Jan. 12, 1932. A. W. RYAN ET AL 1,840,370

SHEET PILING MECHANISM

Filed Aug. 23, 1929 3 Sheets-Sheet 1

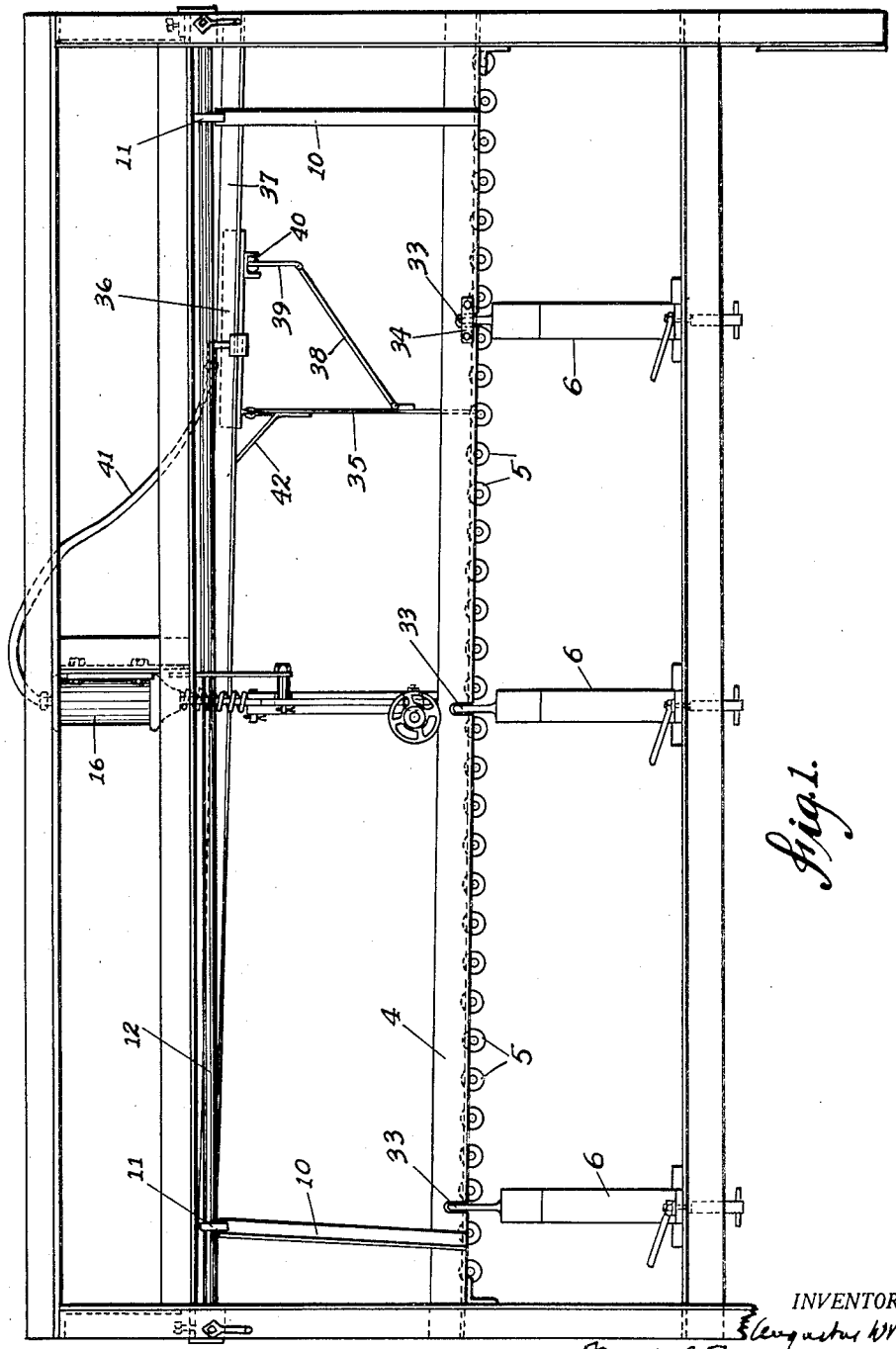


Fig. 1.

