Oct. 16, 1928. 1,688,219

J. D. WILLIAMS

MACHINE FOR PILING SHEETS, PLATES, AND THE LIKE

Filed June 3, 1926 4 Sheets-Sheet 1

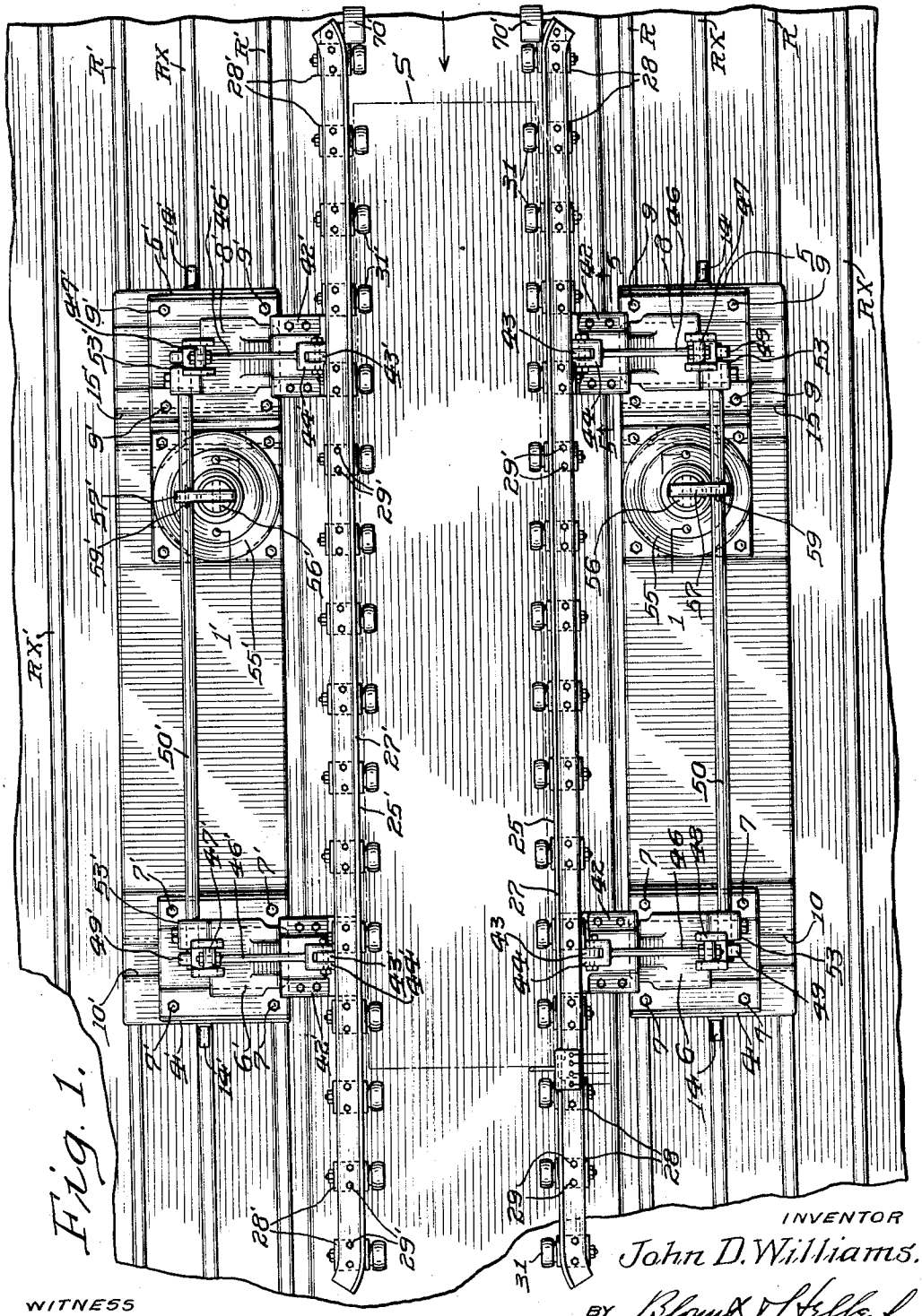


Fig. 1.

WITNESS
F. J. Hartman.

