

1,305,501.

4 SHEETS—SHEET 1.



R D Little
W T Holman

INVENTOR

L. C. Sterle
by
D. Allsina
his Attorney

L. C. STEELE.
CATCHING AND PACKING MECHANISM.
APPLICATION FILED MAR. 27, 1917.

1,305,501.

Patented June 3, 1919.

4 SHEETS—SHEET 2.

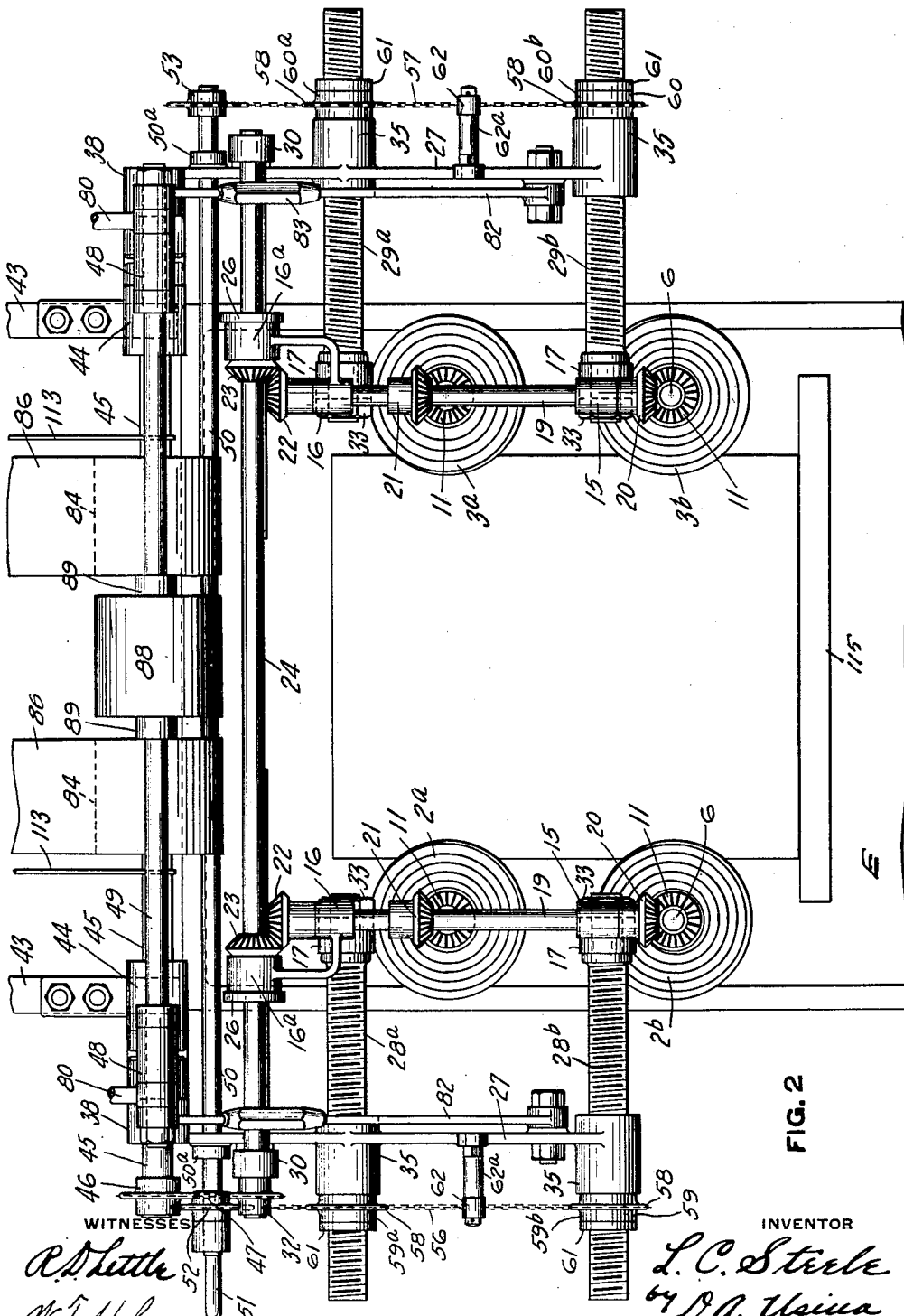


FIG. 2

INVENTOR

L. C. Steele
by D. A. Usina
his Attorney

WITNESSES

R. D. Little
W. J. Holman

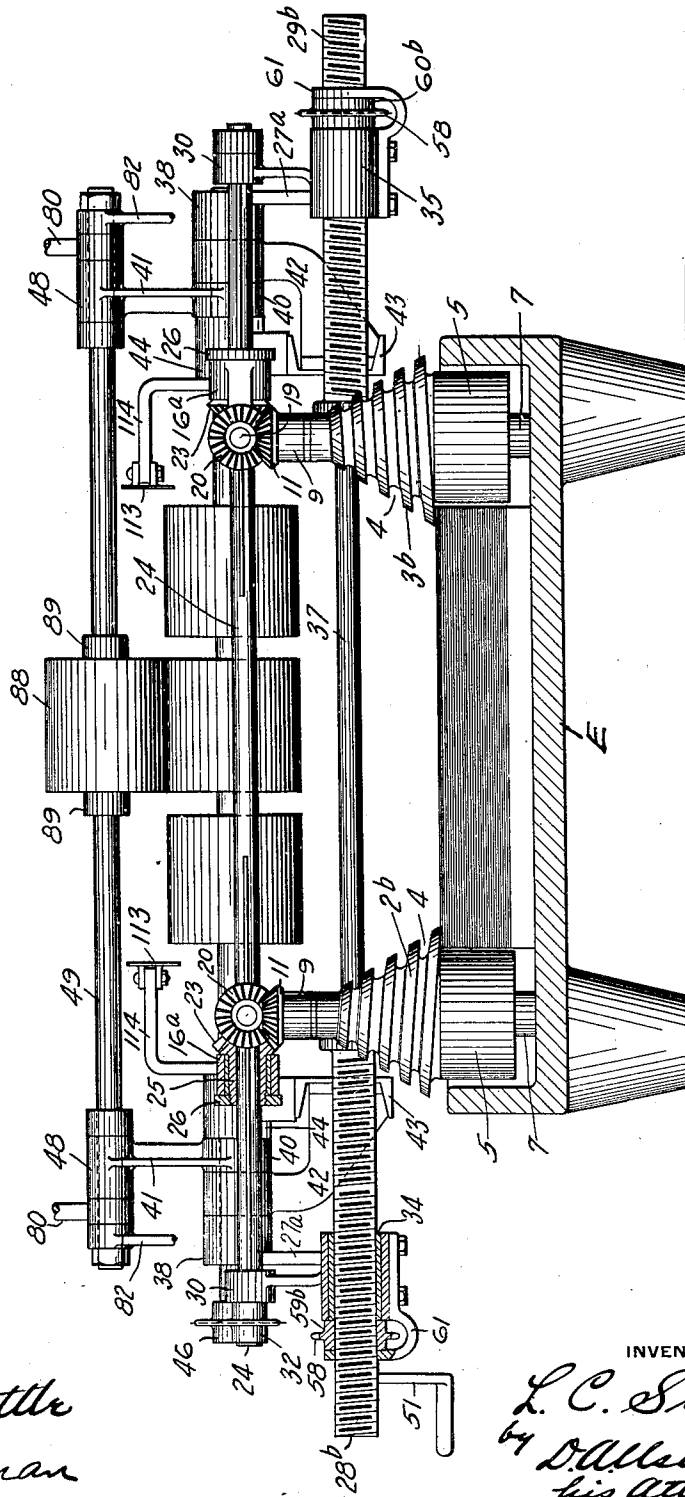
L. C. STEELE.
CATCHING AND PACKING MECHANISM.
APPLICATION FILED MAR. 27, 1917.

1,305,501.

Patented June 3, 1919.

4 SHEETS—SHEET 3.

FIG. 3



WITNESSES

R. D. Little
C. T. Holman

INVENTOR

L. C. Steele
by *D. Allanna*
his Attorney

L. C. STEELE.
CATCHING AND PACKING MECHANISM.
APPLICATION FILED MAR. 27, 1917.

Patented June 3, 1919.

4 SHEETS—SHEET 4.

1,305,501.

