May 8, 1934. A. G. DELANY 1,958,133

SHEET PILER

Filed Nov. 18, 1932 2 Sheets-Sheet 1

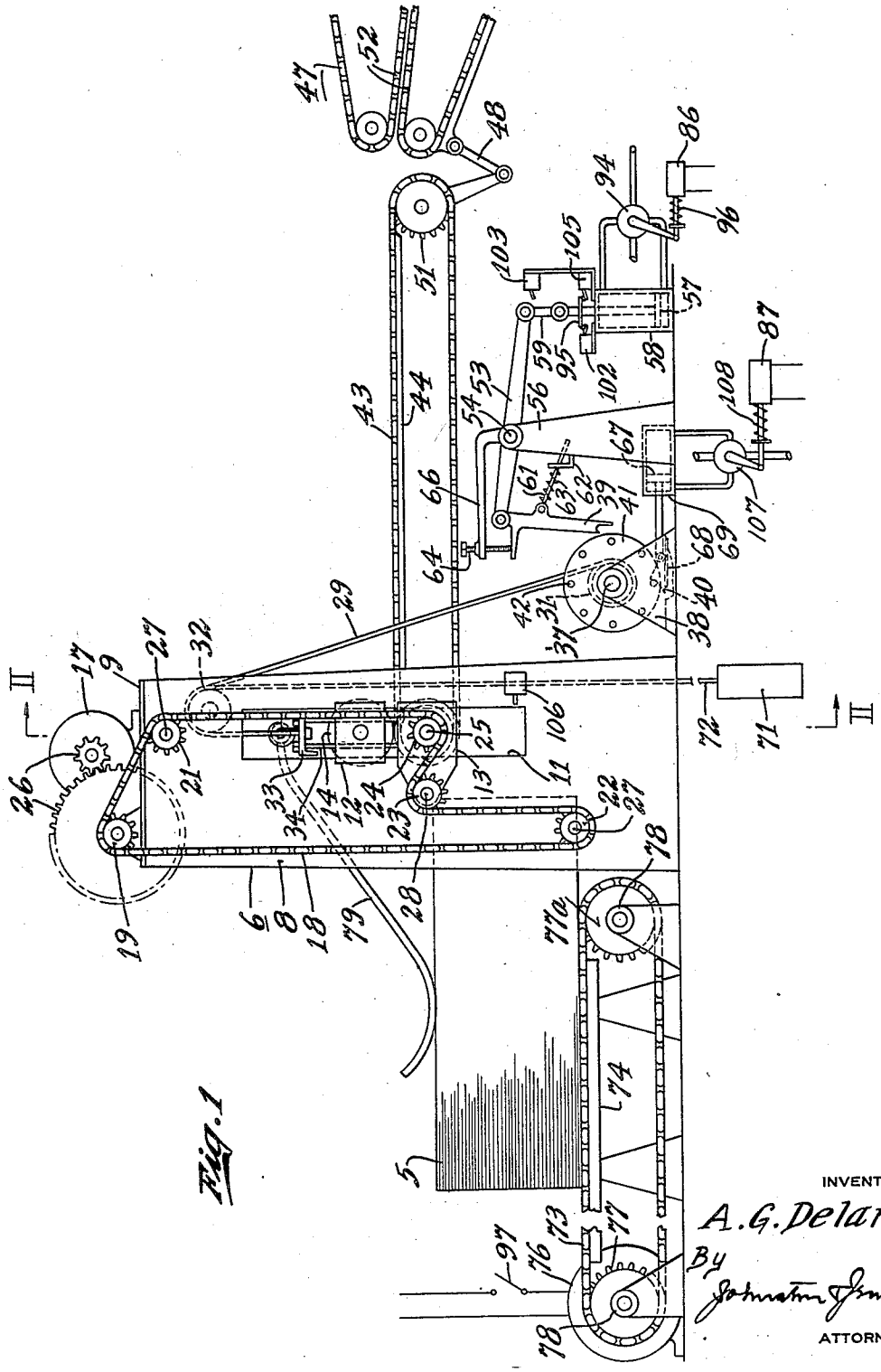


Fig. 1

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Fig. 2

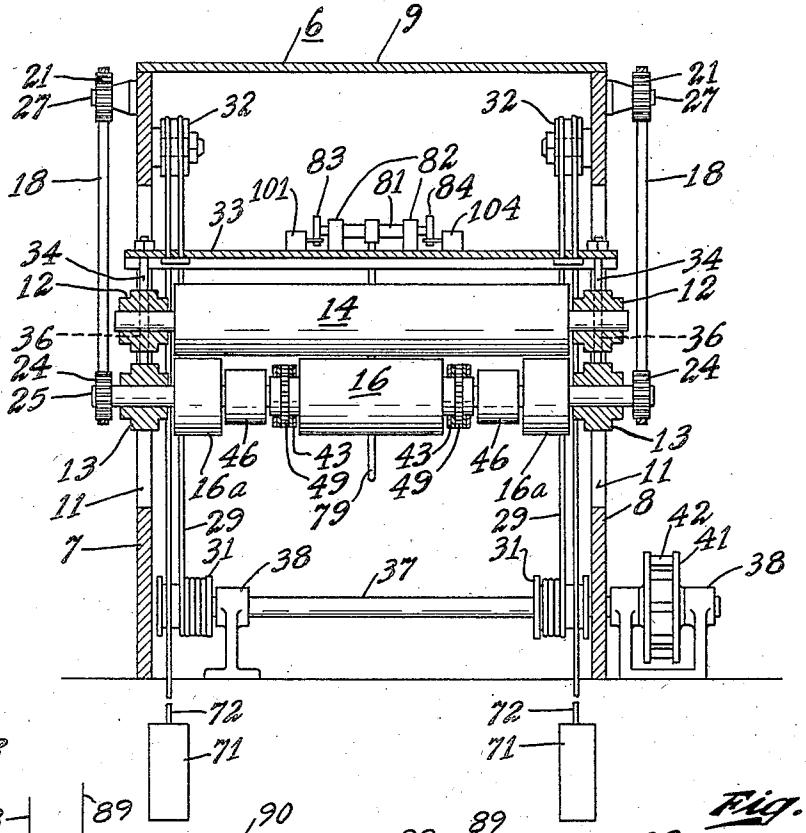


Fig. 3

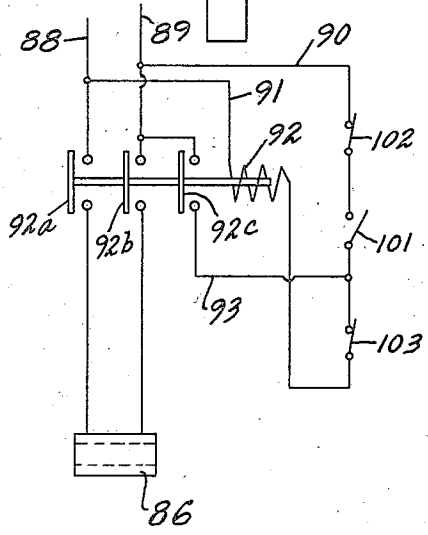
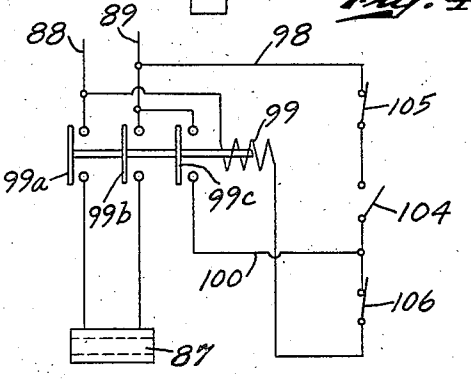


Fig. 4



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1,958,133

UNITED STATES PATENT OFFICE

1,958,133

SHEET PILER

Albanus G. Delany, Alabama City, Ala., assignor to Gulf States Steel Company, a corporation of Delaware

Application November 18, 1932, Serial No. 643,143

12 Claims. (Cl. 198—35)

My invention relates to a piling machine for receiving sheets, plates, packs and the like from rolling mills and depositing the same in a pile, preferably upon a suitable conveyor, with automatic appliances provided for the periodic lifting of the delivery end of the piler as the piling operation proceeds and when the pile is completed and removed for the quick and automatic return of the piler to lowered or initial position ready to repeat its cycle of operation.

