May 28, 1935. R. H. STEVENS 2,003,125

PILING DEVICE FOR SHEET MILL TABLES

Filed March 23, 1934 6 Sheets-Sheet 1

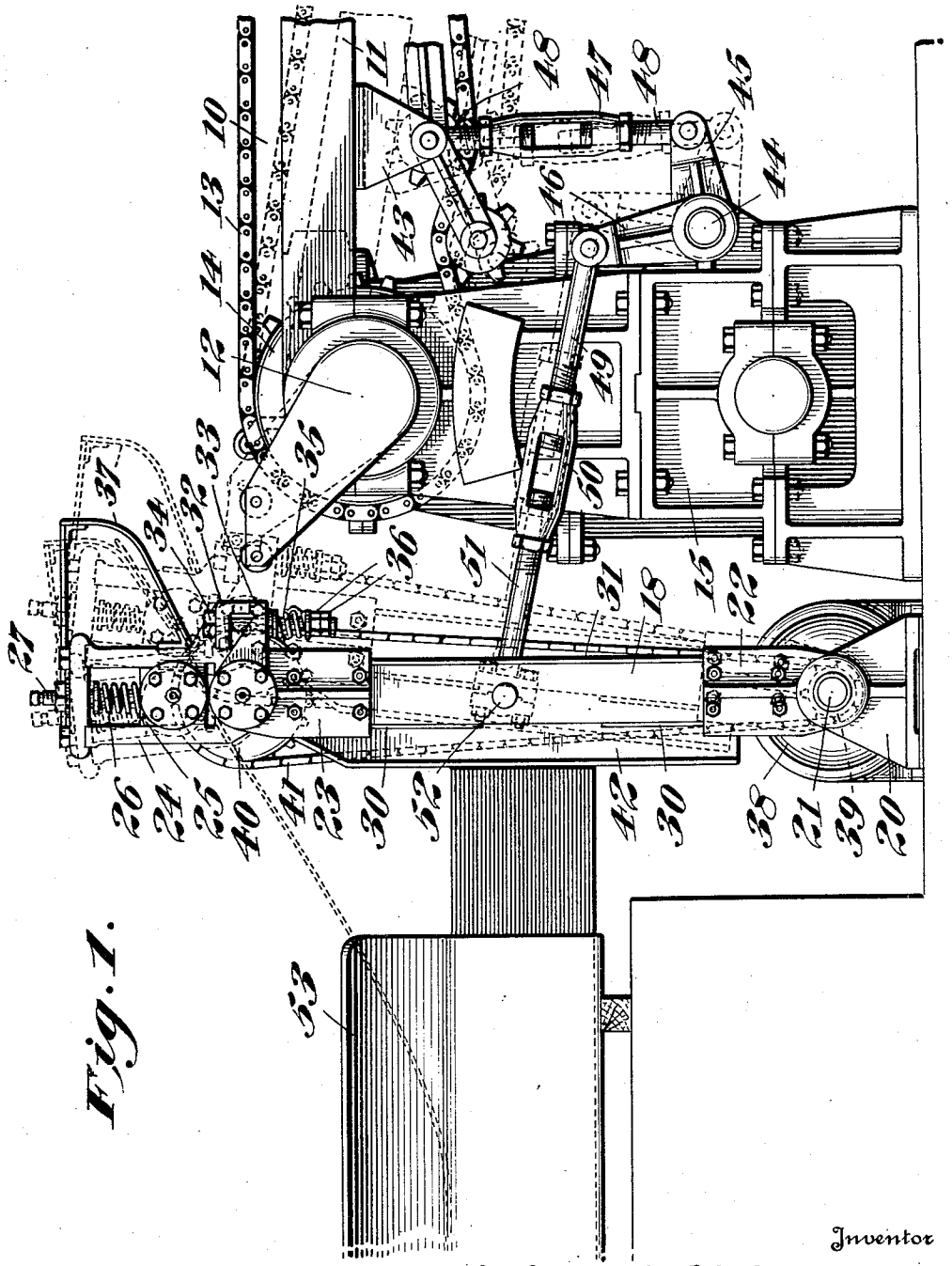


Fig. 1.