INVENTORS.
Alexander W. Ryan
BY Frank E. Talby - Terrence W. Allen
ATTORNEY.

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Filed Aug. 23, 1929 3 Sheets-Sheet 2

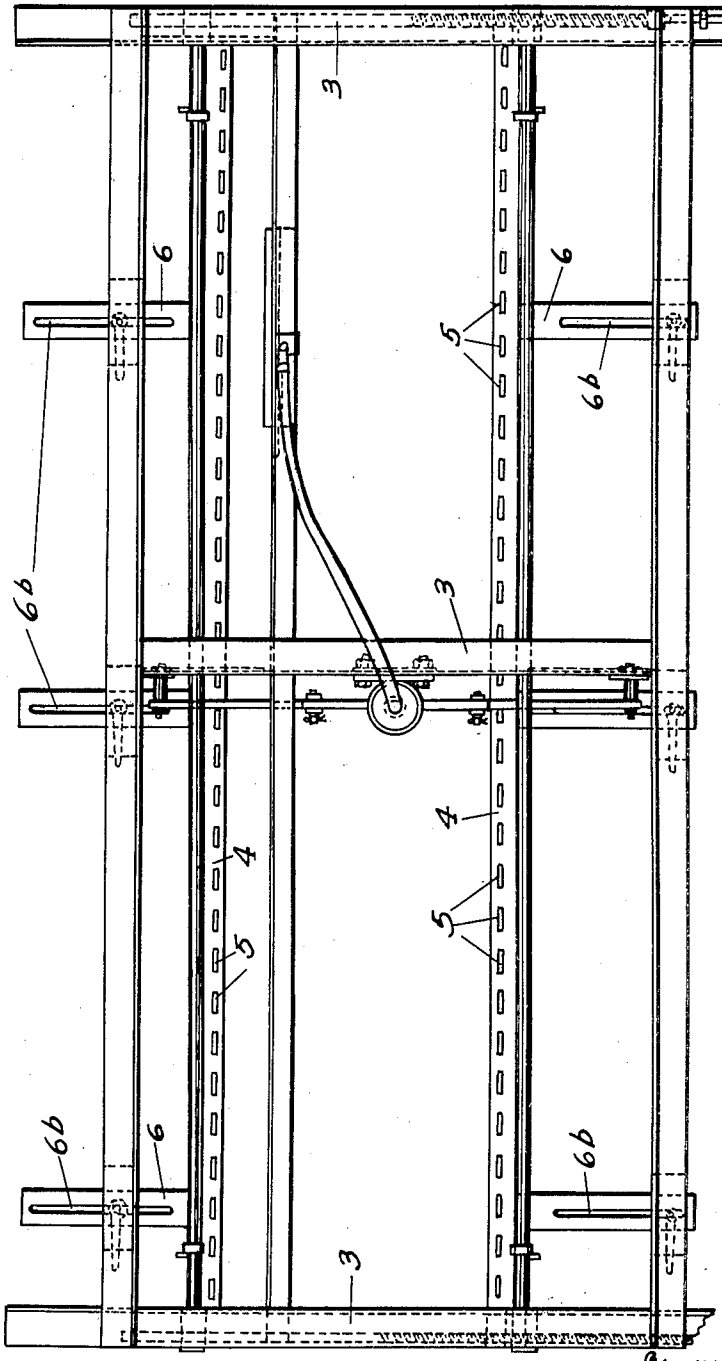


Fig. 2.

INVENTORS.
Augustus W. Ryan
Frank E. Tubbs
Terrence M. Ellsworth
BY
ATTORNEY.

