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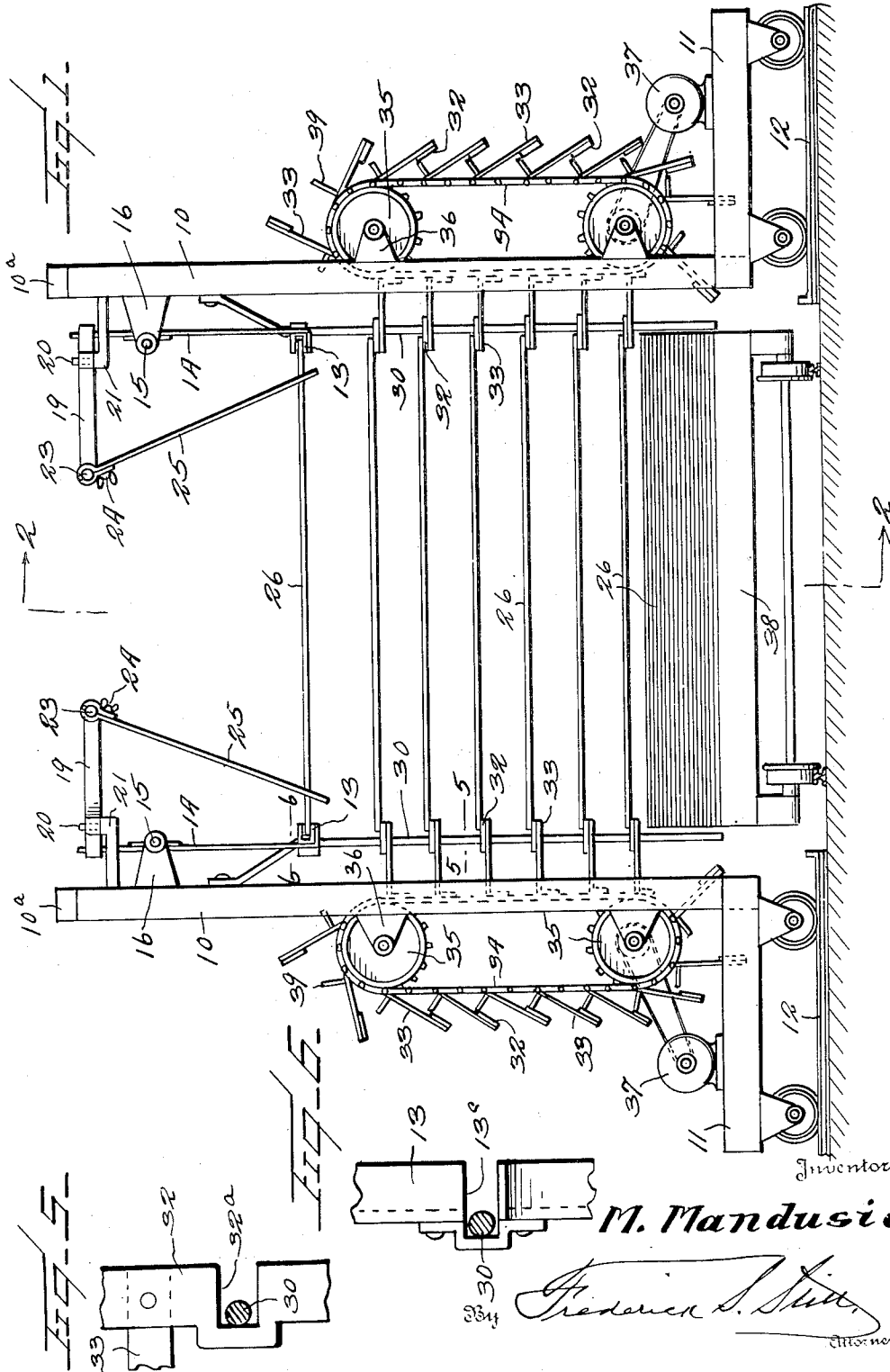
M. MANDUSIC