INVENTOR
John D. Williams.
BY Blount & Hellat
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MACHINE FOR PILING SHEETS, PLATES, AND THE LIKE

Filed June 3, 1926 4 Sheets-Sheet 2

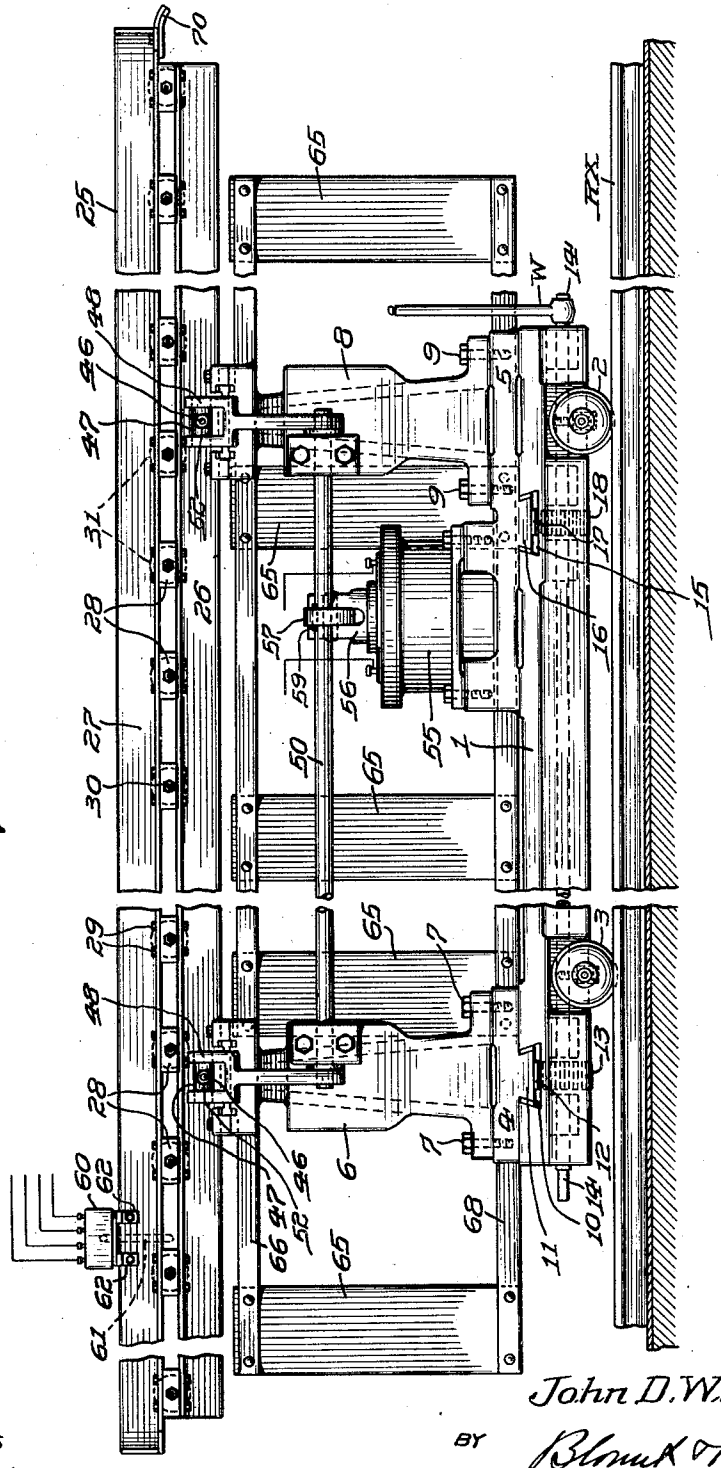


Fig. 2.

WITNESS
F. J. Hartman.

INVENTOR
John D. Williams.