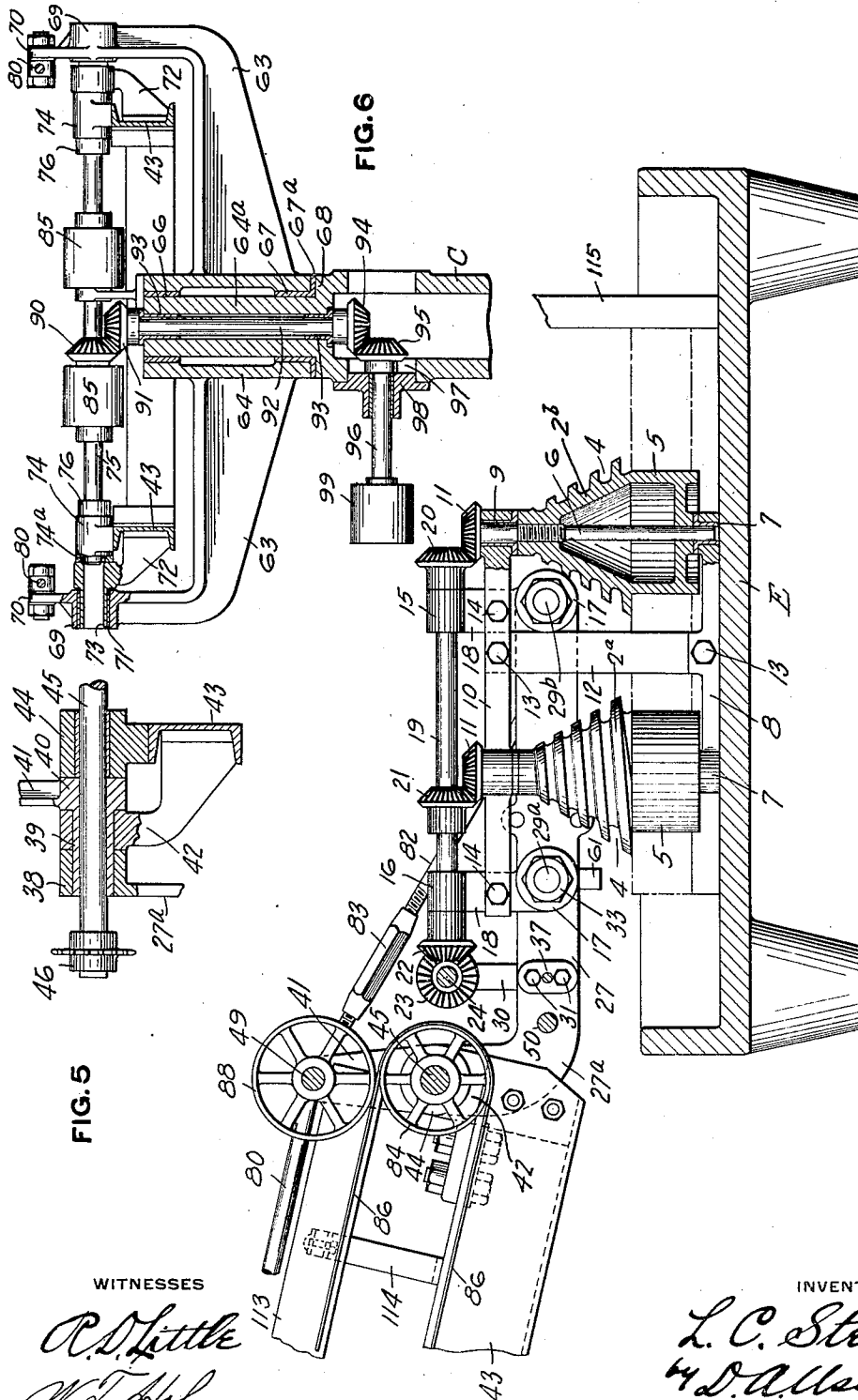


FIG. 4

FIG. 5

FIG. 6

WITNESSES

R. D. Little
W. T. Holman

INVENTOR

L. C. Steele
by D. A. Meina
his Attorney

UNITED STATES PATENT OFFICE.

LAWRENCE C. STEELE, OF BEAVER, PENNSYLVANIA.

CATCHING AND PACKING MECHANISM.

1,305,501.

Specification of Letters Patent.

Patented June 3, 1919.

Application filed March 27, 1917. Serial No. 157,751.

To all whom it may concern:

Be it known that I, LAWRENCE C. STEELE, a citizen of the United States, and resident of Beaver, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Catching and Packing Mechanism, of which the following is a specification.

My invention relates to apparatus used in piling or stacking rolled metal sheets and plates and similar thin and relatively long and wide materials in assembling the materials to form a pile or pack.

While not limited to such use, the invention more particularly relates to the construction and arrangement of apparatus adapted for use in mechanically catching and conveying cold rolled sheets and plates as they emerge from between the rolls of the mill to the packing mechanism forming part of this invention, and for stacking the successive sheets or plates into a pile or pack with the edges of the piled materials in vertical alinement.

One object of this invention is to provide an improved "packing" mechanism, having novel means whereby the pieces of material, as successively engaged thereby, are automatically stacked in a pile, with the opposite side edges thereof in alinement within parallel planes.

Another object of my invention is to provide a packing mechanism having improved means whereby the mechanism is moved by engagement with the successively piled or packed materials, into position to automatically deposit succeeding pieces of the materials and in sidewise and endwise alinement with the pack of piled materials.

Another object of the invention is to provide a packing mechanism having improved means whereby the apparatus is supported and maintained in a horizontal position in the vertical movement of the packing mechanism.

A further object of my invention is to provide a packing or piling mechanism having a vertically tilting and horizontally swinging, packing mechanism support, of novel construction.

A still further object of this invention is to provide a conveyer of improved construction having means whereby the sheets or plates or other materials being handled are discharged therefrom into position to be

mechanically engaged by the packing mechanism.

Still further objects of my invention consist in the provision of apparatus having the parts and novel constructions, combinations and arrangements of parts shown in the drawings, to be described in detail hereinafter, and to be particularly pointed out in the appended claims.

Referring now to the drawings, forming part of this specification, Figure 1 is a longitudinal side elevation, showing a preferred form of sheet or plate packing mechanism, as applied for use on the delivery or "catcher" side of a stand of cold rolls.