My invention is particularly concerned with devising a piling machine which is simple, comparatively inexpensive and which shall possess the qualification of rapid adjustment, particularly in respect of its return movement from highest to initial operating position. The importance of a quick return lies in that the piler is intended for use with automatic rolling mills in which the hot stock is delivered from the heating oven at timed intervals and is automatically manipulated in making its passes through the mill so that the rolling cycle of each sheet or pack is accomplished within a minimum of time, thereby permitting the maximum expansion of the sheet without the necessity of reheating. All of the agencies called upon to handle the sheet stock from its initial pass into the mill to its delivery as a finished sheet on the pile are required to function rapidly in order that no delay shall be imposed on the rolling operations and to this end it is essential that the piler having been adjusted to its uppermost position shall be returnable to lowered position within the time limit of a sheet rolling cycle so that it will be ready after delivery of one sheet in its uppermost position to receive the next succeeding sheet in its lowermost position.

A further object of my invention which is of importance where the piler feed table is connected to and movable with a tilting catcher, is that its conveyors and feed rolls for the sheets shall be driven from the discharge end of the piler feed table and to this end I have devised a novel means for driving the feed rolls and conveyors from a stationary motor to the free end of the movable table.

My invention further contemplates controlling the vertical movements of the piler feed table by a trip controlled pawl and ratchet feed, preferably associated with electrical means for effecting the automatic functioning of air cylinders to manipulate the pawl and ratchet mechanism.

My invention further contemplates controlling the automatic adjustments of the piler by an elongated control arm under which the piler feed table rolls act to force the sheets as they are piled, this arm serving both to hold-down the sheets and after it has been raised through a predetermined angle by the accumulating pile of sheets it will trip mechanism adapted to effect a vertical step adjustment for the feed table.

My invention further contemplates associating the piler feed table with a conveyor for the removal of the piled sheets, there being means automatically responsive to the actuation of this latter conveyor to accomplish the quick return of the feed table to its lowered position.

My invention embodies other novel features and details of construction which will be hereinafter set forth and shown in the accompanying drawings, wherein:—

Fig. 1 is a side elevational view of my improved machine;

Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a wiring diagram showing the circuit for controlling the lifting mechanism; and

Fig. 4 is a wiring diagram showing the circuit for controlling the lowering mechanism.

Referring now to the drawings for a better understanding of my invention, I show a frame 6 having sides 7 and 8 and a top 9. Each side of the frame is provided with a slot 11 to serve as a guide for an upper roll slide 12 and a lower roll slide 13 for vertical movement. An upper roll 14 is journaled in the upper slides 12 and a lower roll 16, having a pair of auxiliary rolls 16*a*, is journaled in the lower roll slides 13 to receive and stack the sheets as they pass from a rolling mill.

A motor 17 is mounted on the top 9 of the frame to drive the lower roll 16, in a direction to carry the sheets away from the rolling mill, by means of a pair of driving chains 18 which pass around the driving pinions 19 and idler gears 21, 22 and 23 to the driven gears 24 secured to the ends of the lower roll shaft 25. The motor drives the pinions 19 through suitable reduction gears 26. The idler gears 21 and 22 are mounted for rotation on stud shafts 27 secured to the sides of the frame 6, and the gears 23 are journaled on stud shafts 28 provided on the lower slide members 13.

A pair of cables 29, which are provided to raise and lower the roll slides, have their one ends secured to drums 31 and their other ends extending over idler pulleys 32 and attached to a channel member 33 which, in turn, is secured to the lower roll slides 13 by means of two pairs of rods 34. The rods 34 pass through holes 36 provided in the upper slides which are thus free to move ver-

tically with respect to the lower slides. The cable drums 31 are secured on a shaft 37 journaled in bearings 38 and rotated by means of a pawl 39 and a ratchet wheel 41. The ratchet wheel is secured to the shaft 37 and provided with a suitable number of equally spaced pins 42 for engagement by the pawl 39 and stop dog 40.

The sheets are delivered to the rolls by a pair of feed table chains 43 mounted on a frame 44 which has its discharge end provided with journals 46 to engage the lower roll shaft 25 and its other end pivotally connected to a sheet catcher 47 by means of a connecting link 48. The chains 43 are driven by pinions 49 secured to the roll shaft 25 and pass around idler gears 51 provided at the receiving end of the frame 44. The end of the sheet catcher 47 shown in Fig. 1 of the drawings moves up and down, as disclosed in my copending application Serial No. 566,230, to pass the sheets back and forth through the mill rolls of a three high mill a suitable number of times after which, the catcher chains 52 deposit the finished sheet on feed table chains 43 for delivering to the stacking rolls 14 and 16.

