

July 26, 1938.

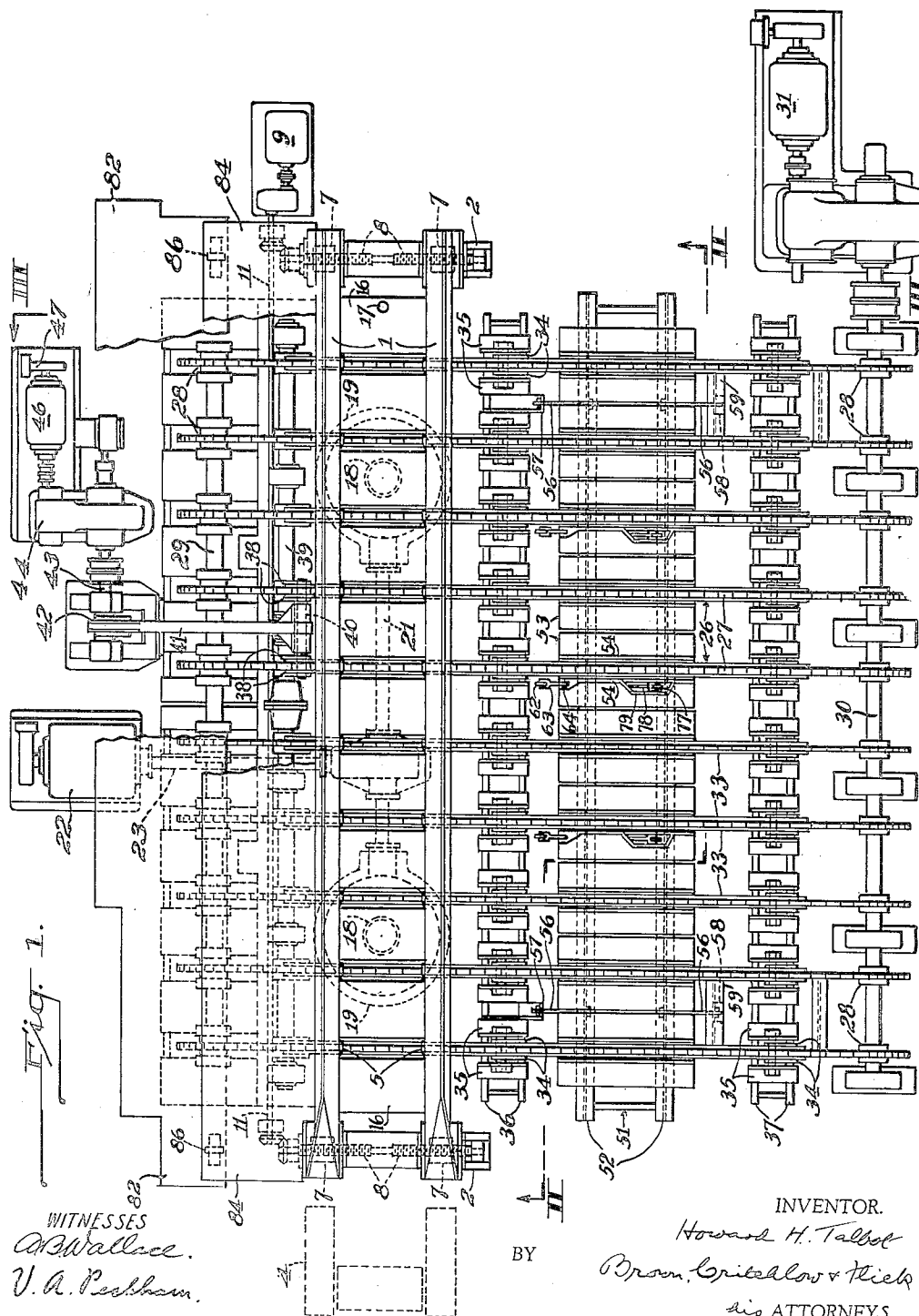
H. H. TALBOT

2,124,678

SHEET-HANDLING APPARATUS

Filed July 7, 1936

3 Sheets-Sheet 1