Fig. 2 is a plan, on a larger scale, showing details in the construction of the packing mechanism forming part of the apparatus illustrated in Fig. 1.

Fig. 3 is an end elevation, partly in section, showing details in the construction of the packing mechanism of Figs. 1 and 2.

Fig. 4 is a sectional side elevation showing details in the construction of the packing mechanism of the preceding figures.

Fig. 5 is a sectional elevation showing details in the arrangement of the pivotal connection by which the packing mechanism of Figs. 1, 2, and 3 is mounted on the end of the tilting support therefor.

Fig. 6 is a sectional elevation of a portion of the apparatus showing details in the construction of the pivot end of the catching and conveying mechanism forming part of my invention.

Fig. 7 is a diagrammatic plan showing the catching, conveying and packing mechanism and the range of swinging movement of the horizontally swinging, vertical tilting catcher mechanism forming part of this invention.

In the accompanying drawings, the packing mechanism A to which my invention primarily relates, is shown pivotally supported on one end of a vertically tilting and horizontally swinging support B, the support also being conveniently utilized to form an endless conveyer, as will be described hereinafter. The support B is pivotally mounted on a pedestal C and is located in line with and on the catcher or delivery side of the rolls *d, d*, of a cold rolling mill D, being arranged to swing and move the packing mechanism A into position above the bottom E of an annealing box located on the

mill floor at either of two stations F and G therefor. (See Figs. 1 and 7.)

While the particular packing mechanism support shown tilts vertically and swings horizontally, it will be readily seen that other supporting means may be employed.

The packing mechanism A, as shown, has four rotating axially vertical, conoidal worms arranged in pairs and designated by the numerals 2^a, 2^b and 3^a, 3^b, each of the worms having a deep spiral groove 4 in the conical surface thereof. The worms also have a cylindrical lower end 5 which is of less diameter than that of the contiguous or large end of the grooved conoidal portion thereof, the radius of the bottom of the spiral groove 4, at the large end of the worm, being substantially the same as that of the cylindrical end 5. (See Fig. 4.)

While but two are shown in each of the two sets illustrated, obviously any number of worms, depending upon the length and flexibility of the materials to be handled, may be used in each set.

Each worm is fastened on a vertical spindle 6 to be rotated thereby, the lower end of the spindles extending downwardly into a bushed bearing 7 in one or the other of the two lengthwise horizontal, bottom bearing bars 8. The upper end of each spindle 6 extends through a bushed bearing 9 in one or the other of the two top bearing bars 10 and has a bevel gear 11 keyed or otherwise fastened thereon.