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MACHINE FOR PILING SHEETS, PLATES, AND THE LIKE

Filed June 3, 1926 4 Sheets-Sheet 3

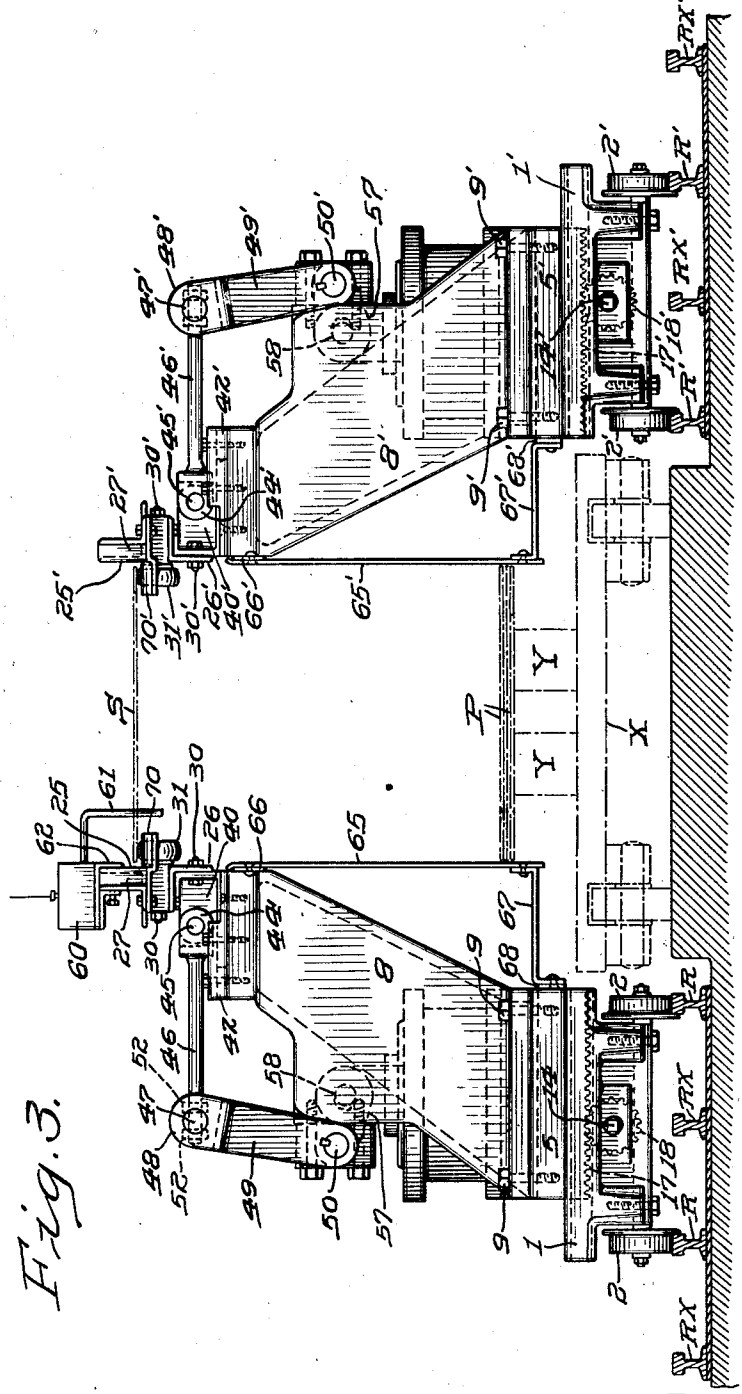


Fig. 3.

INVENTOR
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F. J. Hartman.

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MACHINE FOR PILING SHEETS, PLATES, AND THE LIKE

Filed June 3, 1926 4 Sheets-Sheet 4

Fig. 4.

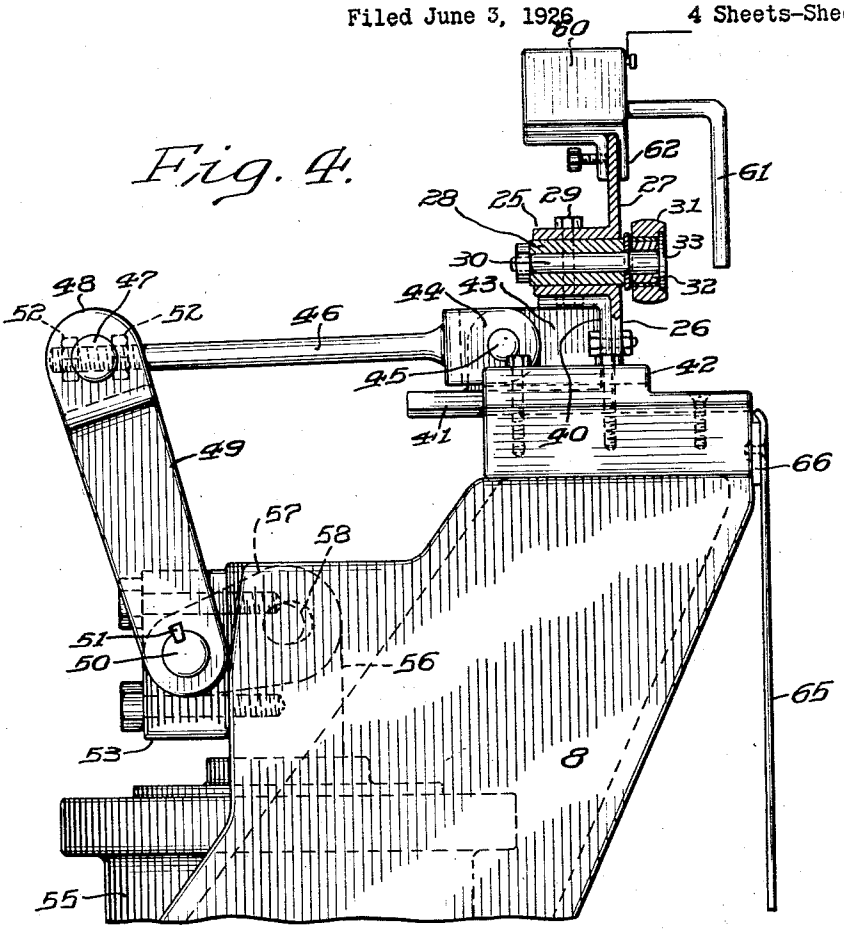
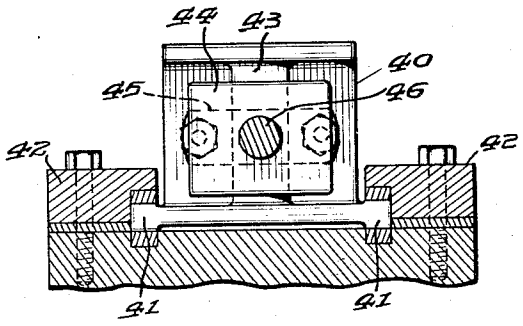