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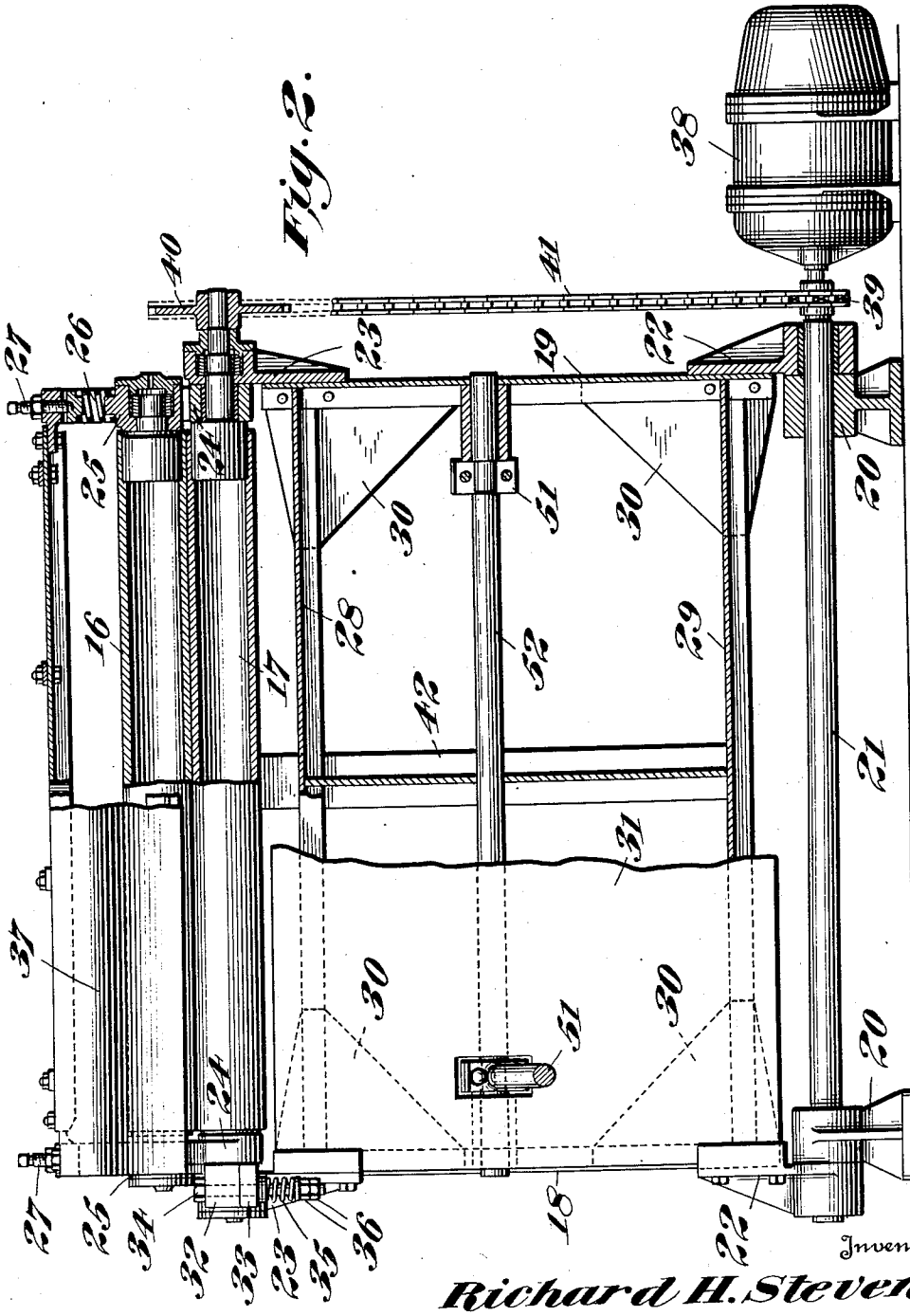
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PILING DEVICE FOR SHEET MILL TABLES

Filed March 23, 1934 6 Sheets-Sheet 2

Fig. 2.