2,010,732

SHEET HANDLING APPARATUS

Filed Sept. 11, 1934

2 Sheets-Sheet 1



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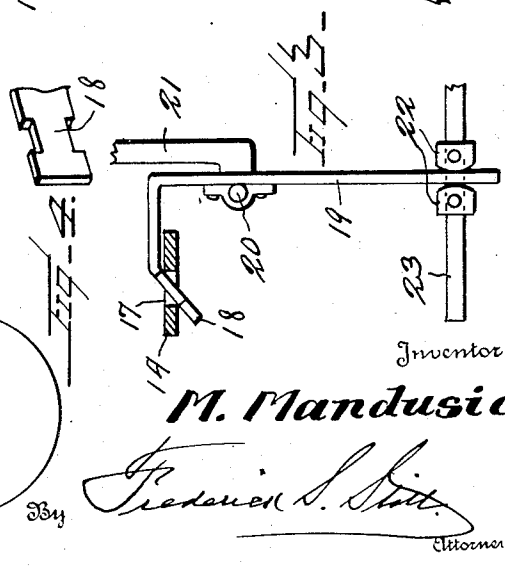
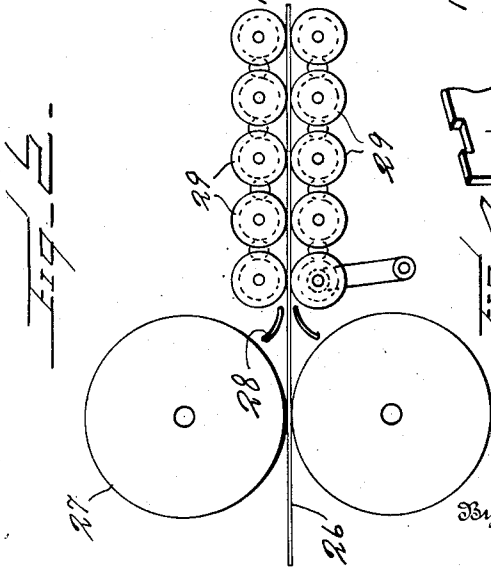
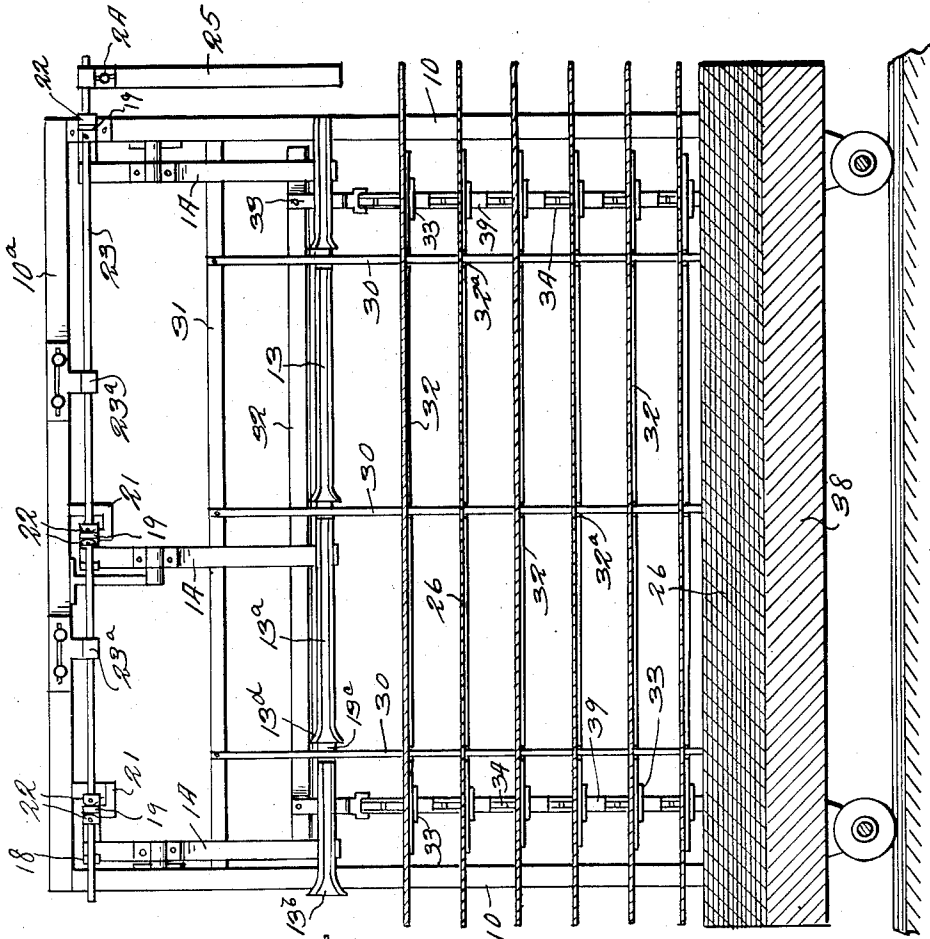
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SHEET HANDLING APPARATUS

Filed Sept. 11, 1934

2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,010,732

## SHEET HANDLING APPARATUS

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7 Claims. (Cl. 271—38)

This invention comprehends certain new and useful improvements in sheet handling and piling apparatus, and relates particularly to an improved mechanism for handling sheets as they are discharged from the cold rolls of the mill.