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SHEET PILING MECHANISM

Filed Aug. 23, 1929 3 Sheets-Sheet 3

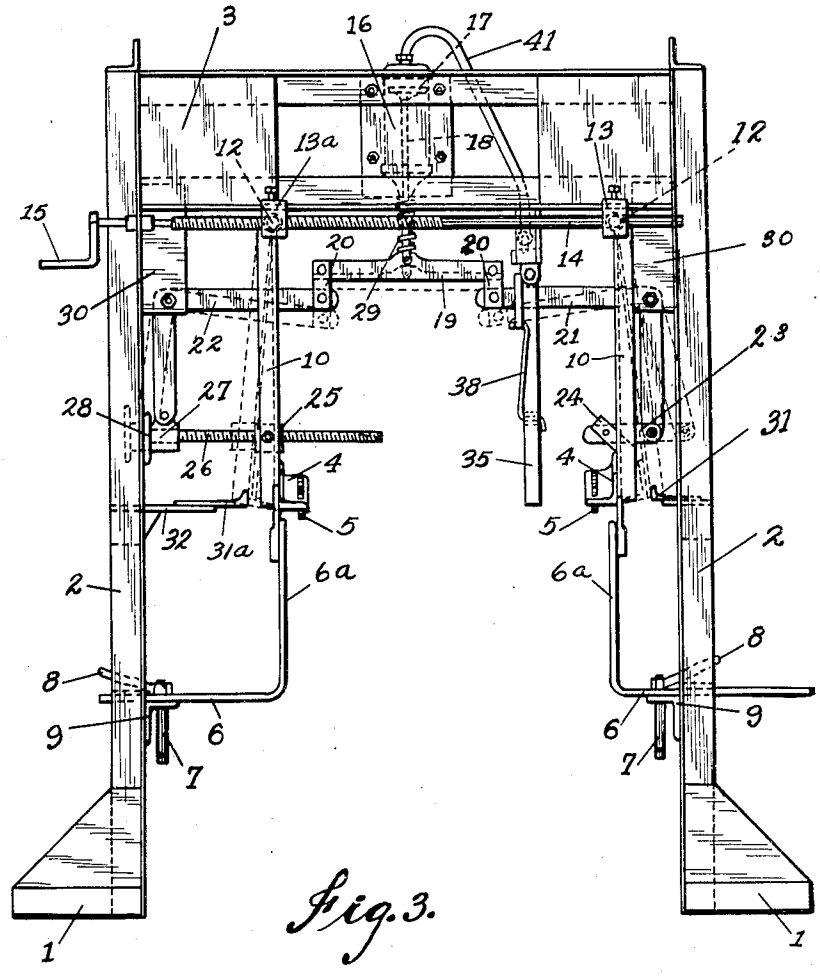


Fig. 3.

INVENTORS.
Augustus W. Ryan.
Frank E. Tuttle.
Terrence Wadsworth.
BY
ATTORNEY.

Patented Jan. 12, 1932

1,840,370

UNITED STATES PATENT OFFICE

AUGUST W. RYAN AND FRANK E. TUBBS, OF ZANESVILLE, AND TERRENCE W. ALLSWORTH, OF MIDDLETOWN, OHIO, ASSIGNORS TO THE AMERICAN ROLLING MILL COMPANY, OF MIDDLETOWN, OHIO, A CORPORATION OF OHIO

SHEET PILING MECHANISM

Application filed August 23, 1929. Serial No. 388,009.

Our invention pertains to the automatic piling of sheets, and its object is to provide a mechanism which will control the stacking of sheets at the end of delivery means in such a way that sheets moving upon a conveyor serially may be automatically stacked one on top the other in a positive manner and with the minimum marring of the sheet's surface. Our invention will be described in connection with the stacking of iron and steel sheets, but it will be understood that its utility is not confined thereto. It is possible, of course, to stack sheets at the end of a delivery mechanism by providing a somewhat lower table to receive the sheets and a back stop against which they may strike as they are being fed. Such a stacking mechanism is hard on the sheets in that it involves the movement or sliding thereof one over another, and it has not proved successful with highly finished sheets, excepting possibly where the sheets may be oiled.

It is an object of our invention to provide a mechanism which will stack sheets without causing them to slip one over the other, and with a minimum of scratching. To this end it is an object of our invention to provide means to position a sheet above a pile, and then allow it to fall upon the pile.