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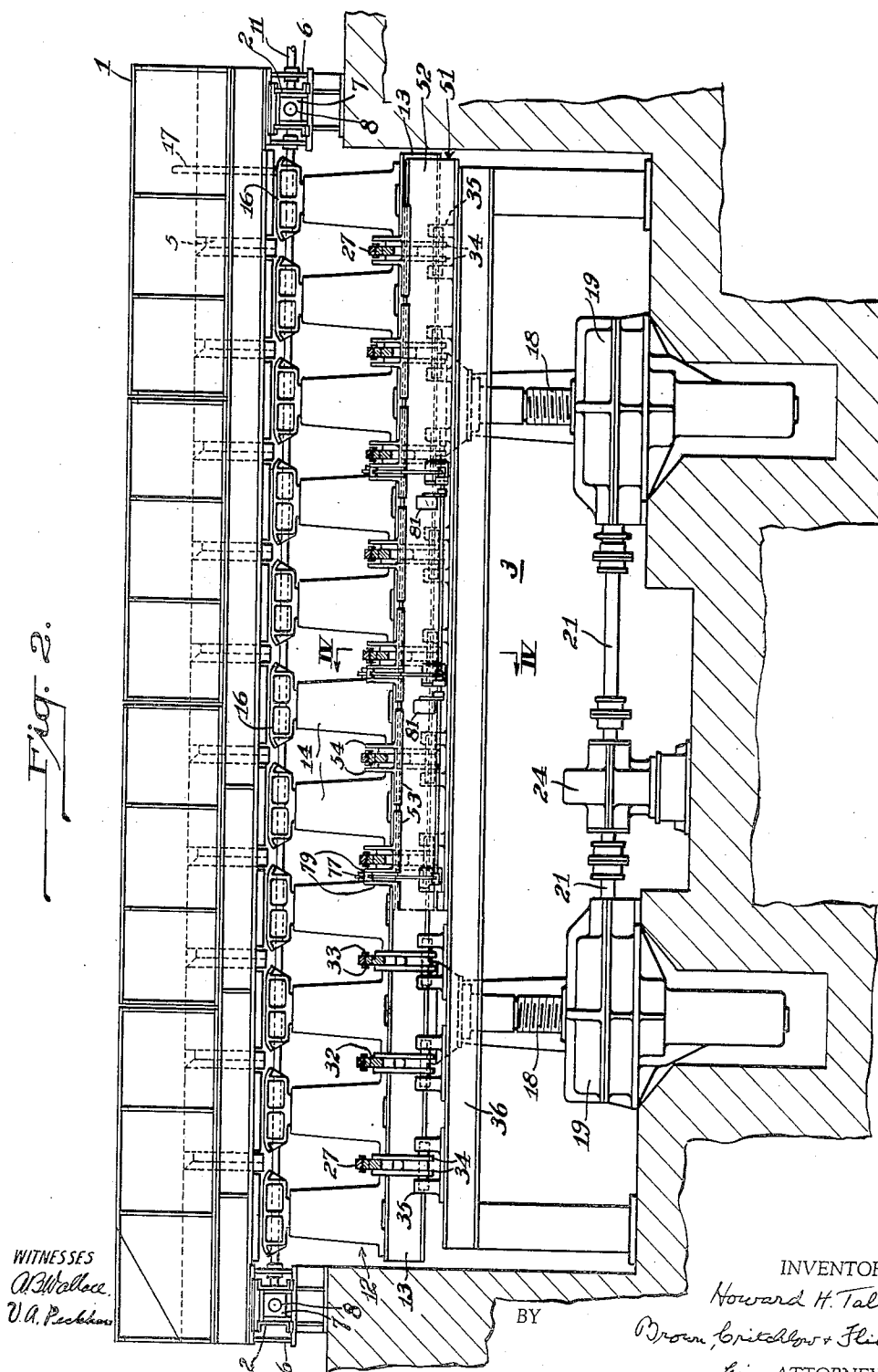
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3 Sheets-Sheet 2

Fig. 2.



