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APPARATUS FOR PILING SHEETS

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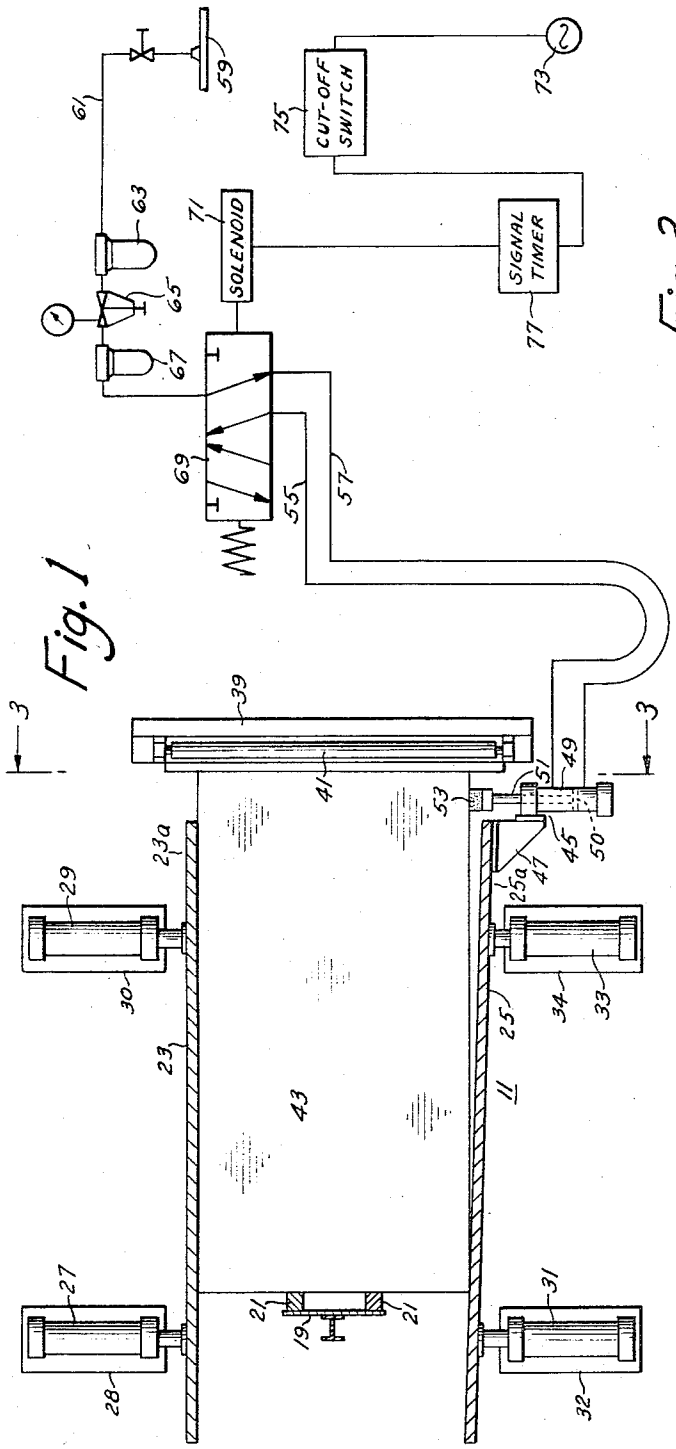


