the base structure rearward of the rear wall; an upright pole plate structure within the casing and including a pair of transversely spaced upright pole plates parallel to and adjacent the front wall; permanent magnet means between the pole plates; means hinging the pole plate structure on a transverse horizontal pivot on the housing structure adjacent the front wall and the base structure whereby the pole plate structure may swing fore and aft between positions adjacent the front wall; a lever structure pivoted on the housing structure above the lower pivot and operatively connected to the pole plate structure to adjust the pole plate structure fore and aft on the hinge means, the lever means having a control element external to the housing structure; a magnetically attracted element at the upper end of the housing structure adjacent the upper end of the front wall structure adapted to magnetically hold the pole plate structure in its forward position adjacent the front wall; and manual gripping means external of and rigid with the housing structure for swinging the housing structure for support on the transport wheels.

10. A stacking device comprising: a housing structure including an upright casing having a front upright nonmagnetic wall, and a laterally disposed base member rigid with the lower end of the casing and normally engaging the floor; transport wheels on the base member rearward of the casing; an upright magnetic pole plate structure within the casing and including a pair of transversely spaced upright pole plates parallel to and adjacent the front wall; means hinging the lower end of the pole plate structure about a transverse horizontal pivot on the housing structure adjacent the front wall and the base member whereby the magnetic pole plate structure may swing fore and aft between positions closely adjacent and gapped from the front wall; a lever structure pivoted on the housing structure above the pivot and operatively connected to the magnetic pole plate structure for effecting movement thereof fore and aft on the hinge means, the lever having a control element external the casing; and manual gripping means external of and rigid with the housing structure for rocking the housing structure for support on the transport wheels.

11. A stacking device comprising: a housing structure including an upright casing having a front upright nonmagnetic wall, and a laterally disposed base member rigid with the lower end of the casing; an upright magnetic pole plate structure within the casing parallel to and adjacent the front wall; means hinging the lower end of the magnetic pole plate structure about a transverse horizontal pivot on the housing structure adjacent the front wall and base member whereby the magnetic pole plate structure may swing fore and aft between positions closely adjacent and gapped from the front wall; and a lever structure pivoted on the housing structure above the transverse pivot and operatively connected to the magnetic pole plate structure for effecting movement thereof fore and aft on the hinge means.

References Cited by the Examiner

UNITED STATES PATENTS

1,595,384 10/1926 Cochran -------------- 214—651
2,606,659 8/1952 Morrison -------------- 214—6
2,635,002 4/1953 Davidson et al. -------- 294—65.5
2,640,605 6/1953 Chatterton ------------- 214—6(D)
2,760,809 8/1956 Mallin ---------------- 294—65.5
3,051,479 8/1962 Gore ------------------ 214—6

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