WITNESSES
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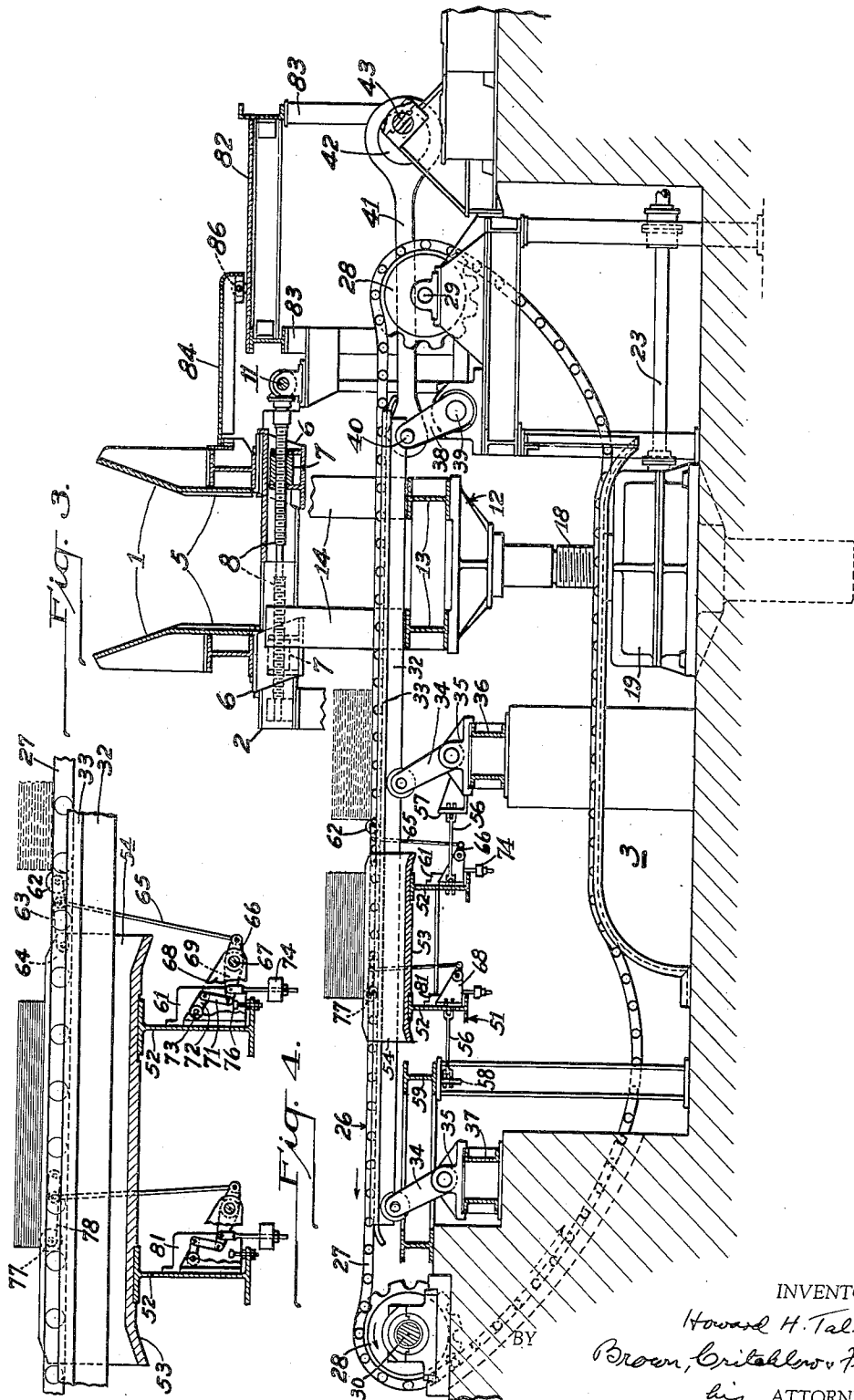
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SHEET-HANDLING APPARATUS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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SHEET-HANDLING APPARATUS

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17 Claims. (Cl. 214—2)

This invention relates to sheet-handling apparatus, and more particularly to apparatus for piling sheets and weighing the piles.

It is among the objects of this invention to provide sheet-handling apparatus which forms piles of sheets and transfers the piles to weighing mechanism without the use of a crane or the like, and which is fast and efficient in operation.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view, broken away in part, of the sheet-handling apparatus; Fig. 2 is an enlarged vertical longitudinal section taken on the line II—II of Fig. 1; Fig. 3 is an enlarged vertical transverse section taken on the line III—III of Fig. 1; and Fig. 4 is an enlarged detail in transverse section taken on the line IV—IV of Fig. 2 and showing a portion of the weighing scale.