Each bottom bearing bar 8 is fastened to a top bearing bar 10 by a lengthwise vertical bar 12 to form a side frame, the ends of the bars 10 being notched and having bolts 13 to rigidly fasten the bars 8 and 10 forming each pair in horizontal alinement. The spindles 6 and ends of the worms 2^a, 2^b and 3^a, 3^b, also help, to some extent, in maintaining the bearing bars 8 and 10 of each side frame in parallel relation.

Rigidly fastened on each top bearing bar 10 by bolts 14, is a single bearing 15 and a double bearing 16, and each of these bearings has a depending boss 17, integrally joined therewith by a rib 18. The ribs 18 are grooved or notched on one side surface thereof to receive a bearing bar 10.

Immediately above and lengthwise parallel with each top bearing bar 10 is a horizontal shaft 19, each shaft being rotatably mounted in a pair of alined bearings 15, 16, and having bevel gears 20 and 21 keyed thereon, which mesh with the bevel gears 11 on the upper ends of the rotary vertical worm spindles 6.

Also secured on one end of each shaft 19 is a bevel gear 22, the gears 22 meshing with bevel gears 23, 23 which are splined to the cross shaft 24. The shaft 24 extends through the transverse bearings 16^a of the double bearing 16 and each bevel gear 23 has

a long hub with a portion thereof of reduced diameter to form an integral tubular sleeve 25 (Fig. 3). The sleeve 25 projects through and is rotatably secured in place in its bearing 16^a by an internally threaded collar 26, screwed and pinned on its threaded end. (See Fig. 3.) In this way the rotating gears 23 are caused to move axially or lengthwise on the shaft 24 when the pairs of conoidal worms 2^a and 2^b, 3^a and 3^b are adjusted toward and away from each other, as is done to enable the worms to operatively engage with and stack various widths of sheets or plates into a pile.

By reference to Figs. 2, 3 and 4, it will be seen that the frames formed by the horizontal bearing bars 8 and 10, and bars 12, are supported on the long or horizontal stems of two L-shaped arms 27, 27, by means of the pairs of horizontal lengthwise adjustable screw threaded shafts 28^a, 28^b and 29^a, 29^b, and that the pair of threaded shafts 28^a, 28^b have right hand and the other pair 29^a and 29^b have left hand threads, preferably of the square type.

The cross shaft 24, in addition to being carried in the bearings 16^a, 16^b on the side frames, also is supported at its ends in bearings 30, 30, fastened by bolts 31 to the horizontal stems of the L-shaped arms 27, and a sprocket wheel 32 is provided on one end of the shaft 24 to rotate the shaft 24, shafts 19, 19, and sets of worms 2^a, 2^b and 3^a, 3^b.

The pairs of horizontal shafts 28^a, 28^b and 29^a, 29^b are rigidly secured at one end in the bosses 17 on the bearings 15 and 16 by means of nuts 33 and extend outwardly in opposite directions from the side frames formed by the bearing bars 8 and 10. These shafts project through bushings 34 in the long bosses or dead-eye bearings 35, 35 of which there are two on the long or horizontal stem of each L-shaped arm. The bushings 34 are not internally threaded but are bored to form a neat sliding fit with the peripheral surface of the square threads on the shafts 28^a, 28^b and 29^a, 29^b.

A separator or strut 37 extending between the inner side surfaces of the L-shaped arms 27, 27, near the bend in these arms, is fastened thereto by the bolts 31, 31, for the bearings 30, to maintain the horizontal or long stems of these arms in spaced relation.

The vertical stems 27^a of the L-shaped arms 27 terminate at their upper ends in bosses 38, these bosses (as is shown in Fig. 5) being loosely secured on the tubular sleeve or extension 39 formed integrally with and projecting outwardly horizontally from one side of the boss 40 on the lower end of vertical arms 41, 41. The upper ends of the vertical arms 41, 41, terminate in bosses 48 and secured in these bosses is a horizontal shaft or rod 49 for a purpose described later (see Figs. 2, 3, and 4). The

sleeves 39 are positioned within bracket bearings 42, 42, which are fastened on the packing mechanism end of the channel beams 43, 43 forming part of the tilting support B of my improved apparatus, to pivotally connect the packing mechanism A to the support B.

Rotatably mounted in bushed bearings 44, 44, on the ends of the beams 43, 43, is a shaft 45. The bearings 44, 44, are in axial alinement with the bore of the tubular sleeves 39, and the projecting end of the shaft 45 which extends through one sleeve 39 has a sprocket wheel 46 thereon which is operatively connected by a sprocket chain 47 to the sprocket wheel 32 on the cross shaft 24 of the packing mechanism by which the worms 2^a, 2^b and 3^a, 3^b are rotated. The tubular sleeves 39 should be bored slightly larger than the diameter of the shaft 45 to prevent binding and to facilitate removal and replacement of the shaft.

Extending through registering openings in bosses 50^a on the long stems of the L-shaped arms 27, 27, near the bend in these arms, is a rotary shaft 50 having a crank 51 on one end. The shaft 50 also has sprocket wheels 52, 53, adjacent to its opposite ends, which are connected by endless sprocket chains 56, 57, with the sprocket teeth 58 on the periphery of the nuts 59^a 59^b, and 60^a, 60^b, a nut being screwed on each of the pairs of threaded shafts 28^a, 28^b and 29^a, 29^b.

Clips 61 bolted to the bosses 35 on the L-shaped arms and having an opening through which the shafts 28^a, 28^b, and 29^a, 29^b extend, serve to keep the nuts 59 in position while being rotated to adjust the pairs of worms 2^a, 2^b and 3^a, 3^b and supports therefor inwardly and outwardly, as is done when the width of the sheets or plates to be handled is changed.