These and other objects of our invention, which will be pointed out hereinafter or will be apparent to one skilled in the art upon reading these specifications, we accomplish by that certain construction and arrangement of parts of which we shall now describe a preferred embodiment, reference being had to the drawings accompanying this application.

In the drawings:

Figure 1 is a side elevation of our sheet piler.

Figure 2 is a top plan view.

Figure 3 is an end elevation.

Broadly speaking, in our mechanism we provide (in a suitable framework) side guides for the sheet pile, and upon these side guides, rails adapted to serve as a conveyor for sheets, or a continuation of a conveyor, by which sheets are fed into the device. The sheets ride upon these rails until they come into the proper position above the pile. We provide means whereby at this point, the rails may be removed from beneath the sheets, and the sheets allowed to fall directly downwardly onto the pile. We have devised means whereby the sheet may operate the rail removal device automatically, so that the piling mechanism does not need the attention of an operator, excepting for the removal of a pile when formed, and for the adjustment of our mechanism when it is to be set for a new sheet size.

Our mechanism comprises a supporting framework, resting upon feet 1, and having a series of upright members 2, and top cross members indicated generally at 3. These cross members may be, if desired, truss shaped for greater strength. We provide intermediate the side member 2, rails 4, which are conveniently in the shape of angle irons, at a proper level to receive sheets and provided with a series of rollers 5 to facilitate the conveying of the sheets. It will be understood that the sheets from a source not shown, which may be a conveyor or, say, a roller leveler, are delivered upon the rails 4, and ride therealong, their edges being supported by the rollers 5. The sheets will be such as have sufficient stiffness in proportion to their width, to be carried along by a support underneath opposite edges. Piling guides 6 are provided, having a portion 6*a* adapted to extend upright in parallel relationship and form guides between which the sheets may fall and come to rest upon the top of a pile, with their edges in alignment. The other extension of the guide members is provided with a slot 6*b*, through which a bolt 7 may extend, fitted with a hand nut 8, for the purpose of fastening the guiding members adjustably to supports 9, attached to the frame. This arrangement makes it possible to vary the distance apart of the parallel upright portions 6*a* of opposed guides, so as to accommodate different widths of sheet, when this may become necessary.

The rails 4 are supported by link members 10, pivoted in the framework. It is convenient to effect this, as at 11, by mounting the links 10 upon a shaft 12; but the pivoting may be otherwise accomplished. The object

is to provide the rails 4 to serve as a conveyor, supporting the edges of sheets when it is in one position, but movable from that position to disengage the sheet edges and allow the sheets to fall. The relationship of the rails 4 and the guides 6 will indicate how the pile will be formed between the portions 6*a* of the latter. It will be understood that a table or a truck may be placed within our apparatus and between or beneath the portion 6*a* to receive the sheets. It is convenient to provide for the raising and lowering of such a table or of the support upon a truck, so that the sheets will not have so far to fall; and it is possible to lower the pile somewhat with the addition of each sheet so as to prevent not only the marring of the sheets, such as might occur in a long drop, but any fluttering of the sheets during the descent thereof. To provide for the adjustability of the rails, it is convenient to mount the shafts 12 in blocks 13 and 13*a*, which may, if desired, be mounted upon supplementary shafts 14. The block 13*a* is threaded within, and the portion of the shaft 14 upon which the block 13*a* rides, is also threaded, so that by a turning of the shaft, the block 13*a* may be moved therealong. The shaft 14 is journaled in the framework, and it may be provided with a handle 15 in the form of a wrench, so as to facilitate the adjustment of the rails toward or from each other. If one of the rails is thus made adjustable, the other need not be made so, and accordingly we have shown only the left hand rail in Figure 3 as adjustable, though of course both may be if desired. It will be seen that when a sheet rests upon the rails 4 in proper position, the rails may be swung outwardly simultaneously, and the sheet allowed to fall between the guides 6.