The primary object of the invention is an apparatus of this character which will handle the sheets automatically and in such a manner as to obviate any liability of the sheets being scratched or deformed, and which will entirely do away with the manual labor heretofore incidental to the handling and piling of the sheets, the apparatus not only handling the sheets better and more expeditiously than is possible by hand labor, but also effecting economies in dispensing with the cost that manual labor would involve.

A further object of the invention is an apparatus of this character which is simple in construction, easy to adjust and manipulate with sheets of varying lengths and widths, and not liable to get out of order.

A further object of the invention is to provide means whereby the sheets as they come into position over the piling station are gently lowered onto a supporting surface, the lowering means being so constructed as to be capable of lateral sliding movement to remove the lowering means from engagement with the sheet without scratching or otherwise marring the sheet.

With these and other objects in view, as will more fully appear as the description proceeds, reference is to be had to the accompanying drawings, wherein

Figure 1 is an end view of a sheet handling and piling apparatus constructed in accordance with my invention.

Fig. 2 is a side elevation in the nature of a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a detail plan view illustrating one of the tripping rods and its concomitant parts, hereinafter specifically described.

Fig. 4 is a fragmentary perspective view of one end of one of the levers which is engaged by the tripping rods.

Fig. 5 is a detail fragmentary plan view, on the line 5—5 of Fig. 1, of one of the sprocket operated sheet receiving devices, and

Fig. 6 is a similar view of one of the channeled bars that are adapted to receive and temporarily hold the sheet as it comes from the cold rolls of the mill.

In carrying out my invention, I provide two vertically disposed frames 10 that are complementary one to the other and which are similarly

constructed, so that a description of one will suffice for both. Each frame 10 is preferably mounted upon a wheel-supported carriage 11 designed to run upon rails 12 that extend at right angles to the direction of passage of the sheets to be handled and made into a pile whereby the two frames may be set and maintained at predetermined distances apart, according to the width of the sheets being handled.

13 designates a sheet receiving rail which is channeled, as at 13<sup>a</sup>, to receive the side edges of the sheets to be handled, and this rail 13 is supported by means of depending arms 14 which are pivotally mounted intermediate of their ends, as at 15, upon brackets 16 carried by the frame 10 whereby the arms 14 and the channeled receiving bars which are supported at their lower ends are permitted to swing laterally, as will be hereinafter more specifically described. There are three arms 14 for each frame, in the present instance, although it is to be understood that any other desired number may be employed.

The arms 14 are slotted at their upper ends, as at 17, to receive and engage the preferably notched laterally extending ends 18 of horizontally disposed levers 19 fulcrumed, as at 20, on brackets 21 that are carried by the frame 10 and which project inwardly therefrom whereby a loose jointed connection is had between the arms 14 and the levers 19, as best illustrated in Figs. 3 and 4. Inwardly extending portions of the levers 19 extend between blocks 22 that are secured in any desired way upon a trip rod 23, and to the trip rod 23 is adjustably secured, by means of a set screw 24 or other connection, a trip finger 25 which is designed to be engaged by the front edge of the sheets 26 as they are received from the cold rolls of the mill and passed or transferred to my improved sheet handling and piling mechanism. The trip rod 23 is supported by means of any desired number of guide members 23<sup>a</sup> adjustably mounted upon the upper longitudinally extending bar 10<sup>a</sup> of the frame 10.

From so much of the description as has preceded in connection with the accompanying drawings, it will be understood that as a sheet 26 passes thru the cold rolls 27 through a guide 28, the sheet will be received between feeding rollers 29 that may be driven by any desired means (not shown) as for example, waste power derived from the cold roll motor, said rollers 29 passing the sheet into and between the channeled receiving rails 13, carried by the frames 10 that are set facing each other at the required distance apart according to the width

of the sheet, as clearly illustrated in Fig. 1. The channels 13<sup>a</sup> of the receiving bars 13 are relatively narrow so that by engagement with the upper and lower faces of the sheet at the side edges thereof, the sheet is maintained level and precluding the possibility of the sheet buckling by its own weight and drawing its lateral edges out of the channels. If the channels are relatively wide and the sheet buckles, there is nothing to prevent said edges of the sheet from being withdrawn from the channels, but by having the channels narrow, the edges of the sheet if the sheet buckles, will strike the upper walls of the channels and thus prevent the sheet from buckling so much as to fall out from the supporting channels. As the sheet is thus passed into and between the receiving bars 13 of the apparatus, its front edge eventually will strike the depending trip fingers 25 whereupon the continued movement of the sheet will move the rods 23 in a direction to swing the levers 19 so as to move the upper ends of the arms 14 inward and the lower ends of the arms 14 outward, which manifestly will cause the channeled receiving bars 13 to release the sheet.