The sprocket chain 56 extends around the nut 59^b on the threaded shaft 28^b and sprocket wheel 52 on the shaft 50, and the other chain 57 extends around the nut 60^b on the threaded shaft 29^b and sprocket wheel 53 on the other end of the shaft 50. The chains 56 and 57 also operatively engage with the sprocket teeth on the nuts 59^a and 59^b for the other threaded shafts 28^a, 29^a, being kept in place by pairs of idler rollers 62 which are rotatably mounted on posts 62^a. The posts 62^a project outward horizontally from the sides of the long stem of the L-shaped arms 27, 27. (See Fig. 2). In this way the nuts 59 and 60 are caused to turn in unison and simultaneously adjust the pairs of worms 2^a, 2^b, and 3^a, 3^b toward and away from each other when the crank 51 is turned manually.

The support B formed by the channel beams 43, 43, is pivotally mounted between the vertical ends of the opposite arms 63, 63, of a yoke 64 to tilt vertically, and the yoke

is pivotally secured by its hub to the upper end of the hollow post or pedestal C so as to swing about a vertical axis. A large flange 65 on the lower end of the pedestal C forms a base to rigidly fasten the pedestal in upright position upon a suitable foundation.

The upper end of the pedestal C, upon which the tilting support B is mounted, is of somewhat less diameter than the lower end thereof and forms a vertical hollow spindle 64^a on which the hub of a yoke 64 turns. The axially central opening in the hub is provided at its ends with bushings 66 and 67, to form bearing surfaces for the spindle 64^a, the bushing 67 in the lower end of the hub having a flange 67^a which engages with the shoulder or jog 68 formed by the junction of the enlarged lower portion with the lower end of the integral spindle 64^a of the pedestal C.

Ribbed arms 63, 63, on the yoke 64 project horizontally outward from opposite sides of its hub and the outer end of each arm which extends vertically upward has a boss 69 and terminates in a smaller boss 70, the openings in the bosses 69 having bushings 71 therein. Fastened on the outer surfaces of each beam 43, 43 of the support B at a suitable distance from the counterweighted end of the beams is a bracket 72 and each bracket has an integral hollow stub shaft or trunnion 73 on its upper end which extends outward horizontally and projects into a bushing 71 in a boss 69 on the yoke arms 63, 63, to pivotally secure the vertically tilting support B on the yoke (see Fig. 5).

Also secured on the beams 43 of the support B are bearings 74, 74, having bushings 74^a in the openings therein, these openings being in axial alinement with the larger openings 73^a in the hollow trunnions 73, 73, and rotatably mounted in the bearings 74 is a horizontal, positively rotated shaft 75, set collars 76, 76, on the shaft engaging an end of the bearings 74 to prevent lengthwise movement of the shaft. This construction enables the shaft 75 to be removed and replaced without disturbing its bearings 74, 74 or the trunnion brackets 72.

The beams 43, 43, forming the tilting support B have separators 77 located adjacent to the ends and at about the middle of the length thereof, to maintain the channel beams in spaced relation, and the rearward end of each beam 43 has a hollow counterweight 78 fastened thereon. The counterweights, which extend angularly relative to the beams, counterbalance the packing mechanism A mounted on the opposite end of the support B, and lessen the power required in moving the packing mechanism. A swinging post 79 pivotally secured to the intermediate separator 77 of the support B may be provided to hold the packing mechanism A in lifted position (the position shown by

broken lines in Fig. 1) while a pack of sheets, plates, or other piled materials is being removed from beneath the packing mechanism.

5 It will be noted by reference to Fig. 1 that the packing mechanism A remains in horizontal position at any elevation into which it is lifted by the vertical tilting support B. In order to keep the packing mechanism A
10 in such horizontal position at all times the horizontal shaft or rod 49 in the bosses 48 on the upper end of the vertical arms 41 of the packing mechanism is connected by tie rods 80 to the small bosses 70 on the upper
15 ends of the arms 63 of the yoke 64 or yoke by which the support B is pivotally mounted on the pedestal C. The tie rods are made in sections, the sleeve nut 81 connecting the sections enabling these rods to be adjusted
20 to the desired length, and the packing mechanism having a tendency to move downwardly at all times, the rods 80 will always be in tension.

The outer end of the long stems of the
25 L-shaped arms 27 of the packing mechanism also are connected to the shaft or rod 49 on the upper ends of the vertical lever arms 41 by means of sectional tie rods 82, these rods extending angularly from the shaft 49 on
30 the arms 41 to bosses on the horizontal stem of each L-shaped arm 27 (see Fig. 4) and having a sleeve nut 83 thereon by which the rods are shortened or lengthened to secure the packing mechanism in horizontal
35 position.

The support B, as shown, also is conveniently utilized to form the frame of a conveyor used in delivering materials to be piled to the packing mechanism A. Pulleys 84
40 are keyed or otherwise fastened on the shaft 45 in the bearings 44, 44, on the piling mechanism end, and similar pulleys 85 are keyed on the shaft 75 at the pivot end of the support B. Endless belts 86 extend around
45 the pulleys 84, 85, to form the moving part of the conveyor, these belts also being employed to transmit power from the driving gearing in the pedestal C to the driving
50 gears of the packing mechanism A. The sprocket wheel 46 on the end of the horizontal shaft 45 is operatively connected by the sprocket chain 47 to the sprocket wheel 32 on one end of the transverse shaft 24 of the packing mechanism, so that when the
55 belts 86 are driven the shaft 24 will be turned and the conoidal worms 2^a, 2^b and 3^a, 3^b forming part of the packing mechanism A will be positively rotated.