To move the rails in this fashion, we have provided a motor, comprising an air cylinder 16, bolted to a cross member 3 of the framework, and provided with a piston 17. The piston rod 18 is connected to a yoke 19, which in turn is pivoted through links 20 to bell cranks 21 and 22. The bell crank 21 is pivoted by means of a link 23 to a bracket 24 on the right hand rail in Figure 3, or upon the link member 10. The bell crank 22 will also be connected to the left hand rail or a support thereof; but in as much as this rail is adjustable, the linkage in this case takes the form of a nut 25, pivoted to a member on the rail 4, or to the link 10, and a screw shaft 26, operating in a collar 27 on the end of the bell crank 22. A hand wheel 28 or other device is provided to turn the gear shaft 26 to effect the adjustability aforementioned. It will be clear that an upward motion of the yoke 19 will tend to draw the rails 4 closely together, while a downward motion thereof will tend to separate them, as shown in the dotted lines of Figure 3. Since the cylinder 16 is adapted to exert power in forcing the yoke downwardly, spring means are provided to pull it up again. These means may be any desired. In the specific embodiment shown, we have surrounded the piston rod 18 with a coil tension spring 29, which is connected to the yoke or the rod at one end, and to the cylinder or the frame of our machine at the other.

It will be noticed that the cylinder 16 and the lever arms are located approximately in the center of our device, while the bell cranks are pivoted to supports 30. To control the outward motion of the rails 4, we have provided on either side, stops 31 and 31*a*, attached to the framework. The stops 31*a* will be made adjustable with reference to a support 32, so as to take care of the movement of the left hand conveyor rail in Figure 3, when it is adjusted to different positions. We have found in the operation of our machine that the coefficient of friction is not substantially different for either rail, and consequently the rails tend to move outwardly evenly and in unison. However, the stops 31 and 31*a* control this movement because, should one rail tend to move out first, or should one end of either rail tend to move outwardly, before the other end, its motion will be halted against the stops and the continuing action of the cylinder 16 will force the other rail or the other end of the rail out into proper position. It will be understood that all this happens very quickly, and before there has been time for the sheet to become skewed, even if the initial motion is uneven.

In order to prevent a sheet being skewed by adhering to one rail more than to the opposite rail, i. e. to provide means for positively removing the sheet from the rails, the guides 6 are provided with extensions or fingers 33. The rails 4 are cut out to accommodate these fingers, which extend up above the tops of the rollers 5, and are thus adapted to engage the edge of a sheet, if it tends to ride with the rail during the outward motion thereof. By proportioning the cut-outs, or by placing a plate 34 over the cut-out portion of the rail, as shown in Figure 1, the fingers 33 may be caused to act as stops to limit the motion of the rails into sheet feeding position, and to act in the same way as the stops 31 and 31*a* in controlling the motion of the rails out of sheet feeding position.

For the automatic control of our mechanism, we provide a lever 35 extending down into the path of the sheets between the rails and pivoted to a supporting member 36, which is arranged to be slidable along a bar 37 in the frame. This lever is connected by means of a link 38 to a second lever 39, arranged to operate an air valve 40, also placed upon the supporting member 36. The flexible hose 41 connects this valve with the cylinder 16, and another flexible hose, not shown, connects the valve with a source of compressed air. The lever 35 may be provided, if desired, with a

stop 42 adapted to strike the bar 37, and limit the forward motion of the lever. The lever not only serves to operate the releasing mechanism, which moves the rails and permits the sheet to fall, but also serves as a stop for the sheets, for which purpose it has been found to be quite accurate. Sheets are stopped with their ends in an alignment, which does not vary by more than one-half inch. A supplementary stop may, of course, be provided, if desired, or means may be taken to prevent the lever 35 from moving back beyond a predetermined point, with reference to the support 36.

It will be understood that various modifications may be made in our device without departing from the spirit of our invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a sheet piling mechanism, side guides for a pile of sheets, a pair of conveyor means for supporting sheets, means for moving said conveyor mechanisms outwardly from beneath a sheet, said guides having portions extending through said conveyor mechanisms to hold said sheet during the movement of said mechanisms.

2. In a sheet piling device, side guides for a pile of sheets, a pair of conveyor mechanisms for supporting sheets, means for moving said conveyor mechanisms outwardly from beneath a sheet, said guides having portions extending through said conveyor mechanisms to hold said sheet during the movement of said mechanisms, and means actuated by said sheet for operating said moving means.