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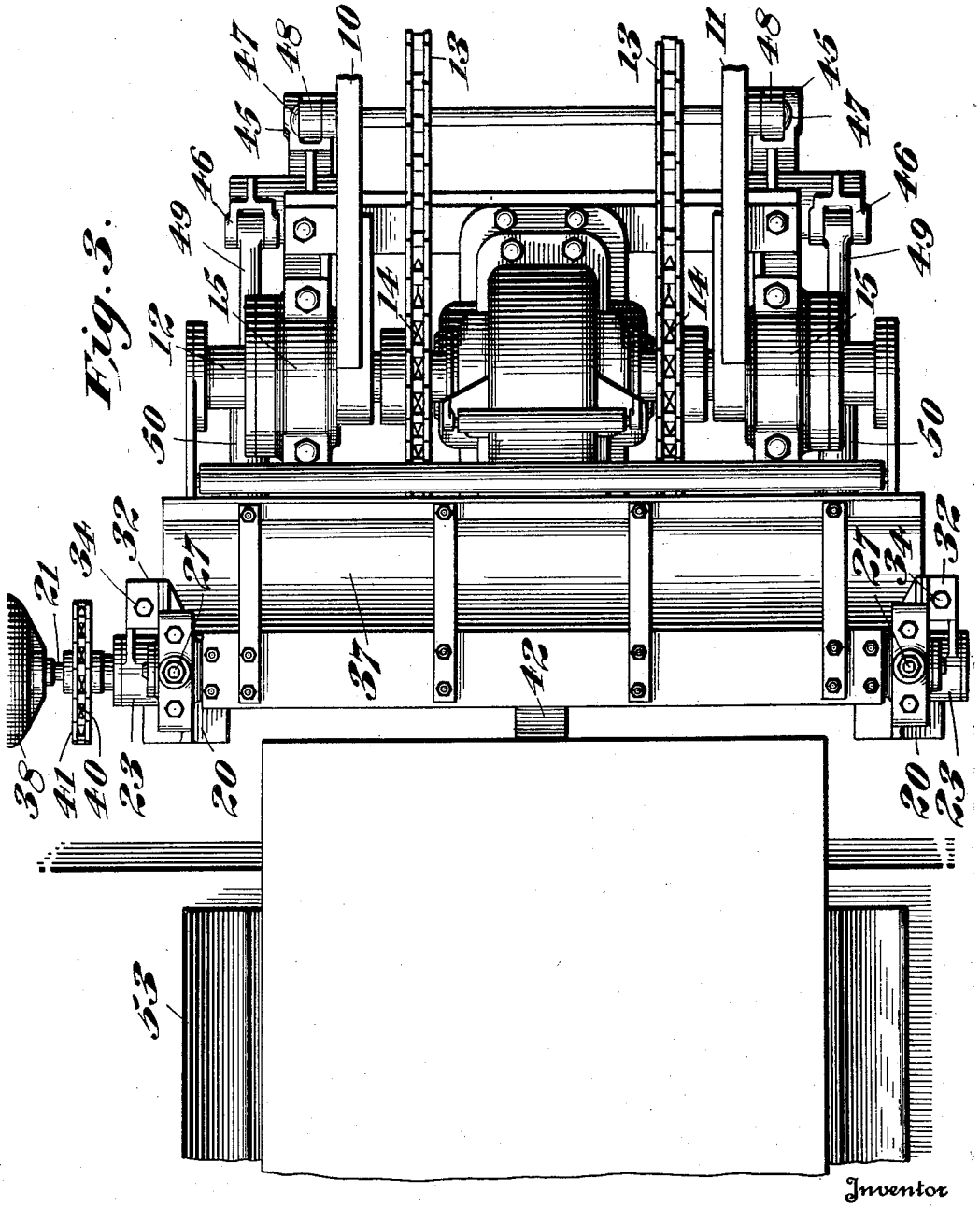
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PILING DEVICE FOR SHEET MILL TABLES

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Fig. 3.



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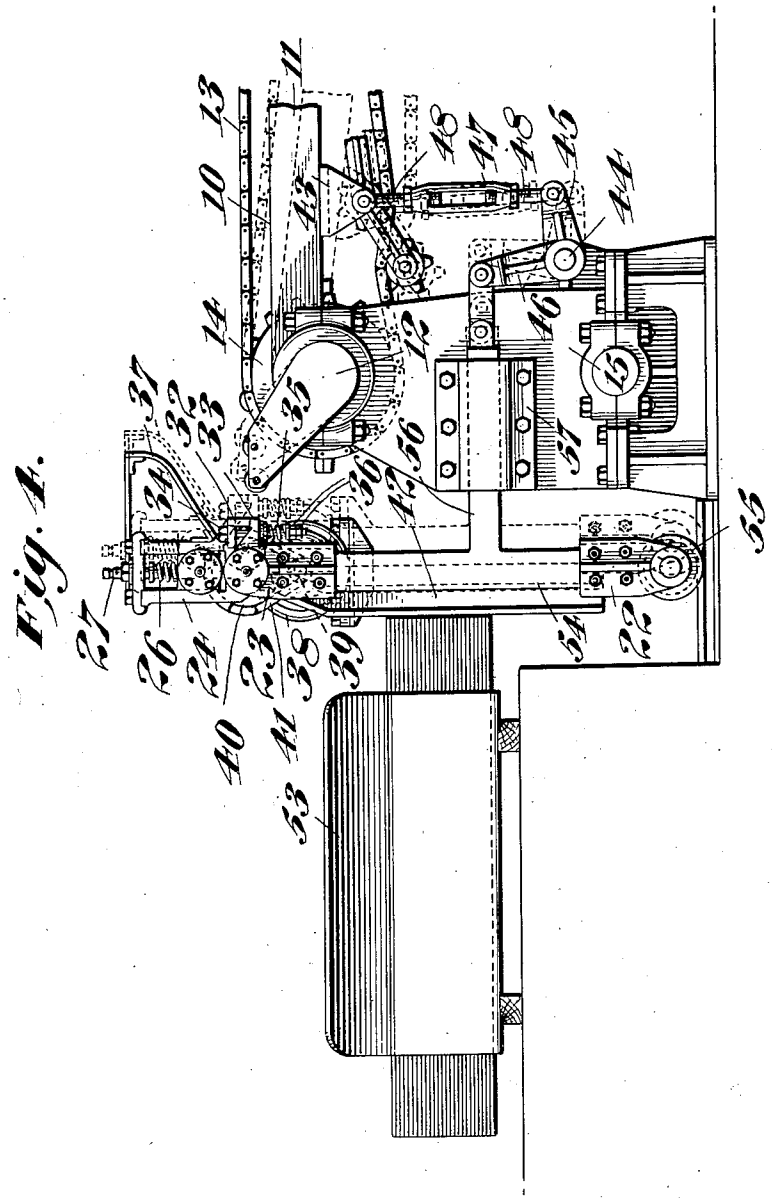
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PILING DEVICE FOR SHEET MILL TABLES

