Jan. 12, 1937. M. P. SIEGER 2,067,505

SLAB PUSHER

Filed Feb. 3, 1936 3 Sheets-Sheet 1

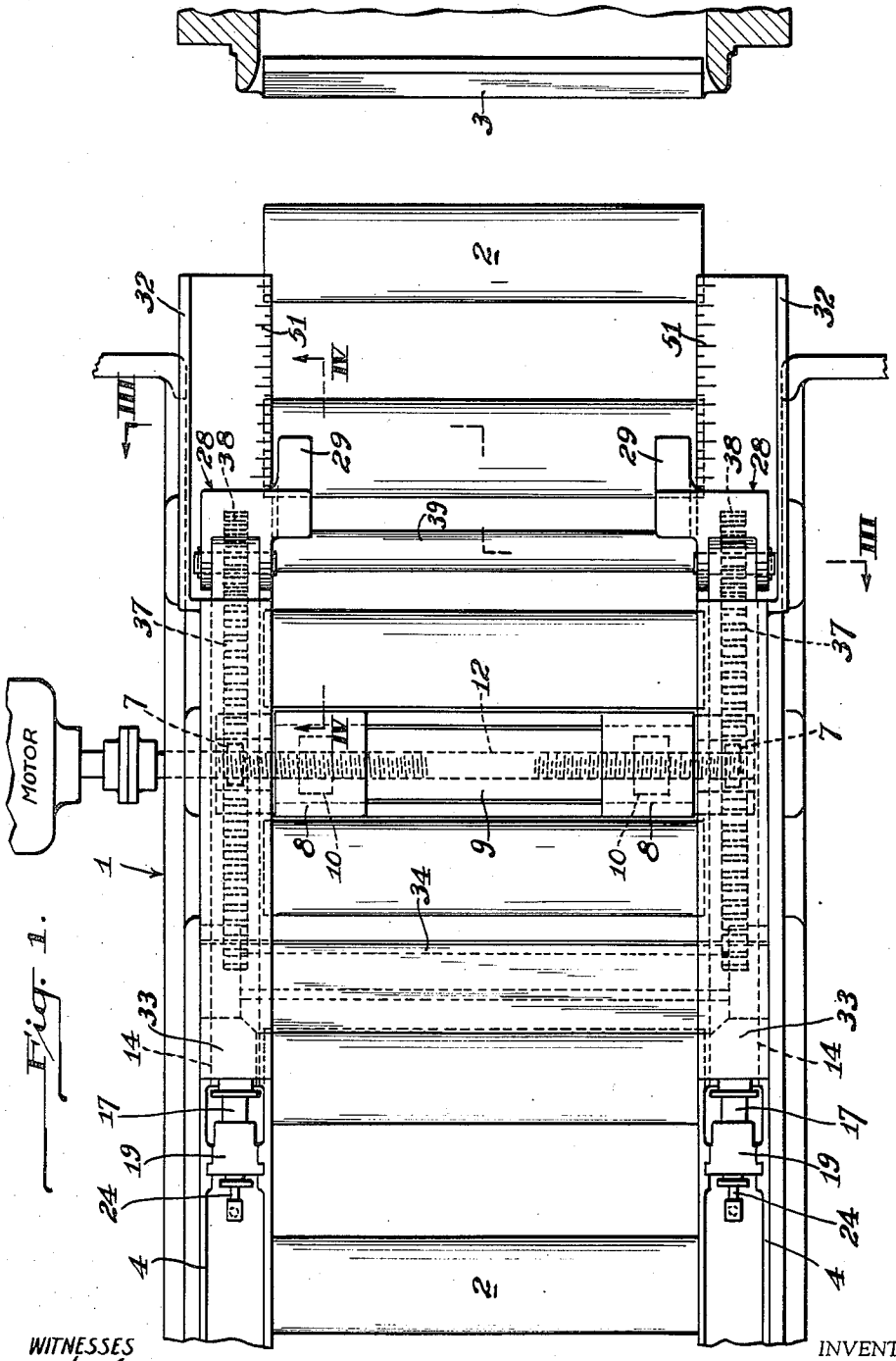


Fig. 1.

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Filed Feb. 3, 1936 3 Sheets-Sheet 2

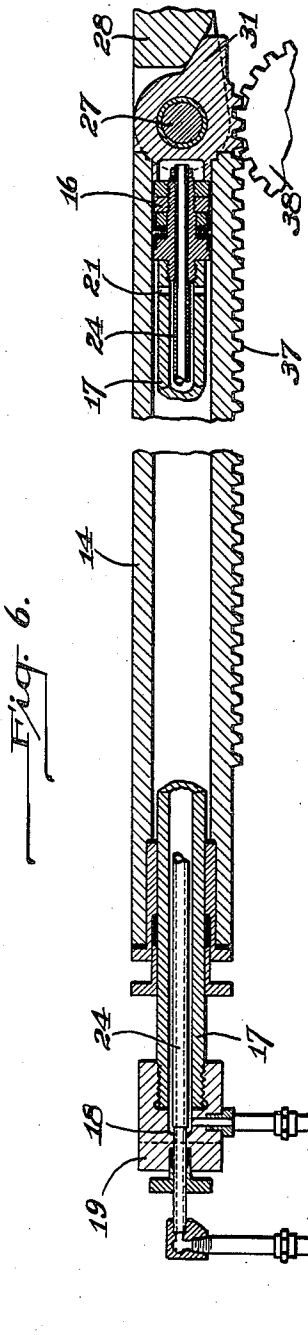


Fig. 6.