Fig. 5.



INVENTOR
John D. Williams.

WITNESS
F. J. Hartman.

BY
ATTORNEYS

Patented Oct. 16, 1928. 1,688,219

UNITED STATES PATENT OFFICE.

JOHN D. WILLIAMS, OF NILES, OHIO.

MACHINE FOR PILING SHEETS, PLATES, AND THE LIKE.

Application filed June 3, 1926. Serial No. 113,523.

A principal object of my invention is to provide a machine for piling sheets, plates or like articles one upon the other, and more particularly for piling metallic sheets, plates, strips or the like as they are successively delivered from the rolls of a rolling mill or other apparatus which has performed some operation on them, said machine being intended to be employed in place of the manual piling of such articles as now customarily performed.

A further object of the invention is to provide a machine adapted to be placed adjacent the delivery side of the rolls of a rolling mill or other apparatus in a position to receive the sheets as they are successively delivered therefrom and while they are moving longitudinally, to afford vertical support thereto until the sheet reaches a predetermined position and is entirely clear of the delivering machine and to then suddenly and rapidly withdraw such support so as to allow the sheet to fall vertically either on a subjacent support or on the upper surface of the preceding sheet as it rests at the top of the pile of sheets being formed by the machine.

A still further object of the invention is to provide a machine of the general character aforesaid which is operative to support the sheet as it is delivered thereto in such manner as to prevent any scratching, marring or other injury to its surface and to thereafter allow the sheet to drop upon the subjacent support or pile in a perfectly flat condition so that all deformation of or injury to the sheets during their passage through the machine and during the formation of the pile is entirely avoided, thus permitting the employment of the machine for the piling of articles having highly finished surfaces.

A still further object of the invention is to provide a machine for piling sheets which is readily adjustable to accommodate sheets of different widths and lengths; which is automatic in action; which is of relatively simple construction and not liable to get out of order under conditions of use and which is operative to pile the sheets or other material evenly and with their lateral and end edges in vertical alignment so that the finished pile of sheets presents the appearance of a rectangular block having smooth and even faces. The ability of the machine to form a smooth and even pile of this character is of great utility when the piled sheets are to be subsequently annealed as the danger of burning the ends of projecting sheets during the annealing process, which is always present when the sheets are unevenly piled, is thereby eliminated.

My invention further comprehends other objects, advantages and novel features of design, construction and arrangement to which reference is hereinafter more particularly made or which will be apparent from the following description of one embodiment of my invention as illustrated on the accompanying drawings.

As a matter of convenience, I shall herein refer to the articles upon which the machine is intended to operate as "sheets", but it is to be distinctly understood that this term is employed in a generic or comprehensive sense and is therefore intended to include plates, strips and other articles of generally like character as well as those articles of commerce which in trade parlance are designated specifically as "sheets".

In the said drawings Fig. 1 is a top plan view of one form of machine constructed in accordance with the invention; Fig. 2 is a side elevation thereof and Fig. 3 an end view looking in the direction in which the sheets enter the machine, these several views showing the position of the parts when in condition to receive and support the sheet prior to its being released and allowed to fall on a subjacent support. Fig. 4 is a fragmentary detail view on a somewhat larger scale showing the position of certain of the parts when withdrawn from supporting position to allow the sheet to fall and Fig. 5 is an enlarged fragmentary detail view in vertical section on line 5—5 in Fig. 1 looking in the direction of the arrows.

As the machine comprises substantially similar conjointly operative mechanisms respectively arranged on opposite sides of the center line of the machine in opposed relation to each other, the following description while, for convenience, more specifically directed to the mechanism on the left hand side of the machine when viewed as in Fig. 3, is to be understood as equally applicable to the corresponding parts of the mechanism on the right hand side of the machine and which are designated by the same numerals but with the addition of a prime (′); however, it will of course be appreciated that because of their disposition on opposite sides

of said center line certain of the parts will be made as rights and lefts or otherwise oppositely formed.