In accordance with this invention metal sheets are fed in succession between adjustable side guards where they drop down onto an elevator and form a pile. The elevator is then lowered to deposit the pile on an endless conveyor that travels transversely of the elevator and carries the pile to a point above the weighing scale on which the pile is deposited by lowering the conveyor. After the pile has been weighed it is removed from the scale in any suitable manner, such as by an overhead crane.

Preferably, the conveyor comprises a plurality of parallel chains the upper portions of which extend through the elevator which is formed in horizontally spaced sections. Likewise, the scale is preferably formed in sections that project above the tops of the chains when the latter are in their lower position. By raising and lowering the chains a pile of sheets carried thereby can be carried to a point above the scale and then deposited thereon for weighing. The setting in operation of the various parts of the machine may be entirely automatic or only partly so, as desired.

Referring to the drawings, two parallel side guards 1 are slidably mounted at their ends on transverse hollow supporting members 2 open at their bottoms and mounted on a suitable foundation at each end of a pit 3. These side guards are for receiving metal sheets from delivery means 4, indicated in broken lines in Fig. 1, and for holding them in vertical alignment as they settle down between the guards. As shown in Fig. 3, the upper portions of the side guards are preferably inclined upwardly and away from each other to facilitate receiving the sheets between them, and their lower vertical walls are provided

with vertical ribs 5 that space the sheets from those walls to permit the rapid escape of air laterally from beneath the sheets so that they will quickly settle into place. The ends of the side guards are rigidly mounted on open-end boxes 6 that surround supporting members 2 along which they are slidable. Secured to the bottom of each box and projecting upwardly into the adjoining supporting member is a nut 7 threaded on one end of a screw 8 journaled at its ends in the supporting member. The ends of the screw are reverse threaded so that when they are turned by a motor 9 through a shaft 11 extending from one screw to the other, the side guards are quickly adjusted toward or away from each other to accommodate sheets of different widths.

To catch and support the sheets as they settle down between the side guards, so as to form a pile, an elevator 12 is mounted below the guards beneath the space between them, as shown in Figs. 2 and 3. This elevator is formed from a pair of parallel beams 13 extending lengthwise of the side guards and each supporting a plurality of horizontally spaced uprights or pedestals 14, the opposing pedestals on the two beams being arranged in pairs with their tops connected by a series of horizontally spaced tables 16. Rigidly mounted in the table farthest from delivery means 4 is an upwardly extending post 17 that serves as a stop for the sheets advancing between the side guards. To reciprocate the elevator vertically, beams 13 are mounted on a pair of screws 18 that extend downwardly through screw boxes 19 by which the screws are raised or lowered when shafts 21 are turned by a motor 22 through its drive shaft 23 and a speed-reducing unit 24.

When a pile of sheets has been formed on the elevator it is lowered onto a conveyor 26 by which it is carried laterally away from the elevator in a substantially horizontal plane, as indicated by the arrow, to receiving means. Preferably, the conveyor is in the form of an endless belt formed from a plurality of parallel horizontally spaced endless chains 27 the active upper portions of which travel horizontally and transversely of the elevator between the pedestals 14. These chains extend around sprockets 28 mounted on parallel shafts 29 and 30 disposed on opposite sides of the elevator, shaft 29 being adjacent the elevator and shaft 30 being spaced some distance therefrom and driven by a motor 31. There is slack in the chains for a purpose about to be described, and therefore to prevent the upper portions of the chains from sagging to an undesir-

able extent they are supported by bars 32 extending longitudinally thereof. Guide strips 33 are attached to both sides of each bar and project above it to prevent the chain supported thereby from slipping off the sides of the bar.