I shall now describe what happens to the sheet when it is released from the complementary receiving rails of the apparatus, but first, let me point out the fact that each receiving rail 13 is formed at its receiving end with a flared portion 13<sup>b</sup> to insure the proper guidance of the sheet into the channels 13<sup>a</sup>, and said rails are further formed intermediate of their ends with notches 13<sup>c</sup> to accommodate vertically disposed guide rods 30, of which there are three in number in the present instance, although any desired number may be employed, these guide rods being supported by means of longitudinally extending bars 31 to which their upper ends are connected and extending downwardly from the said bars 31 in inwardly offset relation to the frames 10. Obviously the rods 30 are designed to insure the downward movement of the sheets 26 in a proper plane whereby finally the sheets will be properly piled one upon the other and a practically perfect pile formed.

When a sheet 26 is automatically released by and from the receiving bars 13, as hereinbefore described, it is caught at its side edges and rests upon longitudinally extending strips 32 that are connected by any desired means to fingers 33, said fingers being pivotally carried by and forming parts of sprocket chains 34 mounted to pass over and around upper and lower sprockets 35 that are journaled in brackets 36 that are carried by the frames 10, as clearly illustrated in Figs. 1 and 2, and these sprocket chains 34 are adapted to be driven preferably by electric motors 37 run at the desired speed whereby the sheets are one after the other lowered gently upon a carriage or truck 38 on which they may be moved away when a pile of desired size is formed.

The fingers 33 are pivotally mounted upon the chains 34 and are provided with heel portions 39 whereby they may be freely turned in one direction, but will be prevented from moving beyond a predetermined point in the opposite direction, as clearly illustrated in Fig. 1, whereby it will be understood that as these fingers and their strips 32 receive the sheets one after another from between the outwardly moved channeled bars 13 they will be gently and easily lowered upon the carriage 38 one upon the other, the pivotal mounting of the fingers 33 permitting them to slide or gently

strip themselves from the side edges of the sheet as it is laid upon the pile whereby all liability of scratching or otherwise injuring the sheet is avoided.

It will be seen that by pivotally mounting the fingers 33 upon the chains 34, and providing the stops 39, that the fingers will successively fall over into the horizontal position beneath and closely adjacent to the channeled rails 13, so that when the channeled rails are shifted away from each other the sheet will drop only a short distance and landing upon the strips 32 carried by the fingers; that the fingers will then move downward until the fingers strike the upper face of the uppermost sheet of the pile of sheets on the truck 38, and that then the inner end of the finger moves with the chain 34, and that the finger thus will be gradually withdrawn from beneath the margin of the sheet and the sheet gently deposited upon the pile of sheets. On the other hand if there are no sheets previously piled upon the truck 38 or only a very few sheets, the fingers 33 will move downward until a position is reached wherein the sheet 26 is in proximity to the upper face of the truck 38 and then the fingers will move downward and outward letting the sheet slide gradually downward and eventually dropping the sheet a short distance onto the truck 38. It will, of course, be understood that the motors 37 are to be run in synchronism with each other so that the fingers 33 will always be properly opposed and in line with each other, and that the speed of the motors will be correlated with the speed of the feeding rolls so as to bring a pair of fingers beneath the lateral edges of the sheet just before the rails 13 are moved outward to drop the sheet upon the fingers.

As clearly illustrated in Fig. 5, the strips 32 are notched, as at 32<sup>a</sup> so as to accommodate the guide rods 30, hereinbefore mentioned.

Preferably each of the receiving bars 13 is formed not only at its receiving end with a flared mouth 13<sup>b</sup>, but at each notch 13<sup>c</sup> with a corresponding flare 13<sup>d</sup> just in the rear of one of the guide rods 30. This is clearly illustrated in Fig. 2.

It will thus be seen that I have provided a very simple, durable, and efficient construction of sheet handling and piling apparatus which may be very easily and efficiently operated at a minimum of cost, and which will properly handle metal sheets and make them into a perfect pile automatically and without any liability of their becoming scratched, deformed, or otherwise injured.