As shown, therefore, the mechanism on each side of the machine comprises a longitudinally extending base plate 1 mounted on wheels 2 and 3 adapted to run on tracks having laterally spaced rails R, R disposed on a suitable supporting floor. The base plate is adapted to support, conveniently near its opposite ends, slide blocks 4 and 5 whose under surfaces are provided with pads adapted to rest on corresponding pads on the upper surface of the base, the contacting faces of the several pads being preferably machined so that the slide blocks can be moved laterally across the base with a minimum of friction by means hereinafter more specifically described. The slide block 4 is adapted to support a pedestal 6 which rises vertically therefrom and is firmly bolted thereto by bolts 7, and the slide block 5 is likewise adapted to support a substantially similar pedestal 8 secured thereto by bolts 9. Each of these pedestals is preferably inwardly inclined as shown in Fig. 3 so that its upper end is disposed considerably nearer the center line of the machine than is its lower and is preferably in the form of a relatively heavy casting to afford the requisite rigidity.

The pedestals 6 and 8 are preferably arranged in longitudinal alignment and means now to be described are provided for moving the slide blocks transversely of the base, and preferably simultaneously, so as to move the pedestals in or out from the center line of the machine, and while the said means may be of any suitable character I prefer to utilize for that purpose a rack and pinion mechanism of such character that the pinions and racks controlling the movement of the blocks may be simultaneously actuated from a single point. More specifically I may provide the base plate beneath the block 4 with a transversely extending undercut groove 10 and the block with an integral transversely extending tongue 11 adapted to engage therein and provided on its lower face with a rack 12 cooperative with a pinion 13 mounted on a longitudinally extending shaft 14 journaled in lugs depending from the base plate and projecting beyond the opposite ends thereof. In a similar way I may provide a groove 15 in the base plate beneath the block 5 adapted to receive a tongue 16 carried by the block and provided with a rack 17 meshing with a pinion 18 also mounted on the shaft 14. Thus by rotating the shaft by means of a suitable wrench W disposed on either end thereof the pinions may be rotated to actuate the adjacent racks and simultaneously move the slide blocks and the pedestals either toward or away from the center line of the machine for a distance limited only by the length of the racks to thereby adapt the machine to different widths of sheets as will hereinafter more fully appear.

The pedestals are operative to support adjacent their upper extremities a longitudinally extending, horizontally disposed rail generally designated as 25 which may comprise a lower member 26 and an upper member 27 respectively formed of angle iron and so disposed that one flange of each member will extend horizontally and the other flange vertically, the last mentioned flange of the lower member being turned downwardly and the corresponding flange of the upper member being turned upwardly and both of said flanges being in vertically aligned relation with each other. Between the horizontal flanges of the rail members are secured at longitudinally spaced intervals a series of blocks 28, bolts 29 extended through the flanges and through the blocks serving to keep the latter in position and also to secure the members 26 and 27 together so that the latter and the blocks form the single operative unit or rail 25. Each block is bored transversely for the reception of a stud 30 secured in the block in any suitable way, the forward end of this stud, that is, the end adjacent the vertical flanges of the rail, being arranged to project inwardly beyond the flanges and to support a roller 31 for rotation on a horizontal axis. Preferably this roller is mounted on a suitable antifriction bearing, conveniently a roller bearing of any suitable type generally designated as 32, and is prevented from slipping off of the end of the stud in any convenient way as by providing the latter with an end flange 33 which is preferably countersunk in the face of the roller. The precise form of antifriction bearing utilized for mounting the rollers on the studs as well as the particular means employed for preventing the rollers from sliding off of the studs are of course a matter of choice and in some cases it may even be found desirable to omit the antifriction bearing entirely and to journal the rollers directly on the studs, but I ordinarily prefer to utilize the antifriction bearings at this point in order to insure the rotation of the rollers with the least possible amount of friction.

It will thus be apparent, as hitherto stated, that the rail 25 is in effect a single operative unit made up of the angle members 26 and 27 and the blocks 28 arranged at longitudinally spaced intervals between them and carrying the rollers 31, this unitary structure being supported adjacent the upper ends of the pedestals and arranged for movement relatively thereto transversely of the machine in the manner and by the mechanism now to be described.