Each bar 32 is supported centrally and at its ends adjacent the sprocket shaft 30 by two pairs of levers 34 pivotally connected at their ends to the bar and to bearings 35 mounted on parallel beams 36 and 37 suitably supported at their ends in the pit. Pivotally connected to the other end of each bar is a pair of levers 38 the lower ends of which are rigidly mounted on a shaft 39 extending transversely of the bars. Connecting the ends of any two adjacent bars near shaft 39 is a short shaft 40 (Fig. 1) on which the inner end of a link 41 is pivotally mounted. The outer end of the link is provided with a circular opening in which is journaled an eccentric disc 42 rigidly mounted on a shaft 43. This shaft is driven through a gear unit 44 by a motor 45 controlled by an electric brake 47, and when the two bars to which the link is connected are moved longitudinally, the rest of the bars are moved in the same manner because they are all connected to shaft 39 by levers 38. When the bars are moved lengthwise by the link 41 they are also moved vertically by virtue of pivoted levers 34 and 38. Thus, movement of the bars to the right, as viewed in Fig. 3, raises the bars and chains, and movement to the left lowers them. Link 41 is of such length that at no time does it permit the bars to drop to a level substantially lower than that shown in Fig. 3.

To permit the pile of sheets to be weighed without having to remove it from the conveyor and place it on a scale at a remote point, weighing scale 51 is associated with the conveyor between the elevator and sprocket shaft 30. The drawings show only the upper portion of the scale which includes a pair of parallel beams 52 extending transversely of the chains between their upper and lower portions. Rigidly connecting the tops of these beams is a plurality of plate sections 53 each of which is provided with a pair of upwardly extending spaced parallel flanges 54 between which one of the bars 32 and a chain are loosely disposed. When the chains are in their lower position, as shown in Fig. 3, the flanges project above the tops of the chains. Beams 52 rest on the usual weighing mechanism levers (not shown), and are steadied in position by links 56 flexibly connecting them to brackets 57 and 58 mounted on beams 36 and 37, respectively.

As the chains are normally below the top of flanges 54, it is necessary to raise them before a pile of sheets can be carried to a point above the scale. Therefore, motor 45 must be set in operation to give shaft 43 a half turn in order to pull link 41 to the right. This is preferably done automatically by a member, such as the pile of sheets, moving with the conveyor and actuating a limit switch 61 that is mounted on one of the scale beams, as best shown in Fig. 4. The switch is connected by wiring, not shown, to motor 45 in a suitable manner, and is actuated when a pile of sheets, shown in broken lines, strikes and depresses a roller 62 projecting above the top of the lowered conveyor. The roller is journaled in one end of a lever 63 pivotally mounted at its opposite end in a bifurcated end portion 64 (Fig. 1) of one of the upright flanges 54. Pivoted to this lever is the upper end of a rod 65 the lower end of which is pivoted to the free end of an arm 66 secured to a shaft 37 journaled in brackets 33

mounted on the scale beam supporting the switch. Projecting inwardly from this shaft is an arm 69 which is pivoted to the lower end of a link 71 the upper end of which is pivoted to the free end of a lever 72 rigidly connected to the actuating shaft 73 of the switch. To bias roller 62 upwardly, a counterweight 74 is suspended from arm 69, while the distance the roller projects above the lowered chains is controlled by an adjustable stop 76 in beam 52 directly below arm 69.

There are several of these switch-actuating rollers 62 disposed at spaced intervals along the scale, and each is operatively connected to shaft 67 so that regardless of the length of a pile of sheets, or of its position on the conveyor, it will strike one of the rollers and actuate the limit switch. The switch closes the circuit of motor 46 to start the motor, but as soon as shaft 43 has made a half turn so that eccentric 42 has moved link 41 to its outer or right-hand position, the circuit is broken by any suitable means, such as a limit switch, and brake 47 stops the motor so that the bars will remain in their upper position. When the bars are up the tops of the chains are above flanges 54, as shown by the broken line in Fig. 3, and the pile of sheets lifted by the conveyor proceeds to move over the scale.

When the entire pile reaches a point above the scale the conveyor is lowered to deposit the pile on the scale. This is done automatically when the pile depresses any one or more of several rollers 77 journaled in the ends of levers 78 pivoted in double walled portions 79 (Fig. 1) of certain of the upright flanges 54. The levers are connected by mechanism like that just described to a limit switch 81 mounted on the scale beam below them and suitably wired to motor 46. When this switch is actuated motor 46 throws link 41 toward the conveyor, which lowers the conveyor below the top of the scale.