Filed March 23, 1934 6 Sheets-Sheet 4

Fig. 4.



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PILING DEVICE FOR SHEET MILL TABLES

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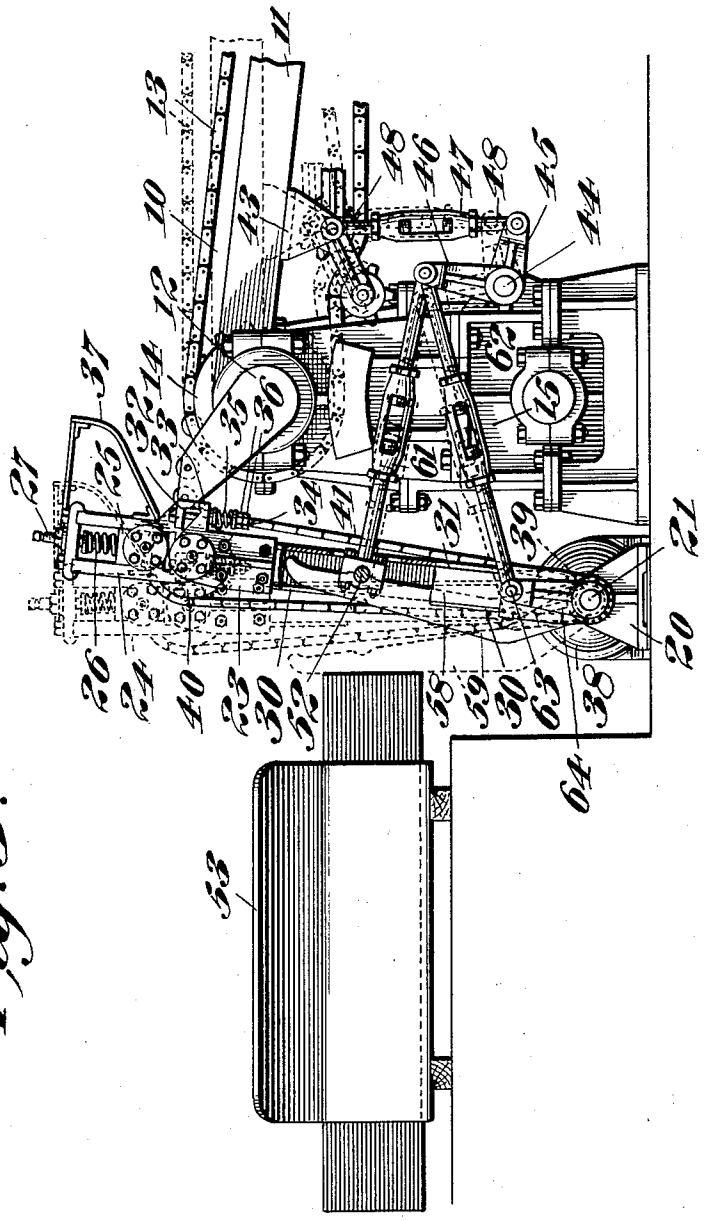


Fig. 5.

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PILING DEVICE FOR SHEET MILL TABLES

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Fig. 6.