Rigidly secured to the rear face of the rail member 26 in alignment with each of the pedestals is a slide 40 which rests on the upper end of the pedestal and has outwardly

projecting flanges 41 which slidably engage in a groove or recess formed between the pedestal and ways 42 secured thereto, thus permitting the slide to move in or out from the center line of the machine. The slide is provided with a central vertically extending web 43 which is received in a clevis 44 pivotally connected to the web by a pin 45 and disposed on one end of a rod 46, the other end of which is preferably provided with threads and extended loosely through a pivot pin 47 disposed in a clevis 48 in one end of a crank 49, the opposite end of which is rigidly secured to a longitudinally extending shaft 50 as by key 51 or in any other suitable way. The end of the rod 46 is adjustably secured in the pin 47 by adjusting nuts 52 disposed on opposite sides of the pin, thus affording a capacity for limited adjustment at this point by means of which the effective length of the rod may be varied as desired.

The longitudinally extending shaft 50 is journaled in suitable boxes 53 mounted on the pedestals and it will thus be apparent that as both of the cranks 49 are fixed to the shaft, rotation of the latter through a limited arc is effective to turn the cranks simultaneously and thus cause the rods 46 to move the slides 40 transversely of the machine thereby effecting a corresponding movement of the rail 25 and rollers 31 from substantially the position shown in Fig. 3 to that shown in Fig. 4 or vice versa depending on the direction of rotation of shaft 50.

Any suitable means may be provided for rotating shaft 50 although for this purpose I prefer to utilize electrically actuated means, conveniently a solenoid 55 supported on the slide block 5 and having a plunger 56 adapted to move vertically when the solenoid is energized. As the particular form of solenoid employed is a matter of choice further description thereof would be superfluous as solenoids suitable for the purpose are readily obtainable in the open market and are in common use in steel mills and other manufacturing establishments.

The plunger 56 of the solenoid may conveniently be provided with a clevis at its upper extremity adapted to receive one end of a crank 57 pivotally secured in the fork of the clevis by a pin 58 and rigidly secured at its opposite end to the shaft 50 in any suitable way, conveniently through the medium of a key 59, so that when the solenoid plunger moves the shaft will be correspondingly rotated to move the cranks 49 and in turn the rail 25 outwardly, that is, away from the center line of the machine, when the plunger is raised, and in the opposite direction, so as to move the rail inwardly, when the plunger is lowered.

As hitherto stated and as will be apparent from an inspection of the drawings, the complete machine embodies two mechanisms, each substantially of the character of that heretofore described, which are disposed in opposed relation on opposite sides of its center line and preferably equidistantly therefrom; in consequence the rollers of the two rails 25 and 25′ overhang their respective pedestals when the rails are respectively moved inwardly as shown in Fig. 3 and are thus in a position to receive and vertically support the edges of a sheet S as it is moved longitudinally and progressively between the rails, conveniently in the direction of the arrow as shown in Fig. 1. As it is the function of the machine in piling the sheets to receive them one at a time from the source of supply, to then support each sheet vertically as it progressively moves along between the rails upon the rollers which engage beneath its lateral edges, and to then allow the sheet to fall suddenly after it has reached a predetermined position with respect to the machine by moving the rails rapidly and simultaneously outward in opposite directions so as to withdraw the rollers from beneath the sheet, I prefer to provide means actuated by the sheet itself when it reaches such predetermined position for effecting the desired movement of the rails. To this end when utilizing solenoids as the source of power for actuating the rails, I may mount a switch 60 provided with a depending actuating lever arm 61 upon one of the rails at any suitable point and in such manner that the lever arm will depend into the path of the sheet so that when the forward end of the latter comes into contact with the arm the switch will be actuated to simultaneously energize both solenoids and thus cause the desired outward movement of both rails. As switches suitable for this purpose are of common and well known construction I have merely illustrated the switch and wiring by which it is connected to both solenoids and to the line in a conventional way, but it will be understood that I prefer to so arrange the switch, conveniently by mounting it on depending clamps 62 adapted to engage over the vertical flange of the rail and to be secured at any point thereon, that it may be readily adjusted longitudinally of the rail so as to adapt the machine for use with different lengths of sheets or to insure the formation of the pile of sheets at any predetermined point between the rails.

For the purpose of guiding the sheets during their fall and to assist in aligning the side edges of the sheets during the formation of the pile, I may arrange a plurality of vertically disposed longitudinally spaced depending guides 65 in front of the pedestals and beneath the movable rails, securing the upper end of each guide, which latter may be formed of a flat plate of steel, to a longitudinally extending support 66 which is in turn secured to the adjacent faces of the pedestals

and the lower end to a bracket 67 attached to a longitudinally extending support 68 secured to the bases of the pedestals.

It will be understood that the tracks comprising rails R, R′ are so laid as to terminate adjacent the delivery side of a rolling mill or other source of supply from which the sheets are to be received by the machine whereby the latter may be run up along the tracks until the ends of the rails 25, 25′ are adjacent the mill so that as a sheet emerges therefrom its forward or leading end will be received between the rails and supported by the rollers as it moves progressively forward in the direction of the arrow in Fig. 1. In order to insure the entry of the leading end of the sheet between the rails the ends thereof may be turned outwardly as best shown in Fig. 1 and may also be provided with a suitably curved guiding flange 70 which is operative to deflect the leading end of the sheet upwardly and guide it over the rollers.