It is preferred to cover the sprockets on shaft 29 with a stationary platform 82 mounted on upright supports 83. To permit access to be easily gained to any part of the piler, a platform 84 is connected along one edge to the side guard adjacent platform 82, and is provided with rollers 86 under its opposite edge so that it will roll back and forth on the stationary platform as the side guards are adjusted laterally.

In operation sheets are fed in succession between the side guards above the top of the raised elevator so that each successive sheet will settle down onto the preceding one and form a pile. When the pile is completed the elevator is lowered until the tops of its tables are below the tops of the chains which are in their lower position, whereby the pile of sheets on the elevator is deposited on the chains. The conveyor is then set in motion and the pile is carried away from the elevator and toward the scale.

On approaching the scale the pile depresses rollers 62 whereby limit switch 61 is actuated to cause motor 46 to move the bars toward it so as to lift the top of the chains above the top of the scale. The pile of sheets then continues to move toward the scale and starts across it, but before it reaches the other side it depresses rollers 77 which trip switch 81 to cause motor 46 to lower the conveyor. As the chains drop below the top of flanges 54 the pile is deposited on the scale where it is weighed. It is then removed by any suitable means, such as by an overhead crane.

The conveyor has been described as receiving piles in its lower position, but without exceeding the scope of this invention it is possible for the

conveyor to receive a pile in its upper position, lower it onto the scale, and then rise again before receiving the next pile.

With apparatus constructed in accordance with this invention sheets of various lengths and widths can be quickly piled and weighed without any intermediate handling by a crane or the like. The piling, transfer to the scale and weighing are carried out in regular sequence without confusion or delay.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Article-handling apparatus comprising means for forming a pile of articles, weighing means spaced therefrom, an endless conveyor traveling from said pile-forming means to said weighing means and permanently mounted therebetween, means for lowering said pile-forming means to deposit said pile on said conveyor, means for actuating said conveyor to cause it to convey said pile to a point above said weighing means, and means for lowering said conveyor to deposit said pile on said weighing means.

2. Sheet-handling apparatus comprising an endless conveyor adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and associated with said conveyor, means for driving said conveyor to cause it to convey said pile of sheets from said station to a point above said scale, and means for effecting relative vertical movement between said conveyor and scale to cause the pile of sheets to be deposited on the scale.

3. Sheet-handling apparatus comprising a conveyor adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and associated with said conveyor, means for driving said conveyor to cause it to convey said pile of sheets toward said scale, means for raising said conveyor as it approaches the scale to lift said pile above it, and means for lowering the conveyor when said pile reaches a point above the scale to deposit the pile thereon.

4. Sheet-handling apparatus comprising an endless conveyor belt having upper and lower portions, means supporting said upper portion, said upper portion being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and normally projecting above the belt, means for raising said supporting means to raise the top of the belt above the scale, means for driving the belt to cause it to carry said pile of sheets to a point above the scale, and means for lowering said supporting means to deposit said pile on the scale.

5. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains adapted to receive a pile of sheets at a receiving station, sprockets for driving said chains, a weighing scale spaced from said station and projecting upwardly between said chains, means for rotating said sprockets to cause said chains to convey said pile of sheets from said station to a point above said scale, and means for lowering said chains to deposit said pile on the scale.

6. Sheet-handling apparatus comprising an

endless conveyor belt formed from a plurality of spaced parallel endless chains adapted to receive a pile of sheets at a receiving station, sprockets for driving said chains, a weighing scale spaced from said station and projecting upwardly between and normally above said chains, means for rotating said sprockets to cause said chains to carry said pile of sheets toward said scale, means for raising said chains as said pile approaches the scale to lift it above the scale, and means for lowering the chains when said pile reaches a point above the scale to deposit the pile thereon.

7. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains having upper and lower portions, means supporting said upper portions, said upper portions being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced laterally from said station and projecting upwardly between and normally above said chains, means for raising said supporting means to raise the top of the chains above the scale, means for rotating said sprockets to cause the chains to carry said pile of sheets to a point above the scale, and means for lowering said supporting means to deposit said pile on the scale.