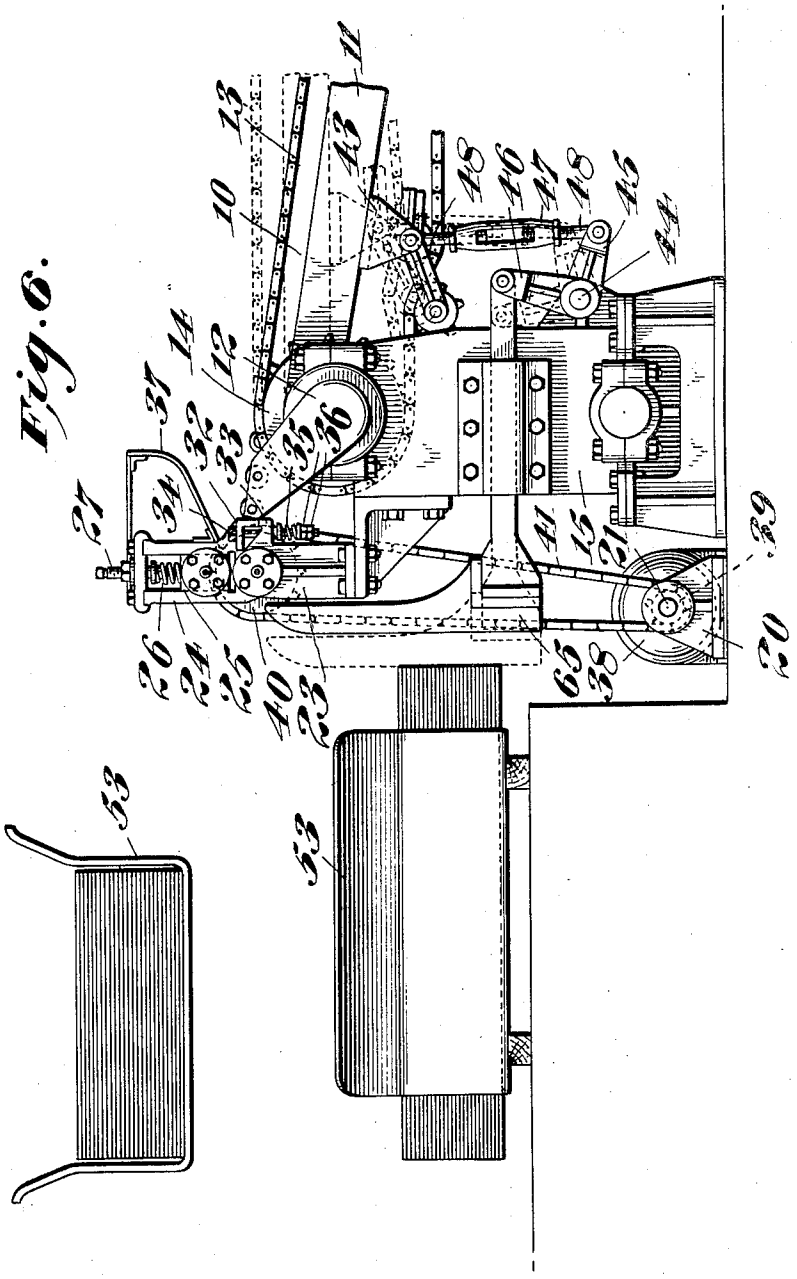


Fig. 7.

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Patented May 28, 1935

2,003,125

UNITED STATES PATENT OFFICE

2,003,125

PILING DEVICE FOR SHEET MILL TABLES

Richard H. Stevens, Baltimore, Md., assignor to Bethlehem Steel Company, a corporation of Pennsylvania

Application March 23, 1934, Serial No. 716,962

14 Claims. (Cl. 80—43)

This invention relates to piling devices for sheet mill catchers tables, and more particularly to a sheet discharging and piling device, operable by said catcher, for piling and aligning the sheets at the delivery end of the catcher.

An object of my invention is to provide pinch-rolls at the rear of the table, movably mounted so as to be moved toward and away from the table by the action of the table, whereby the sheet being delivered by the rolls will drop clear of the bottom roll.

Another object is to provide means for lining up the edges of the sheets as they accumulate to form a pile, and that this aligning device may be utilized for moving the pinch-rolls.

A further object of my invention comprises pivotally mounting the top pinch-roll about the axis of the bottom roll so that the rolls will always remain normal to the sheet being delivered as its front end drops onto the pile, whereby to prevent excessive or permanent bending of the sheet and to more fully discharge the sheet from the rolls.

The novel features will be more fully understood from the following description and claims taken with the drawings, wherein

Fig. 1 is a side elevation of my device in combination with a hot mill catcher.

Fig. 2 is an end and sectional view of the piling device.

Fig. 3 is a partial plan of a hot mill catcher and my device in combination.

Figs. 4, 5 and 6 are diagrammatic modifications of the preferred form of my invention as shown in Fig. 1.

Fig. 7 is an end view of a piling trough.

With reference to the drawings, numeral **10** represents generally a sheet mill catcher which may be of any suitable type. In this particular instance the lifting table **11** is rockably mounted at its rear or delivery end about a horizontal axis **12**. A pair of endless, power operated conveyor chains **13** extend from the front of the catcher (not shown) to the rear thereof and pass around the sprocket **14** for moving the plates or sheet on the catcher in either direction. A suitable support **15** provides a bearing for mounting the table for swinging action at its front end.

Since catchers of this type are generally common to the art, further description is deemed unnecessary, suffice to say that the catcher is provided with power means for raising and lowering the table, and is also provided with suitable means for controlling the movement of the table and conveyor, as is well understood by those skilled in the art.