3. In a sheet piler, a framework and a pair of conveying rails adapted to receive sheets, side guides for a pile of sheets, said guides having a portion extending into the normal sheet path, and automatic means for moving said rails outwardly.

4. In a piling mechanism a frame work, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails outwardly comprising a single motor and inversely arranged operative connections from said motor to either rail, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails.

5. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails outwardly comprising a single motor and universally arranged operative connections from said motor to either rail, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails, and means on said rails cooperating with said projections on the guides whereby said projections on the guides may serve as members limiting the inward motion of said rails.

6. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails outwardly comprising a single motor and inversely arranged operative connections from said motor to either rail, stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails.

7. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails outwardly, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side at least being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails, said means for moving said rails outwardly comprising a pressure cylinder and inversely arranged operative connections from said cylinder to either rail, one of said connections having an adjustable link to allow for the adjustment of the said rail.

8. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails outwardly, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails, said means for moving said rails outwardly comprising a pressure cylinder and inversely arranged operative connections from said cylinder to either rail, and

means actuated by said sheets to control said means for moving the rails.

9. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework, so as to hang downwardly, and means for moving said rails outwardly, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails, said means for moving said rails outwardly comprising a pressure cylinder and inversely arranged operative connections from said cylinder to either rail, and means actuated by said sheets to control said means for moving the rails, and comprising a lever with a portion in the path of said sheets, and a portion adapted to operate a valve, said lever adapted to act as a stop for said sheets.

10. In a piling mechanism a framework, an opposed pair of conveying rails, pivoted upon supporting members in said framework so as to hang downwardly, and means for moving said rails, and stop means on said frame limiting the outward motion of said rails, opposed guides for defining the edges of a pile of sheets, said guides upon one side being connected to said frame adjustably, said guides having a portion extending through said rails into the plane of the normal sheet path whereby sheets may be held during the movement of said rails, said means for moving said rails outwardly comprising a pressure cylinder and inversely arranged operative connections from said cylinder to either rail, and means actuated by said sheets to control said means for moving the rails, and comprising a lever with a portion in the path of said sheets, and a portion adapted to operate a valve, said lever adapted to act as a stop for said sheets, said lever mounted upon a member movable with reference to said framework to accommodate different lengths of sheets.

11. In a sheet piling mechanism, side guides for a pile, supports for a sheet located near the top of said guides, said guides having portions extending into the plane of a sheet on said supports, means for conveying the sheet over said supports, and means for removing said supports from beneath a sheet.

12. In a mechanism for piling sheets of relatively great area and thinness, supports engaging under opposite edge portions of said sheets, movable in opposite directions out from under said portions to allow the sheets to drop, and means at intervals along said supports, engageable with the adjacent edges of a sheet on said supports to prevent lateral displacement of the sheet along with either outwardly moving support.

13. In a mechanism for piling sheets of relatively great area and thinness, supports engaging under opposite edge portions of said sheets, movable in opposite directions out from under said portions to allow the sheets to drop, said supports having recesses at intervals along said supports, and means engageable through the respective recesses with the adjacent edges of a sheet on said supports to prevent lateral displacement of the sheet along with either outwardly moving support.

14. In a sheet piling mechainsm, a pair of laterally spaced rails adapted to receive and afford vertical support to the lateral edges of a sheet as it is moved longitudinally between them, means for supporting the rails, means for simultaneously moving both rails outwardly relatively to their supporting means so as to withdraw their support from the sheet and permit it to fall, means carried by said supporting means for guiding the lateral edges of the sheet during its descent, and means postioned to engage with the sheet to prevent movement of the sheet with either one of said rails when the rail moves outwardly as aforesaid, to hold the sheet in substantial vertical alignment with said guiding means, so that the sheet upon being released by the outwardly moving rails, drops with the desired accuracy between said guiding means.

AUGUST W. RYAN.
FRANK E. TUBBS.
TERRENCE W. ALLSWORTH.