The pawl 39 is pivotally mounted at one end of a walking beam 53 which is journaled at 54 in a bearing 56. A piston 57, mounted in a cylinder 58, is provided to actuate the walking beam through a link connection 59 and can be operated by air, oil, etc., as desired. A guide rod 61, pivotally connected to the pawl and passing through a hole formed in the guide bracket 62, carries a spring 63 to bias the pawl into engagement with the ratchet pins 42 to rotate the ratchet wheel 41 and, an adjustment screw 64 is provided on a bracket 66 to engage and move the pawl away from engagement with the pins 42 on its return movement.

After each setting of the rolls 14 and 16, the ratchet wheel 41 is engaged by the stop dog 40 which is pivotally mounted at the end of a piston 67 and biased upwardly into engagement with the ratchet pins 42 by a flat spring 68. The piston 67 is mounted in a cylinder 69 and actuated to draw the stop dog out of engagement with the ratchet wheel to lower the rolls 14 and 16 to their first position by gravity. In order to prevent a too rapid lowering of the rolls, counterweights 71 are provided at the ends of the cable 72 which passes over the idler pulleys 32 for engagement with the channel member 33.

The sheets of steel 5 are stacked by the rolls 14 and 16 on a conveyor belt 73 which is adapted to be driven across a table 74 provided with rollers (not shown) by means of a motor 76. This belt is mounted on a driving sprocket 77 and an idler sprocket 77*a* which are journaled in suitable bearings 78.

An arm 79 is provided to control the mechanism employed to raise and lower the rolls 14 and 16 and is secured to a shaft 81 journaled in bearings 82 provided on the channel member 33. A pair of cams 83 and 84 are secured to the shaft 81 for engagement with switches 101 and 104 respectively to set up circuits controlling the roll lifting solenoid 86 and roll lowering solenoid 87. The circuits employed to control the vertical movements of the rolls will be hereinafter described in connection with the brief description of the complete operation of the machine.

In operation, the rolls 14 and 16 and the feed table chains 43 are driven continuously by the motor 17 to deliver and stack sheets passing from the sheet catcher 47 onto the conveyor belt 73. As the stack increases in height, it pivots the control arm 79 causing the cam 83 to close the switch 101 which completes a circuit from the power lines 88 and 89 through leads 90 and 91 to a coil 92. When the coil is thus energized, it closes the switches 92*a*, 92*b* and 92*c* to complete a circuit to the roll lifting solenoid 86 and also to complete a holding circuit for the relay through the switch 92*c*, leads 93 and 90, coil 92 and lead 91 (Fig. 3).

The energization of the solenoid 86 actuates the valve 94 to raise the piston 57 which acts to rotate the cable drum 31 to move the rolls 14 and 16 one step. As the piston moves upwardly, a collar 95 is adapted to open the switch 103 to break the holding circuit to the relay 92 and permit the spring 96 to actuate the valve 94 to lower the piston. A safety switch 102 is interposed in the lead 90 to be closed by the collar 95 on the return of the piston to the bottom of the cylinder after the opening of the switch 103. This step by step movement of the rolls takes place until the stack has reached the desired size, after which an operator closes the switch 97 controlling the motor 76 to remove the completed stack of sheets 5 to another part of the mill.

When the stack of sheets passes from under the control arm 79 the latter will fall and cause the cam 84 to close the switch 104 interposed in the lead 98 (Fig. 4) and energize the coil 99. When the coil is thus energized, it closes the switches 99*a*, 99*b* and 99*c* to energize the solenoid 87 and to form a holding circuit to the relay through the switch 99*c*, leads 100 and 98, relay 99 and lead 88. The solenoid then actuates a valve 107 to cause the piston 67 to draw the stop dog 40 out of engagement with the ratchet wheel 41 and permit the rolls to descend to their first position by gravity. On the return of the rolls to their lowest position, the slide 13 opens the switch 106 to break the holding circuit to the coil 99 and de-energize the solenoid 87. The spring 108 then actuates the valve 107 to cause the piston 67 to bring the dog 40 back into engagement with the ratchet wheel 41.