In the preferred form as shown in Fig. 1, my invention comprises a pair of pinch-rolls **16** and **17** mounted on frame arms **18** and **19** which in turn are pivotally mounted at their lower ends by means of brackets **20** and shaft **21**. The lower ends of said arms are secured in brackets **22** adapted for rocking motion about shaft **21**. To the upper end of the arms are secured brackets **23** which form bearings for the lower roll **17**. The upper roll is pivotally mounted about the axis of the lower roll by means of housings **24** and mounted over the ends of the lower roll as illustrated in Fig. 2. These housings carry slidably mounted bearing blocks **25** in which are mounted the ends of the upper roll so as to allow separation of the rolls as the sheet passes through the rolls. Springs **26** and screws **27** are provided for effecting compression between the rolls.

The arms **18** and **19** are suitably braced by means of transverse members **28** and **29**, with the gussets **30**, and plate **31** so as to produce a rigid frame for mounting the rolls.

Referring again to the pivoted housings **24**, it will be noted that the housings are provided with stops **32** which abut the stops **33** forming part of bracket **23**, thus limiting the rocking movement of the housings in the direction of the stops. Movement of the housings in the opposite direction is provided for by the bolts **34**, the springs **35**, and nuts **36** so as to effect a yielding means, whereby the top roll is permitted to move circumferentially of the bottom roll and thereby maintain normal contact to the sheet as its front end drops onto the pile.

An entering guide **37** is attached to the housing **24** for guiding the finished sheets into the pinch rolls. This guide also acts as a lever for swinging the top roll about the bottom roll. As the front end of the sheet drops onto the pile, its rear end is lifted so as to press upwardly against the guide and thereby angularly moving the top roll relative to the bottom roll.

A motor **38**, aligned with shaft **21** furnishes the power for the pinch rolls through sprockets **39** and **40**, and chain **41**. For certain types of catchers it may be found advantageous to mount the motor for the pinch-rolls directly on the swinging frame instead of on the foundation, similar to that shown in Fig. 4.

For aligning the edges of the sheets after they are delivered from the catcher by the pinch-rolls, I attach to the swinging frame a project-

ing wing member 42 adapted to engage the sheets as they accumulate at the rear of the catcher so as to push each sheet a limited distance to effect the vertical alignment of their edges adjacent the frame. This alignment occurs when the catcher table is raised, by means operatively connecting the frame member to the tilting table of the catcher so as to swing the frame away from the catcher and thereby engage and vertically align the sheets as illustrated in Fig. 1.

To each frame member of the table 11 is attached a bracket 43, and on the lower front end of the support 15 a cross shaft 44 is mounted, on which are secured intermediate arms 45 and end arms 46. The arms 45 are connected to brackets 43 by means of turnbuckles 47 and eye bolts 48. Arms 46 are likewise connected to the swinging frame by means of eye bolts 49, turnbuckles 50, and capped eye bolts 51. The ends of bolts 51 engage a cross shaft 52 carried by the arms 18 and 19 as shown in Fig. 2. It will thus be obvious that when table 11 is lowered, the pinch-rolls will be moved toward the catcher to the position as shown by the dotted lines of Fig. 1, and when the table is raised, the rolls will be moved away from the catcher so as to position the wing 42 in a substantially vertical line. The proper positioning of the swinging frame is effected by adjustment of the turnbuckles.

At the rear of the piling device is placed a trough shaped member 53, as illustrated in Fig. 7, for receiving the sheets as they are piled. This trough effects the transverse alignment of the sheets during the formation of the pile.

Fig. 4 shows a modification of the arrangement as shown in Fig. 1. Here the pinch-rolls are shown mounted for reciprocating movement and the frame member 54 is shown supported on rollers 55, with the frame being held erect by means of the crosshead 56 and guides 57. In this case the motor 38 is mounted on the frame member 54 and reciprocates therewith.

Fig. 5 shows another modification, comprising the swinging frame member 58 for supporting the pinch-rolls and a separate swinging member 59 for aligning the sheets. The two swinging members are pivotally mounted about the shaft 21, and the connecting rods 61 and 62 for the two swinging members being arranged so that member 59 will move relatively faster than member 58. Rods 61 are connected to frame 58 at 52, and rods 62 being connected to member 59 at 63 through arm 64.

Fig. 6 illustrates still another modification embodying certain principles of my invention. In this case the pivoted pinch-rolls may be rigidly mounted on the catcher and a separate reciprocating pusher 65 utilized for aligning the sheets. Again it may be advantageous to mount the pivoted pinch-rolls on a non-tilting conveyor table where sheets or plates are discharged from the table to a lower level, and where piling is not required.