The trip fingers 25 are held in an adjustable manner on the rods 23, as hereinbefore stated. This is necessary so that the positions of the trip fingers may be varied and they may be fastened to the rods at different points along the rods according to the length of the sheets to be handled. The apparatus is thus capable of handling sheets of various sizes, the widths of the sheets being compensated for by the adjustment of the frames 10 towards or from each other and the different lengths of sheets being provided for by changing the position of the trip fingers 25 along the rods 23, as just mentioned.

While I have illustrated the preferred embodiment of my invention, it is to be understood that the invention is not limited thereto, and that various changes may be made in the construction, arrangements, and proportions of the parts without departing from the scope of the invention as claimed.

What is claimed, is:

1. A sheet handling and piling apparatus com-

prising confronting frames, depending arms pivotally mounted intermediate of their ends and supported by said frames in the space between the latter for lateral movement, sheet receiving rails secured to the lower ends of said arms, trip fingers, means for feeding sheets to said rails and into engagement with said trip fingers, levers fulcrumed intermediate of their ends and carried by said frames above said rails, rods carrying said trip fingers and engaged by the inner ends of said levers, and a jointed connection between the other ends of said levers and the upper ends of said depending arms, as and for the purpose set forth.

15 2. A sheet handling and piling apparatus comprising confronting frames, laterally swinging arms carried by said frames in the space between the latter, sheet-receiving rails secured to the lower ends of said arms, means for feeding sheets to said rails, tripping devices actuated by the sheets as they are fed to said rails for automatically moving said rails in a direction to release the sheets, and receiving means for said sheets including sprocket chains, fingers carried by said chains and having limited movement in one direction, and strips carried by said fingers and adapted to receive the sheets one after another upon the release of the sheets from said rails.

30 3. A sheet handling and piling apparatus comprising confronting frames, laterally swinging arms carried by said frames in the space between the latter, sheet receiving rails secured to the lower ends of said arms, means for feeding sheets to said rails, tripping devices actuated by the sheets as they are fed to said rails for automatically moving said rails in a direction to release the sheets, and receiving means for said sheets including a plurality of longitudinally extending strips, fingers carrying said strips, sprocket chains carrying said fingers, the latter having a limited movement in one direction, and means for moving said chains to carry the fingers successively beneath the sheet receiving rails, as and for the purpose set forth.

45 4. A sheet handling and piling apparatus comprising confronting frames, laterally swinging arms carried by said frames and mounted in the space between the latter, sheet-receiving rails carried by said arms, means for feeding sheets to said rails, trip fingers, longitudinally extending rods upon which the trip fingers are adjustably held, said rods being movably supported by said frames, levers fulcrumed on said frames and engageable with said rods to be moved by the latter, and a jointed connection between said levers and the depending arms at the upper end of the latter, said rails being longitudinally chan-

neled, the channels being flared at their receiving ends.

5 5. A sheet handling and piling apparatus comprising confronting frames, laterally swinging arms carried by said frames, and mounted in the space between the latter, sheet-receiving rails carried by said arms, means for feeding sheets to said rails, trip fingers, longitudinally extending rods upon which the trip fingers are adjustably held, said rods being movably supported by said frames, levers fulcrumed on said frames and engageable with said rods to be moved by the latter, a jointed connection between said levers and the depending arms at the upper end of the latter, said rails being longitudinally channeled, the channels being flared at their receiving ends; and vertically disposed guide rods carried by said frames, the rails being notched to accommodate said guide rods.

20 6. A sheet handling and piling apparatus comprising confronting frames, means for supporting said frames for movement toward or from each other to accommodate different widths of sheets, laterally movable sheet receiving rails supported by said frames in the space between the frames, means for feeding the sheets into said space onto said rails, and means for automatically shifting said rails away from each other to permit the sheets to drop including longitudinally extending shafts carried by the frames, trip fingers extending radially from said shafts at the rear ends of the frames, and a jointed connection between said trip fingers and the supports for said rails adapted to move the rails away from each other and release the sheets upon the engagement of a sheet with said trip fingers, the fingers being mounted upon said shafts for swinging movement toward or from each other to accommodate sheets of different widths and compensate for adjustments between the two frames.

30 7. A sheet handling and piling apparatus including confronting frames, channeled sheet receiving rails carried by said frames for lateral movement toward or from each other, vertical guide bars operatively supported upon said frames, the rails being outwardly slotted at intervals to accommodate said guide bars, means for feeding the sheets into the channels of said bars, and means disposed opposite the receiving ends of the frames in the path of movement of the sheets and acting when engaged by said sheets to shift the rails away from each other to thereby release the sheet supported by said rails and permit it to drop between said guide rods, the rails acting by gravity to return the trip means to its initial position.

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