The safety switches 102 and 105 are provided to prevent the solenoids 86 and 87 being simultaneously energized, for when the stop dog 40 is retracted the pawl 39 must stand clear of the ratchet wheel 41. The safety switch 105 is interposed in the lead 98 and adapted to be held closed by the collar 95 when the pawl 39 is out of engagement with the ratchet wheel 41.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. In a piling machine for rolled metal sheets, a feed table having its discharge end vertically adjustable and adapted when released to drop quickly to lowered position, means responsive to the accumulating pile of sheets for raising said table end during the piling operation, and a control arm automatically operable to release the table for its return to lowered position responsive to the removal of the piled sheets.

2. In a piling machine for rolled metal sheets, a feed table having a discharge end adapted to be raised and lowered, a pawl and ratchet actuated mechanism adapted to raise the discharge end

of the feed table, stop means operable to hold the table and to release it for return to lowered position, and means adapted to automatically control the operation of said raising mechanism and lowering means responsive to the height and the removal of the pile of sheets.

3. In a sheet piling machine, a feed table conveyor having a discharge end, means provided to drive said conveyor, a hoisting cable means secured to the discharge end of said conveyor, a pawl and ratchet mechanism adapted to coact with said cable means to raise the discharge end of said conveyor step by step, a stop dog operable to release said cable means and permit the discharge end of the conveyor to return to its lowest set position by gravity, and an arm adapted to control the operation of the pawl and ratchet mechanism and the stop dog.

4. A device according to claim 3, in which separate coordinated means are provided for actuating the pawl and ratchet mechanism and the stop dog responsive to a change in position of the control arm.

5. In a piling machine adapted to stack sheets, a feed table having its discharge end vertically movable, sheet moving elements driven from said discharge end of the table and a drive for said elements comprising a serpentine flexible drive means having a stationary driving element and a driven element vertically movable with said table.

6. In a piling machine adapted to stack sheets received from a mill catching table, a feed table having a vertically movable discharge end provided with pinch rolls, and means adapted to drive said rolls comprising a serpentine belt adapted to permit free vertical movement of the belt driven parts on said discharge end of the feed table.

7. In a piling machine, a feed table conveyor, means adapted to raise the discharge end of the conveyor step by step throughout the piling operation, and means responsive to the removal of the completed stack for automatically lowering the discharge end of the feed table conveyor to its initial starting position.

8. In a piling machine, a feed table conveyor, a stack receiving conveyor positioned at the discharge end of the feed table conveyor, means adapted to raise the discharge end of the feed table conveyor step by step throughout the piling operation, and means responsive to the operation of said receiving conveyor in removing a completed stack for automatically lowering the discharge end of the feed table conveyor to its initial starting position.

9. In a piling machine, a feed table comprising sheet delivery rolls at its discharge end, means to drive said rolls, a trip arm carried by the table and resting on uppermost sheet on the pile, said rolls acting to force the sheets successively under said arm to raise it, and means responsive to the raising of the arm for elevating the table step by step.

10. In a sheet piling machine, a feed table, stationary guides between which its discharge end is vertically movable, pinch rollers at said discharge end, a serpentine chain drive for the vertically adjustable rollers, an elongated arm pivotally mounted above said rollers and disposed to rest by gravity on the pile of sheets, electro-magnetically controlled means controlled by the movement of said arm to raise the table as the pile rises, and electro-magnetically controlled means to lower the table responsive to the removal of the completed pile of sheets.

11. In a sheet piling machine, a table having sheet discharge means, a pawl and ratchet operated means to lift the discharge end of said table step by step, means responsive to the height of the sheet pile to energize said pawl and ratchet mechanism, counterweights to approximately counterbalance said table, a dog coacting with said ratchet and releasable to free the feed table to drop quickly by gravity to lowered position, and means to hold the pawl disengaged from the ratchet when the dog is released.

12. In a sheet piling machine, a table having sheet discharge means, a pawl and ratchet operated means to lift the discharge end of said table step by step comprising a fluid pressure motor and a walking beam driven thereby and carrying a pawl, means normally retracting the pawl from engagement with said ratchet, means responsive to the height of the sheet pile to energize said pawl and ratchet mechanism, counterweights to approximately counter-balance said table, a motor operated stop dog coacting with said ratchet and releasable to free the feed table to drop quickly by gravity to lowered position, and means to hold the pawl disengaged from the ratchet when the dog is released.

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