In operation, the sheets are finished from the mill with the catcher table in the down position and the frame carrying the pinch-rolls leaning toward the mill. The conveyor on the table moves the sheets rearwardly into the bite of the revolving pinch-rolls, and after passing through the rolls the sheets are piled on top of each other in the piling trough which transversely aligns their edges. The sheets in passing through the pinch-rolls effect a rocking movement of the top roll about the bottom roll due to the inclination of the sheet when its front end drops onto the pile, thus maintaining a normal relation between the sheet and the rolls. This normal relation of rolls to sheet also assists in clearing the sheet from the rolls because the rolls remain in contact with the sheet until the sheet is about clear of the bottom roll, which is not the case when the rolls are held in a fixed vertical position. As soon as the sheet is out of the bite of the rolls, the top roll snaps back to its initial position by the action of the retracting springs.

As the sheet slides onto the pile its rear edge slides downwardly over the upper inclined portion of the pusher so as to clear the frame, and when the conveyor table of the catcher is raised, the pusher engages the edge of the sheet and moves it into alignment with the other sheets to make a uniform pile, which prevents them from being bent when picked up by crane. After the pile reaches a certain height, a sheet infrequently stops with its rear end resting on the bottom roll and the rest of the sheet on the pile, but when the pinch-rolls recede from the extreme rearward position it allows the rear end of the sheet to drop clear of the bottom roll and is then in position to be shoved into line upon the next rearward movement of the reciprocating member.

While I have shown my invention in a plurality of forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other 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.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of pinch-rolls mounted on the upper end of a swinging member pivotally supported at the rear end of said catcher for discharging sheets from said table to form a pile, said member being adapted to be swung away from said catcher when said table is tilted in one direction and to be swung toward said catcher when said table is tilted in the other direction, said swinging member having means adapted to engage and align said delivered sheets when swung away from said catcher.

2. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of pinch-rolls mounted on the upper end of a swinging member pivotally supported at the rear end of said catcher for discharging sheets from said table to form a pile at the rear thereof, said member being adapted to be swung away from said catcher when said table is tilted in one direction and to be swung toward said catcher when said table is tilted in the other direction, said swinging member having means adapted to engage and align the sheet forming said pile when swung away from the catcher, and means operable by said table for swinging said member.

3. The combination with a catcher having a conveyor table pivotally mounted at its rear end for rocking movement about a horizontal axis, of a frame positioned to the rear of said table and pivotally mounted at its lower end

adapted for swinging movement toward and away from said table, means operable by said table for effecting said movement, pinch-rolls carried by the upper end of said frame, said rolls being swung toward said table when its forward end is in a lowered position for grasping and delivering sheets from said conveyor to form a pile at the rear of said frame, said frame having means adapted to engage and align said delivered sheets when swung away from said table as effected by the lifting of the table.

4. In a hot mill catcher, a rigid support, a table mounted at its rear end on said support for rocking movement about a horizontal axis, means for rocking said table, means for conveying plates and sheets along said table, means for driving said conveying means in reverse directions, a swinging member positioned to the rear of said table pivotally mounted at its lower end for horizontal swinging movement toward and away from said table, pinch-rolls carried by the upper end of said swinging member for grasping and delivering sheets from said conveyor to form a pile at the rear of said swinging member, means carried by said swinging member for vertically lining up the edges of said piled sheets when swung toward said pile, and means operable by said table for moving said swinging member toward said pile when the end of the table is raised.

5. The combination with a catcher having a conveyor table pivotally mounted at its rear end for rocking movement about a horizontal axis, of a frame positioned to the rear of said table and pivotally mounted at its lower end adapted for swinging movement toward and away from said table, means operable by said table for effecting said movement, pinch-rolls carried by the upper end of said frame, said rolls being swung toward said table when its forward end is in a lowered position for grasping and delivering sheets from said conveyor to form a pile at the rear of said frame, said frame having a vertically extending and outwardly projecting wing portion on the rear side thereof adapted to engage and align said delivered sheets when swung toward said sheets, said wing having a sheet contacting face adapted to assume a substantial vertical position when the frame is swung away from the table to its extreme position.

6. In a hot mill catcher, a rigid support, a table mounted at its rear end on said support for rocking movement about a horizontal axis, means for rocking said table, means for conveying plates and sheets along said table, means for driving said conveying means in reverse directions, a swinging member positioned to the rear of said table pivotally mounted at its lower end for horizontal swinging movement toward and away from said table, means operable by said table for swinging said member, pinch-rolls carried by the upper end of said swinging member for taking sheets from said conveyor and delivering them to the rear of the swinging member to form a pile, means carried by said swinging member for vertically aligning the edges of the sheet facing said member when said member is swung toward said pile, and means carried by said swinging member for operating said pinch-rolls.

7. The combination with a rolling mill catchers table adapted for vertical tilting movement and having means for conveying sheets along said table, of a piling device at the delivery end of said table, said device comprising a member pivotally mounted at its lower end for swinging movement toward and away from said table, pinch-rolls carried by the upper end of said member arranged one above the other for discharging sheets from said table, pivotal means for mounting the top pinch-roll for swinging movement about the axis of the bottom roll, resilient means for urging the top roll toward the bottom roll, means for driving the bottom roll, means carried by said swinging member adapted to engage and align the edges of sheet delivered by said pinch rolls from said table when said member is swung away from the table, and means operable by the tilting of said table for swinging said member.