Fig. 1

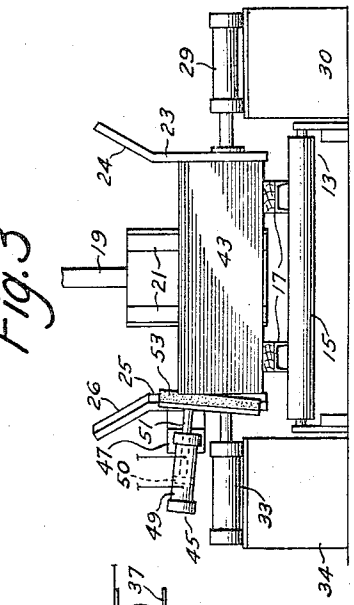


Fig. 3

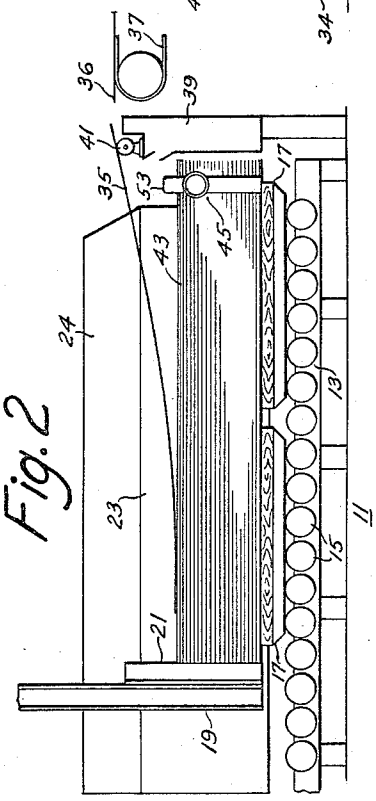


Fig. 2

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APPARATUS FOR PILING SHEETS

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ABSTRACT OF THE DISCLOSURE

A pair of converging side guides are arranged in a wedge shaped stop adjacent to the end of a sheet conveyor to align the leading end of the sheets as they leave the conveyor, and a reciprocating bumping device is located in a position to bump the rear of the sheets into alignment against one of the side guides as they leave the conveyor.

This invention relates to the piling of metallic sheets and particularly to the even alignment of the edges of the sheets as they are piled.

In the past many devices have been designed to facilitate the alignment of metallic sheets in piles by mechanical means. Usually such devices have consisted of mechanical bumpers or pushers contacting the sheets along several edges to urge the sheets into alignment. Such devices have usually been both massive and complicated and none has proven completely satisfactory in service.

It is an object of the present invention, therefore, to provide a simple, economical, and efficient method and means for aligning sheets in piles which obviates the use of previous complicated devices.

It has been discovered that the foregoing object may be attained by directing the forward end of each sheet into a wedge shaped stop to align the forward end of the sheet and then bumping the rear end of the sheet to the side against a guide by a series of blows administered to the edge of the sheet by a bumping device.

Referring to the drawings:

FIGURE 1 is a partly sectional plan view of the apparatus of the present invention, with a portion shown diagrammatically.

FIGURE 2 is a side elevation of the apparatus, with a portion removed.

FIGURE 3 is an end elevation of the apparatus taken along line 3—3 of FIGURE 1.

The accompanying drawings show a sheet piling station station 11 which may be one portion of a sheet handling line, not shown. A piler conveyor 13, which, as shown, may comprise a roller conveyor having rolls 15 to convey an even pile of sheets away from the piling station 11, is adapted to support a pallet or other supporting platform such as parallel wood-topped channel beams 17, which support the aligned sheets as shown. A movable backstop 19, which may be supported by any suitable overhead support, not shown, is located above the piler conveyor 13. Backstop 19 is preferably movable longitudinally along piler conveyor 13 in order to accommodate the piling of different length sheets, and usually will be provided with a slightly resilent contact surface 21 of some suitable material such as wood or plastic which will not damage the edges of the sheets.

Two side guides 23 and 25 are supported and positioned by hydraulic or pneumatic cylinders 27 and 29, and 31 and 33 respectively, above piler conveyor 13. Cylinders 27, 29, 31 and 33 are supported on appropriate bases 38, 30, 32 and 34, respectively. Side guides 23 and 25 are positioned by their supporting cylinders during piling in a slightly wedge shaped arrangement with the open end upstream, so that the distance between the side guides at a downstream location in line with contact surface 21 of backstop 19 will be substantially the same width as the

width of the forward end of the sheets being delivered to the piler, while the upstream ends 23*a* and 25*a* of the side guides 23 and 25 nearest the supporting cylinders 29 and 33, respectively, will be slightly farther apart than the width of the rear portions of the sheets being piled. It has been found that a distance between upstream ends 23*a* and 25*a* of side guides 23 and 25 of approximately ¼ inch greater than the corresponding width of the rear portions of the sheets is a suitable opening for most applications.

Top sections 24 and 26 of side guides 23 and 25 respectively, are bent outwardly, as may be seen in FIGURE 3, to more effectively guide the sheets into a central position between the guides.

Sheets of metal, such as sheet 35, shown entering piling station 11, and sheet 36, shown about to enter the side station, are delivered to the piling station by any suitable means such as belt conveyor 37 positioned at a level above piling station 11. As the sheets are delivered from the end of belt conveyor 37 they pass across the top of wind box 39. A carrying roll 41 journaled adjacent the top of wind box 39 aids in supporting the sheets as they pass over the wind box. As the sheets pass over wind box 39 a blast of air impinges upon the bottom of the sheets and aids in supporting them. A body of air is also momentarily trapped under the sheet and cushions the descent of the sheet upon the pile of sheets 43 already aligned upon supporting channels 17 as the sheet passes beyond carrying roll 41.