8. Sheet-handling apparatus comprising an endless conveyor belt having upper and lower portions, means supporting said upper portion, said upper portion being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and normally projecting above the belt, means for driving the belt to cause it to carry said pile of sheets toward the scale, means actuated by said pile as it approaches the scale for raising said supporting means to raise the top of the belt above the scale, and means actuated by the moving pile for lowering said supporting means when the pile is above the scale for depositing it thereon.

9. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains having upper and lower portions, a plurality of bars extending longitudinally of the chains and supporting said upper portions thereof, said upper portions of the chains being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced laterally from said station and projecting upwardly between and normally above the top of the chains, and means for raising said bars to lift the top of the chains above said scale.

10. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains having upper and lower portions, a plurality of bars extending longitudinally of the chains and supporting said upper portions thereof, said upper portions of the chains being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced laterally from said station and projecting upwardly between and normally above the top of the chains, supporting members below said bars and spaced therefrom, levers pivotally connected at their ends to said members and bars, and means for moving the bars longitudinally.

11. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains having upper and lower portions, a plurality of bars extending longitudinally of the chains and supporting said upper portions thereof, said upper portions of the chains being adapted to receive a pile of sheets at a receiving station, a weighing scale spaced laterally from said station and projecting

upwardly between and normally above the top of the chains, supporting members below said bars and spaced therefrom, levers pivotally connected at their ends to said members and bars, a link

5 pivotally connected to one end of the bars and extending longitudinally therefrom, and means for reciprocating said link.

12. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and having a flange projecting upwardly beside each chain and normally above it, means for driving said

15 chains to cause them to convey said pile of sheets toward said scale, means for raising the top of the chains above the top of said flanges as said pile approaches the scale, and means for lowering the chains below the top of said flanges to deposit said pile thereon.

13. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and having a flange projecting upwardly beside each chain and normally above it, means for driving said chains to cause them to convey said pile of sheets toward said scale, electrically operated means for raising and lowering said chains to move their upper surface above and below the top of the flanges, electric switches for controlling said electrically operated means, and means disposed in the path of said pile of sheets and adapted to be moved

35 thereby for actuating said switches.

14. Sheet-handling apparatus comprising an endless conveyor belt formed from a plurality of spaced parallel endless chains adapted to receive a pile of sheets at a receiving station, a weighing scale spaced from said station and having a flange projecting upwardly beside each chain and normally above it, means for driving said chains to cause them to convey said pile of sheets toward said scale, electrically operated means for raising and lowering said chains to move their upper surface above and below the top of the flanges, electric switches for controlling said electrically operated means, switch-actuating means disposed

in the path of said pile of sheets and adapted to be actuated by the pile as it approaches the scale, and switch-actuating means disposed in said path and adapted to be actuated by said pile after it reaches a point above the scale.

15. Sheet-handling apparatus comprising a vertically movable support, a plurality of horizontally spaced members mounted thereon and adapted to receive a pile of sheets, a plurality of horizontally spaced endless conveyor chains extending transversely of said members between them, a weighing scale spaced laterally from said members, means for lowering said support to deposit said pile on said chains, means for driving the chains to cause them to convey said pile to a point above said scale, and means for lowering the chains to deposit the pile on the scale.

16. Sheet-handling apparatus comprising a pair of side guards for guiding successive pieces of sheet material as they are fed lengthwise between the guards, an elevator mounted below and between said guards for catching said sheets to form a pile, a weighing scale spaced laterally from the elevator, an endless conveyor traveling from said elevator to said scale, means for lowering said elevator to deposit said pile of sheets on the conveyor, means for actuating the conveyor to cause it to convey said pile to a point above the scale, and means for lowering the conveyor to deposit said pile on the scale.

17. Sheet-handling apparatus comprising a pair of laterally adjustable side guards for guiding successive sheets as they are fed lengthwise between the guards, an elevator mounted between the guards, for catching and supporting said sheets to form a pile, the upper portion of the elevator being in the form of spaced tables disposed in a line extending lengthwise of the elevator, a weighing scale spaced laterally from said elevator, a plurality of horizontally spaced endless conveyor chains extending transversely of the elevator between said tables, means for lowering said elevator to deposit said pile of sheets on said chains, means for driving the chains to cause them to convey said pile to a point above the scale, and means for lowering the chains to deposit the pile on the scale.

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