8. The combination with a rolling mill catchers table adapted for vertical tilting movement and having means for conveying sheets along said table, of a piling device at the delivery end of said table, said device comprising a frame pivotally mounted at its lower end for swinging movement toward and away from said table, pinch-rolls separably mounted one above the other for discharging sheets from said table and carried by the upper end of said frame, means for pivotally mounting the top pinch roll for swinging movement about the axis of the bottom roll, resilient means for resisting swinging of the top roll in one direction and a stop for limiting swinging movement in the opposite direction, resilient means for urging the top roll toward the bottom roll, means for driving the bottom roll, means carried by said frame adapted to engage and align the sheets delivered by said pinch-rolls when said frame is swung away from the table, and means operable by the tilting of said table for swinging said frame.

9. The combination with a rolling mill catchers table adapted for vertical tilting movement and having means for conveying sheets along said table, of a piling device at the delivery end of said table, said device comprising a frame pivotally mounted at its lower end for swinging movement toward and away from said table, pinch-rolls arranged one above the other for discharging sheets from said table carried by the upper end of said frame, the lower roll being fixedly journaled on said frame, swinging housings pivotally mounted at the ends of the lower roll, bearings slidably mounted in said housings for journaling the upper roll, adjusting means including springs for urging the top roll toward the bottom roll, yielding means for resisting swinging movement of said housings in one direction and a positive stop for limiting swinging of said housings in an opposite direction, means secured to said housings for guiding material into said rolls, means for driving the rolls, means carried by said frame adapted to engage and align the sheets discharged by the pinch-rolls when said frame is swung away from the table, and means operable by the tilting of said table for swinging said frame.

10. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of a sheet piling device at the rear end of said catcher comprising a member adapted to be moved away from said catcher when said table is tilted in one direction and to be moved toward said catcher when said table is tilted in the other direction, pinch-rolls carried by said member and positioned so as to receive sheets from said table and discharge them at the rear of said member to form a pile,

and means operable by said table for moving said member into engagement with said piled sheets whereby to align the edges of the sheets adjacent said member.

11. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of a sheet piling device at the rear end of said catcher comprising a member adapted for movement away from said catcher when said table is tilted upwardly and to be moved toward said catcher when said table is tilted downwardly, pinch-rolls arranged one above the other carried by said member and positioned so as to receive a sheet from said table and discharge it at the rear of said member when said member is positioned toward said catcher, means pivotally mounting the top pinch-roll for limited circumferential movement about the axis of the bottom roll, yielding means for resisting said circumferential movement, yielding means for urging the top roll toward the bottom roll, means for driving the bottom roll, and means operable by said table when tilted upwardly for moving said member toward said discharged sheet whereby to push the sheet a definite distance.

12. The combination with a conveyor table for sheets or the like, of pinch-rolls positioned adjacent the discharge end of said table, said rolls comprising a fixedly journaled bottom roll, upwardly projecting swinging housings pivotally mounted on the ends of said lower roll, bearings slidingly mounted in said housings, a top roll journaled in said bearings, adjusting means including springs for urging the top roll toward the bottom roll, yielding means for resisting swinging movement of said housings in the direction of delivery of said rolls, a positive stop for limiting swinging of said housings in the opposite direction, means secured to said housings for guiding sheets into said rolls, and means for driving the bottom roll, whereby to maintain said rolls normal to the material being delivered.

13. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of pinch-rolls positioned adjacent the discharge end of said table for piling sheet at the rear thereof, said rolls comprising a fixedly journaled bottom roll, upwardly projecting housings pivotally mounted adapted for swinging motion about the axis of said bottom roll, bearings slidingly mounted in said housings, a top roll journaled in said bearings, adjusting means including springs for urging the top roll toward the bottom roll, yielding means for resisting swinging movement of said housings in the direction of delivery of said rolls when discharging a sheet, a positive stop for limiting swinging of said housings in the opposite direction, means secured to said housings for guiding sheets into said rolls, means for driving said bottom roll, and a device operable by the tilting said table for aligning each individual sheet longitudinally of said catcher as deposited by said pinch-rolls to form a pile.

14. The combination with a catcher having a conveyor table adapted for rocking movement about a horizontal axis, of pinch-rolls positioned adjacent the discharge end of said table for piling sheet at the rear thereof, said rolls being mounted so as to be moved away from said catcher when said table is tilted in one direction and to be moved toward said catcher when said table is tilted in the other direction, means operable by said table for so moving said rolls, and means operable by said table adapted to align the ends of the sheets being piled.

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