A bumper assembly 45 is supported by a bracket 47 on the end 25*a* of side guide 25 adjacent the rear end of the pile of sheets 43. Bumper assembly 45 comprises an air cylinder 49 containing a double-acting piston 50, shown in dotted outline, to which is connected a piston rod 51 on the end of which is mounted a rubber tipped bumper 53. Bumper assembly 45 is so mounted that oscillations of piston 51 will cause bumper 53 to intermittently contact the edge of the rear porition of the descending sheets after the rear of the sheets pass beyond carrying roll 41.

The assembly 45 is so positioned that the stroke of piston rod 51 is such as to carry bumper 53 back beyond side guide 25 on the bank stroke to retract the bumper from under the descending sheets and to carry the bumper 53 forward to a position nearly or just contacting the edge of a sheet resting against side guide 23 on its forward stroke.

Periodic oscillations of bumper 53 may be generated by means of any suitable control system, such as, for example, that shown diagrammatically in FIGURE 1, which applies alternate air pulses to cylinder 49 through air lines 55 and 57. Air for the pulses is conducted from an air source 59 through line 61 including filter 63, pressure regulator 65, and air lubricator 67 to a four way single solenoid spring return air valve 69 which directs the air from source 59 into either line 55 or line 57 depending upon the position of the valve as determined by the condition of solenoid 71 which is operatively connected to four way valve 69.

Solenoid 71 is activated by current from any suitable source 73 applied through switch 75 and a signal timer 77. The oscillations of bumper 53 need not be timed with the descent of the sheets onto the pile. A simple periodic oscillation is all that is necessary.

Preferably side guide 23 will be aligned at right angles with wind box 39 and carrying roll 41, and substantially parallel to the path of the sheets as they are delivered to piling station 11. The angle of the opposite side guide 25, which converges toward side guide 23, will then provide a substantially greater portion of the wedging effect of the converging side guides to align the sheets.

During operation of the sheet piler, sheets such as 35 and 36 are delivered from belt conveyor 37 over carrying

roll **41**. A blast of air from wind box **39** serves to slow the descent of the sheets onto the pile of sheets **43** already aligned and to facilitate the movement of the forward end of each sheet farther towards the downstream end of the piler before it contacts the already piled sheets. The forward ends of the sheets are contacted by one or the other of side guides **23** and **25**, but more usually by side guide **25** and directed toward backstop **19** and also toward the opposite side guide since the side guides converge. Just as the forward end of the sheet contacts backstop **19**, its forward corners will contact both side guides **23** and **25** and the forward end of the sheet will thus be aligned in a lateral direction. In the meantime the rear end of the sheet will have just passed beyond carrying roll **41** and will be descending under the influence of gravity towards the pile of sheets **43**, its descent being decelerated by the increased pressure of the body of air trapped under it from wind box **39**. As the rear end of the sheet descends upon the pile of sheets **43**, one edge will be contacted by periodically oscillating bumper **53** on one or more forward oscillations; the rear of the sheet will be gently bumped against side guide **23**, and, as it descends, will be prevented from springing away from side guide **23** by the continuing oscillations of the bumper **53**. Since the forward end of the sheet is caught between the two side guides, it cannot be displaced laterally as the rear of the sheet is bumped into place, and the only adjustment of the forward end is a longitudinal movement of the forward corners of the sheet to align it with the pile of sheets **43** already aligned.

The periodic pulsations of the bumper **53**, which are not synchronized with the descent of the sheets, do not interfere with other operations of the piling station, and can go on continuously, if desired, whether sheets are descending onto the pile **43** or not. As soon as a sheet descends from conveyor **37**, it will be acted on by bumper **53** and aligned. Each sheet is thus effectively aligned. Small changes in camber, stray metal pickup of the sheet edges, and small width changes in the sheets have no effect on the operation of the piler. Furthermore, all the operating parts of the apparatus are reliable, have long service lives, and yet are easily replaceable, so that down time due to mechanical difficulties is effectively minimized.

I claim:

1. A sheet piling device for vertically aligning the edges of rectangular metallic sheets comprising:

(a) means for feeding rectangular metallic sheets serially to a piling station upon which the sheets settle by gravity after being discharged by the feeding means,

(b) means to terminate forward movement of the sheets over the piling station,

(c) side guide means defining the sides of the piling station, said side guide means being arranged so that the distance therebetween becomes progressively less from the end of the feeding means to a point where the guide means are the same distance apart as the width of the sheets,

(d) a bumper means located adjacent to and below the feeding means and adjacent one end of one side guide means, and

(e) means to intermittently oscillate said bumper means to bump said sheets against the opposite side guide means as the sheets descend from the feeding means.

2. The apparatus of claim **1** wherein

(f) one of said side guide means is disposed substantially parallel to the path of the sheets as they are fed to the piling device.

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