In order to discharge the sheets or plates
60 upon the packing mechanism A into position to be engaged by the worms, a pinch roll 88 is loosely mounted on the shaft or rod 49 which extends between the bosses 48 on the upper end of the vertical arms 41 of the

packing mechanism. Set collars 89, 89, on 65 the shaft 49 secure this pinch roll 88 in position on the shaft, and the pinch roll is mounted on the shaft 49 to enable it to move into or be driven by frictional engagement with sheets and plates or pieces of other ma- 70
terials passing between the roll 88 on the conveyer belts 86 and deliver such materials into position to be operatively engaged by the worms of the piling mechanism.

The guards 113 on the sides of the con- 75
veyer B, which are secured to the beams 43, 43 by bent arms 114, 114, serve to keep the sheets or plates in position on the conveyer belt 86 while traveling to the discharge end of the conveyer.

80 The shaft 75 on the pivot end of the tilting support B has a bevel gear 90 thereon meshing with the bevel gear 91 on the upper end of the vertical shaft 92. The shaft 92 is mounted within the upper or spindle end 85
64^a of the pedestal C, flanged bushings 93, 93, forming bearing surfaces therefor. The lower end also of the shaft 92 has a bevel gear 94 thereon which meshes with the bevel gear 95 on one end of the short horizontal 90
shaft 96. The shaft 96 extends through a transverse opening 97 in the side or wall of the pedestal C, being rotatably mounted in the bearing 98 fastened to the pedestal C, and a driving pulley 99 on the outer end of 95
the shaft 96 is connected by a belt 100 (Fig. 1) to a suitable driving motor (not shown).

An auxiliary conveyer H is provided between the tilting support B and the rolls 100
of the mill D to catch the sheets or plates as they emerge from between the cold rolls d, d, and deliver these plates to the endless conveyer belts 86 on the support B.

This conveyer H has an endless belt 101
which extends around pulleys 102, 103 at the 105
opposite ends of the conveyer. The pulley 102 is secured on the horizontal shaft 104 which is mounted in bearings 105, 105, on one end of the side members of the conveyer frame and the pulley 103 is fastened on the 110
shaft 106 mounted in bearings 107, 107, on the opposite end of the side members of the conveyer frame. The side members of the frame which are formed of beams 108, 108, and are inclined outwardly and upwardly 115
from the mill D are connected to the upper ends of legs 109, and the pair of legs at each end of the conveyer are connected by transverse beams 110, 110. A pulley 111 on one end of the shaft 104 is connected by a driv- 120
ing belt 112 to a driving pulley on the horizontal shaft 96 in the bearing 98 of the pedestal C.

A plank or other removable stop 115 will be provided at one end of the annealing box 125
bottom E against which the successively piled sheets and plates will be moved to bring the end of the sheets into vertical

alinement (see Fig. 1), this stop being adjustably held in place to accommodate plates of a length which differs from time to time.

The operation of my improved piling mechanism will be readily understood. The driving motor (not shown) being started, the belt 100 will drive the horizontal shaft 96. Rotation of the shaft 96 causes the driving belt 112 to positively rotate the shaft 104 and conveyer belt 101 on the pulleys 102, 103 of the conveyer H and at the same time the shaft 75 and pulleys 85, 85, are positively driven through the vertical shaft 92 and connecting bevel gears (see Fig. 6). When the shaft 75 is rotated the pulleys 85, 85, actuate the endless belts 86 on the support B, these belts extending around the pair of pulleys 85 on the shaft 75, and pulleys 84, 84, on the shaft 45, mounted in the bearings 74, 74 on the opposite or tilting end of the support B. The belts 86 which serve the double function of a conveyer for the sheets or plates and driving belt for the shaft 45 and the middle one of the three pulleys 84 on the shaft 45 frictionally drives the pinch roll 88 on the discharge end of the tilting support B.

Rotation of the shaft 45 causes the cross shaft 24 of the packing mechanism A to be positively rotated, as the shafts 24 and 45 have sprocket wheels 32, 46 on one end thereof which are connected by a sprocket chain 47 (see Fig. 2) and the cross shaft 24, through the shafts 19, 19 and connecting bevel gears positively rotate the vertical spindles 6 and conoidal worms 2^a, 2^b and 3^a, 3^b on opposite sides of the piling mechanism.

The crank 51 will be turned to adjust the pairs of worms 2^a, 2^b and 3^a, 3^b to the necessary distance apart to accommodate the materials of the particular width to be packed or stacked in a pile and the support B will be swung sidewise into position at one or the other of the stations F and G with the bearing bars 8 of the packing mechanism A resting on the upper surface of the annealing box bottom E, preparatory to putting the apparatus in use. (See Figs. 3 and 4). Obviously, however, any suitable support may be substituted for the annealing box bottom to receive the plates formed into a pack or pile. When the vertical stop 115 is adjusted to position on the bottom E the piling mechanism is in readiness to receive and form the sheets or plates as discharged upon the conveyer 4 into a pile or pack.

The sheets or plates, as they emerge from between the rolls *d*, *d*, of the mill D are delivered upon the endless belt 101 of the inclined conveyer H and this conveyer delivers the materials to the conveyer belt 86 on the tilting support B. The belt conveyer 86 delivers the materials to the packing mechanism A, the pieces of the materials being suc-

cessively discharged from the upper end of the tilting support B so as to fall into engagement with the opposite pairs of conoidal worms 2^a, 2^b and 3^a, 3^b. The conoidal worms are constantly rotated and as the worms in one set rotate in the opposite direction to those of the other the spirally grooved surfaces of the worms will engage with the marginal edges of opposite sides of a sheet or plate when it is delivered between the sets of worms 2^a, 2^b and 3^a, 3^b, and feed it forwardly lengthwise and also vertically downward.