Prior to the machine being placed in operation and either before or after it is moved into proximity to the rolling mill or other apparatus from which the sheets are to be delivered as just described, the shafts 14, 14′ are operated so as to adjust the pedestals and in turn the rails 25, 25′ so that the rollers respectively carried thereby will be properly spaced on either side of the center line of the machine to engage beneath the edges of and afford vertical support to the particular width of sheet which is to be piled when the rails are projected inwardly to the limit of their movement in that direction. The machine is now in condition for operation and as the first sheet is received from the source of supply its leading end is guided over the rollers by the curved extremities of the rails and guides 70, 70′; the sheet thereafter moves along on the rollers until its leading end comes into contact with the switch lever 61, the switch of course having been previously adjusted to a position in which the rear end of the sheet will be entirely clear of the delivering apparatus before its leading end engages the lever. The movement of the switch lever, thus effected by the moving sheet, actuates the switch in a manner to energize both solenoids, thereby simultaneously rotating shafts 50, 50′ and moving the rails 25, 25′ outwardly to withdraw the rollers from beneath the edge of the sheet. By reason of the arrangement and disposition of the rail actuating mechanism this outward movement of the rails is a very sudden one with the result that the sheet is relieved from its vertical support almost instantaneously and falls perfectly flat between the guides 65 either upon the floor or upon any suitable supporting means such as truck X provided with supporting skids Y—Y as indicated in broken lines in Fig. 3 disposed between the base plates 1, 1′ in a position to receive the falling sheet.

The rails are now moved inwardly again to their initial position for the reception of the succeeding sheet, this movement being effected in any suitable way, conveniently by so arranging the switch that after lever 61 is relieved from the pressure of the advancing sheet the switch will automatically operate to energize the solenoids in such manner as to pull the plungers 56 downwardly, but in some cases it may be found unnecessary to positively return the parts to initial position upon the shutting off of the current through the solenoids, the plungers under such circumstances operating substantially as counterweights or, if desired, the weight of the plungers may be supplemented by counterweights acting on shaft 50, 50′ or other suitable points in the mechanism as will be readily understood.

The cycle of operations just described is repeated each time that a sheet is received by the machine and as the vertical support for each consecutive sheet is withdrawn at exactly the same predetermined point with respect to the travel of the sheets through the machine and the sheets thus allowed to fall each time in exactly the same place, the sheets will form a pile between the guides 65 the sides and ends of which, assuming the sheets to be of similar size, are smooth and even. After the pile of sheets P has reached the desired height the truck X, if the same be used, may be rolled away from the machine or, if no truck be employed and the pile of sheets formed directly on the floor, the machine itself may be rolled out of the way on the tracks R, R′, the pile of sheets then picked up by a crane or conveyor and removed and the machine then repositioned adjacent the delivering apparatus to form another pile of sheets.

It will be apparent that by suitable operation of the shafts 14, 14′ the rails and their supporting pedestals may be adjusted in or out from the center of the machine so as to adapt the latter for the reception of sheets of different widths, but as the extent of this adjustment is necessarily limited by the length of the adjusting racks I prefer, in order to increase the capacity of the machine and to enable it to handle sheets of greater width than could be accommodated when the rails were moved outwardly to the maximum extent permitted by the racks, to provide one or more additional supporting tracks whose rails RX, RX′ are respectively spaced laterally outward from the corresponding rails R, R′ so that by bodily transferring the machine to these tracks the distance between the rails 25, 25′ will be correspondingly increased while the capacity of adjustment through the medium of shafts 14, 14′ will be unaffected; in consequence the machine may be readily adapted to handle sheets whose width progressively increases from those of the min-

imum width which the machine is capable of handling when the bases are disposed on rails R, R', that is, on the innermost tracks and the pedestals adjusted inwardly to their maximum extent, to those of the maximum width which the machine is capable of handling when positioned on the outermost tracks and the pedestals adjusted outwardly to their maximum extent as well as sheets of any intermediate width.

When the machine is to be used for the piling of highly finished sheets whose surfaces must be preserved from abrasion or scratching, I prefer to form the rollers of a composition known as "micarta" or some other material which will not tend to mar the sheet surfaces, but when the preservation of the surface finish of the sheets is not such a material consideration or when the machine is to be utilized for the piling of hot sheets, the rollers may be made of brass or other material which will be unaffected by the heated material passing over it.

While I have herein described and illustrated a preferred form of my invention with considerable particularity I do not thereby desire or intend to limit myself to any precise details of construction or arrangement of the various parts as the same may be modified in numerous particulars from the precise embodiments to which I have referred and the machine arranged for actuation by compressed air, steam or other sources of power besides electricity and adapted to and utilized for the piling of any sort of plates or sheet-like material without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A machine of the class described comprising 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 adjusting the distance between the rails, and means actuated by the moving sheet when it attains a predetermined position with respect to the rails operative to move the rails simultaneously horizontally outward in opposite directions to thereby withdraw their support from the sheet and allow it to fall vertically.

2. A machine of the class described comprising in combination a pair of laterally spaced rails each provided with a plurality of rollers adapted to afford vertical support to the lateral edges of a sheet as it is moved longitudinally between the rails, a supporting base adjacent each rail, means interposed between each rail and the adjacent base adapted to support the rail, means for adjusting said supporting means laterally with respect to the base, and means operative to simultaneously move both of said rails in opposite directions relatively to their respective supporting means irrespective of the laterally adjusted position thereof.

3. A machine of the class described comprising in combination a pair of laterally spaced rails each provided with a plurality of rollers adapted to afford vertical support to the lateral edges of a sheet as it is moved longitudinally between the rails, a base disposed adjacent each rail, supporting means mounted on each base and extending to the adjacent rail, means for moving each of said supporting means laterally with respect to its base to position the rail at a greater or less distance from the center line of the machine, and means for simultaneously moving both of said rails outwardly relatively to their respective supporting means but in opposite directions and irrespective of the laterally adjusted position of said supporting means.

4. A machine of the class described comprising, in combination, a pair of laterally spaced rails each provided with rollers rotatable on horizontal axes and adapted to afford support to the lateral edges of a sheet as it is moved longitudinally between the rails, a supporting base adjacent each rail, means interposed between the rail and the base for supporting the rail, said means being adjustable laterally with respect to the base, a solenoid carried by each of said rail supporting means and having a movable plunger, means connecting the plunger with the adjacent rail and operative to cause movement of the rail upon movement of the plunger, and means operable by the moving sheet upon the attainment of a predetermined position with respect to the rails for contemporaneously energizing both solenoids to cause a simultaneous movement of said rails in opposite directions to withdraw the rollers from beneath the edges of the sheet.

5. In a machine of the class described, a longitudinally extending rail, a base, supporting means interposed between the base and the rail and arranged for lateral adjustment with respect to the base, a solenoid having a movable plunger, and means connecting the plunger and the rail operative upon movement of the plunger to translate the rail horizontally outwardly.

6. In a machine of the class described, a base, supporting means carried by the base, a longitudinally extending rail carried by said supporting means and adapted for lateral movement with respect thereto, means for laterally adjusting said supporting means on the base, a solenoid carried by said supporting means and having a movable plunger, and connections between said plunger and the rail operative when the solenoid is energized to move the rail relatively to said supporting means.

7. A machine of the class described comprising longitudinally extending, laterally spaced sheet supporting means, means for supporting said first mentioned means in a position to receive a longitudinally moving sheet between them, means for moving said first mentioned means simultaneously outward in opposite directions so as to withdraw their support from the sheet, and means carried by and movable with said second mentioned means for guiding the sheet as it falls vertically after said support is withdrawn.

8. A machine of the class described comprising a pair of laterally spaced rails adapted to receive and support a longitudinally moving sheet, means for supporting the rails, means for simultaneously moving the rails outwardly in opposite directions to thereby withdraw their support from the sheet and permit it to fall, and means carried by and movable with the rail supporting means and disposed beneath the rails operative to guide the sheet during its descent.

9. A machine of the class described comprising 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 adjusting the distance between said supporting means, means for simultaneously moving both rails outwardly relatively to their respective supporting means so as to withdraw their support from the sheet and permit it to fall, and means carried by said supporting means for guiding the lateral edges of the sheet during its descent.

10. In a machine of the class described, a base, supporting means carried by and relatively movable with respect to the base, a longitudinally extending rail carried by said supporting means and adapted for movement with respect thereto, a prime mover carried by said supporting means, and connections between said prime mover and the rail operative when said prime mover is energized to move the rail relatively to the supporting means irrespective of the adjusted position of the supporting means with respect to the base.

11. In a machine of the class described, a base, supporting means carried by the base, a longitudinally extending rail carried by said supporting means and adapted to be moved horizontally with respect thereto, means for laterally adjusting said supporting means on the base, a prime mover carried by said supporting means, and connections between said prime mover and the rail operative when the prime mover is energized to move the rail relatively to said supporting means.

In witness whereof, I have hereunto set my hand this 31 day of May, 1926.

JOHN D. WILLIAMS.