As the sheets or plates come into contact with the opposite and oppositely rotating pairs of worms and the side edges thereof enter the spiral grooves 4 in the side surfaces of the opposed worms they are not only caused to move lengthwise against the stop 115 as well as downwardly, but are also moved sidewise, so that as they emerge from the lower end of the grooves 4 in the conoidal worms they will be alined sidewise with materials previously stacked in the pack or pile of sheets and plates beneath the packing mechanism.

The cylindrical lower end portions of the worms being of a diameter somewhat less than that of the large or lower end of the conoidal worms 2^a, 2^b, and 3^a, 3^b engage with the sides of the pack or pile and thereby hold the horizontally swinging support B in position while the spiral threads formed by the grooves 4 cause the worms to climb upwardly by engagement with the upper surface of the top one of the pile of sheets or plates.

As the height of the stack of piled materials increases by the successive additions thereto the tilting support B moves upward and the parallel motion used in suspending the piling mechanism A on its tilting support B, causes the packing mechanism to be maintained in its horizontal position at all times.

The above described operations are then repeated with successive sheets or plates until a stack of the desired height has been formed. The tilting support B is then swung manually horizontally to move the packing mechanism A out of the way of the pile or pack, or from one of the stations F, F to the other. The stack of piled plates is then removed and a new stack is started. When but one station is employed to stack the sheets or plates the support B and piling mechanism A will be held in lifted position by the post or arm 79 provided on the support for that purpose, while a stack of piled materials is being removed.

The advantages of my invention will be appreciated by those skilled in the art. The apparatus is simple and easily kept in repair.

Modifications in the construction and arrangement of the parts may be made without departing from my invention. The piling mechanism may be supported in ways other than by the tilting support shown. The conveyers shown may be replaced by flight or chain conveyers. The driving mechanism may be modified and other changes may be made within the scope of my invention as defined in the appended claims.

I claim:

1. A packing mechanism comprising means having opposed positively rotating members adapted to engage the edges on opposite sides of materials successively placed therebetween and move the materials lengthwise and sidewise to thereby aline said materials in a pile or pack, and means on said rotary members arranged to lift and automatically maintain the packing mechanism on top of the stack of piled materials during the formation of the pack.

2. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials therebetween and thereby move said materials lengthwise and sidewise to form the materials in a pile or pack and means on said rotary members whereby the side edges of the materials in the pack are mechanically moved sidewise into alinement with the piled materials in forming the pack.

3. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials piled therebetween and thereby stack said materials in a pile or pack and means on said rotary members engaging the side edges of the material, adapted to move the materials sidewise and endwise in alining the materials, and a stop against which the end of the materials is moved during the alinement thereof.

4. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials placed therebetween and thereby stack said materials in a pile or pack, means on said rotary members whereby the piling mechanism is lifted and automatically maintained on top of the stack of piled materials while the pack is being formed, and a counterbalanced support for said packing mechanism.

5. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials placed therebetween and thereby stack said materials in a pile or pack, means on said rotary members whereby the piling mechanism is lifted and automatically maintained on top of the stack of piled materials in the pack, a counterbalanced support for said packing mechanism, and means for delivering the materials into position between said rotary members.

6. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials placed therebetween and thereby stack said materials in a pile or pack, means on said rotary members whereby the side edges of the materials in the pack are alined vertically and whereby the piling mechanism is lifted vertically and maintained on top of the stack of piled materials, and a tilting support for the rotary members.

7. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials placed therebetween and thereby stack said materials in a pile or pack, and means on said rotary members whereby the piling mechanism is lifted and automatically maintained on top of the stack of piled materials, and a conveyer on said tilting support to deliver materials into position between said rotary members.

8. A packing mechanism comprising opposed rotary members adapted to engage the edges on opposite sides of materials placed therebetween and thereby stack said materials in a pile or pack, means on said rotary members whereby the edges of the sides and at least one end of the materials in the pack are alined vertically, and means for relatively adjusting said rotary members to suit materials of various widths.

9. A packing mechanism comprising opposed depending rotary members arranged to engage the side edges of materials placed therebetween and thereby stack successive pieces of the materials in a pile or pack, the rotary movement of said depending members being adapted to aline the successively piled materials sidewise with reference to the stack of piled materials, and means for delivering the materials between said depending rotary members.

10. A packing mechanism comprising opposed depending rotary members arranged to engage the side edges of materials placed therebetween and thereby stack successive pieces of the materials in a pile or pack, the rotary movement of said depending members being adapted to aline the successively piled materials sidewise with reference to the stack of piled materials, means for delivering the materials between said depending rotary members, a tilting support on which said depending members are mounted, and means for maintaining said depending members in horizontal position on said tilting support, when the support is tilted.

11. A packing mechanism comprising opposed rotary and vertically adjustable piling members, said members being arranged to engage with the edges of opposite sides of the materials to be packed while rotating to thereby stack successive pieces of the materials in a pile or pack and the rotary move-

ment of said members being adapted to aline the materials sidewise and to lift the packing mechanism vertically by engagement with the upper one of the successively piled pieces of the materials, means for actuating said rotary piling members, a tilting support for said piling members, means for maintaining the piling members in horizontal position during the tilting movement of said support, an endless conveyer on said support adapted to tilt therewith and arranged to deliver materials into engagement with said piling members, and means for actuating said conveyer.

12. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces, said worms being arranged in sets adapted to engage the marginal edges on opposite sides of a sheet or plate, the grooves in said worms being adapted to aline each sheet or plate sidewise with the edges of a stack of sheets or plates positioned below said worms, and the worms being arranged to deposit the successively alined plates on top of the pack, and means for actuating said worms.

13. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces, said worms being arranged in sets adapted to engage the marginal edges of opposite sides of a sheet or plate, the grooves in said worms being adapted to aline each sheet or plate sidewise with the edges of a stack of sheets or plates positioned below said worms and the worms being arranged to deposit the successively alined sheets or plates on top of the pack, means for actuating said worms, and means for discharging successive sheets or plates into position between and in operative engagement with the sets of worms.

14. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces said worms being arranged in sets adapted to engage the edges of opposite sides of a sheet or plate, and means for rotating the worms, the grooves in said worms being adapted to move the successive plates downwardly into place on top of a pack of piled sheets or plates and to aline the sheet or plate sidewise with the pack in the downward movement thereof.

15. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces, said worms being arranged in sets adapted to engage the edges of opposite sides of a sheet or plate, means for rotating the worms, the grooves in said worms being adapted to aline each sheet or plate sidewise with the edges of the pack of sheets or plates below said worms, and the worms being arranged to deposit the successively alined sheets or plates on top of the pack and being adapted

to climb upward by engagement with the pack as successive sheets or plates are added to the pack.

16. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces, said worms being arranged in sets adapted to engage the edges of opposite sides of a sheet or plate, means for rotating the worms, the worms being arranged to deposit the successively alined sheets or plates on top of the pack and being adapted to climb upward by engagement with the pack as successive sheets or plates are added to the pack.

17. A packing mechanism comprising a plurality of axially vertical conoidal worms having grooved conical surfaces, said worms being arranged in sets adapted to engage the edges of opposite sides of a sheet or plate, and means for rotating said worms, the grooves in said worms being adapted to move the successive sheets or plates downwardly upon the pack of piled sheets or plates into alinement sidewise with the pack in the downward movement thereof and the worms being arranged to climb upward by engagement with the pack as the successive sheets or plates are added to the pack.

18. A sheet and plate packer comprising an axially vertical and vertically movable rotary piling mechanism, said mechanism being arranged to engage with opposite marginal edges of the sheets or plates to thereby stack successively engaged sheets or plates in a pile or pack, and the rotary movement of said mechanism being adapted to aline the sheets or plates in the pile and to lift the packer by contact with the upper surfaces of the successively piled sheets or plates, means for actuating said rotary piling mechanism, and means for delivering sheets or plates into operative engagement with said piling mechanism.

19. A sheet and plate packer comprising an axially vertical and vertically movable rotary piling mechanism, said mechanism being arranged to engage with opposite marginal edges of the sheets or plates to thereby stack successively engaged sheets or plates in a pile or pack, and the rotary movement of said mechanism being adapted to aline the sheets or plates in the pile lengthwise and sidewise, and means for delivering sheets or plates into engagement with said piling mechanism.

20. A packing mechanism comprising a vertically adjustable piling means, said means having depending rotary members arranged to engage with the edges of opposite sides of the pieces of materials being packed to stack the materials in a pile or pack, and the rotary movement of said depending members being arranged to aline the materials sidewise and to lift the packing mechanism vertically by engage-

ment with the upper one of the successively piled pieces of material, means for rotating said depending members, a tilting support for said piling means, and means for main-
 5 taining the piling means in horizontal position during the tilting movement of said support.

21. A packing mechanism comprising rotary and vertically adjustable piling means,
 10 said means being arranged to engage with the edges of opposite sides of the materials being packed while rotating to thereby stack successive pieces thereof in a pile or pack, and the rotary movement of said
 15 means being adapted to aline the materials sidewise and to lift the packing mechanism vertically by engagement with the upper one of the successively piled pieces, and means
 20 for actuating said rotary piling mechanism, a tilting support for said piling mechanism, and means for maintaining the piling mechanism in horizontal position during the tilting movement of said support, and an endless
 25 conveyer to deliver the materials into engagement with said piling means, and means for driving said conveyer.

22. A packing mechanism comprising rotary and vertically adjustable piling means, said means being arranged to engage with
 30 the edges of opposite sides of the materials being packed while rotating to thereby stack successive pieces thereof in a pile or pack and the rotary movement of said piling means being adapted to aline the materials
 35 sidewise and to lift the packing mechanism vertically by engagement with the upper one of the successively piled pieces, a tilting support for said piling mechanism, means for
 40 maintaining the piling mechanism in horizontal position during the tilting movement of said support, and a conveyer to deliver the materials into engagement with said
 piling means.

23. A packing mechanism comprising ver-
 45 tically adjustable piling means, said means

having rotating members arranged to engage with the edges of opposite sides of the materials being packed, to thereby stack
 successive pieces thereof in a pile or pack, and the rotary movement of said members
 50 being adapted to aline the materials sidewise.

24. A packing mechanism comprising vertically adjustable piling means, said means
 55 having rotating members arranged to engage with the edges of opposite sides of the material being packed, to thereby stack successive pieces thereof in a pile or pack, and the rotary movement of said
 60 members being adapted to aline the materials sidewise, and by engagement with the upper one of the successively piled pieces to lift the packer vertically, and means for actuating
 said rotary members.

25. A packing mechanism comprising ver-
 65 tically adjustable piling means, said means having rotating members arranged to engage with the edges of opposite sides of the materials being packed, to thereby stack
 70 successive pieces thereof in a pile or pack, and the rotary movement of said members being adapted by engagement with the upper one of the successively piled pieces to
 lift the packer vertically, and means for
 75 actuating said rotary members.

26. A packing mechanism comprising a rotary and vertically adjustable piling
 80 means, said means being arranged to engage with the edges of opposite sides of the materials being packed while rotating, to thereby stack successive pieces thereof in a pile
 or pack, and the rotary movement of said
 85 piling means being adapted to move the materials sidewise to aline the edges of the opposite sides thereof with the sides of the
 pack of piled materials.

In testimony whereof I have hereunto set my hand.

LAWRENCE C. STEELE.