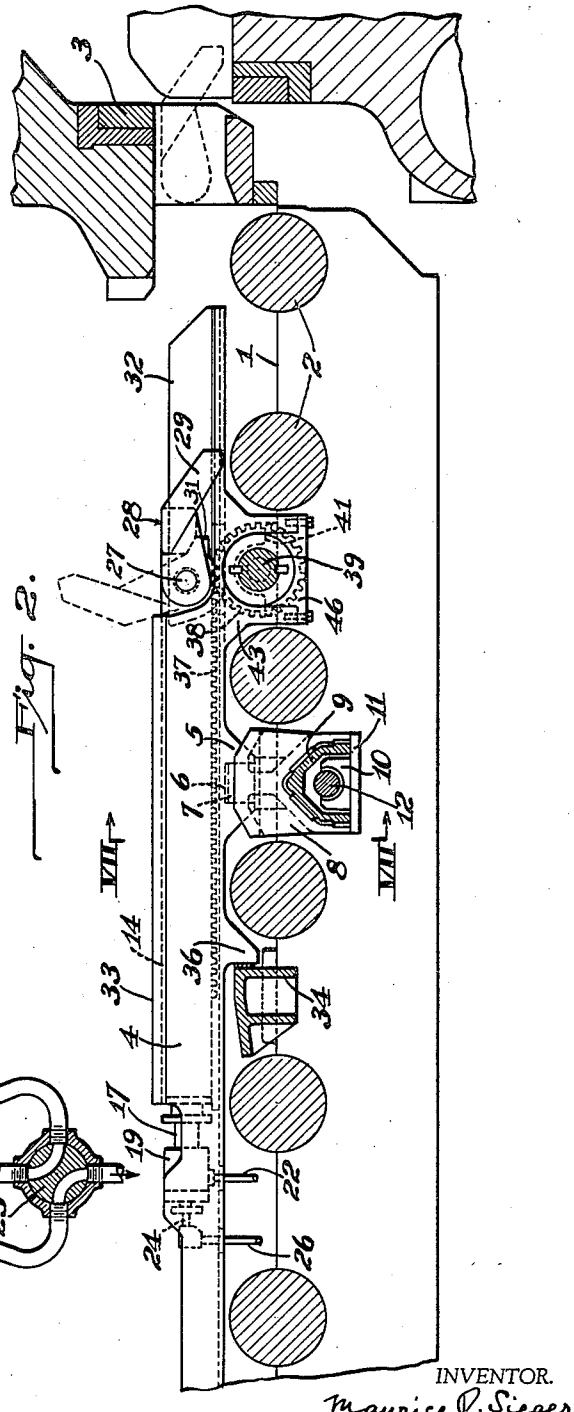


Fig. 2.

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Fig. 3.

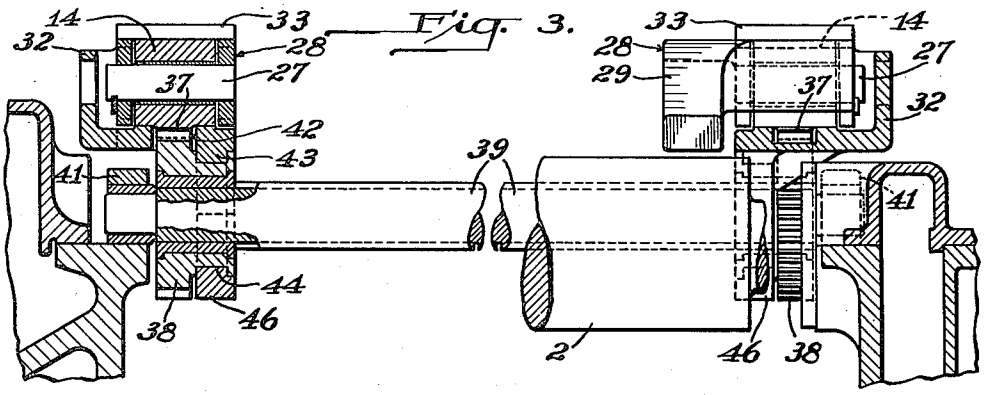


Fig. 4.

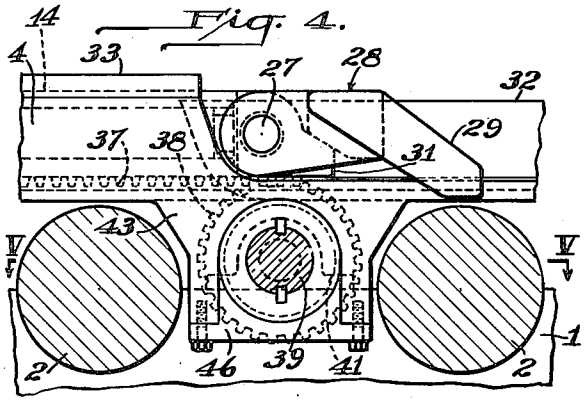


Fig. 7.

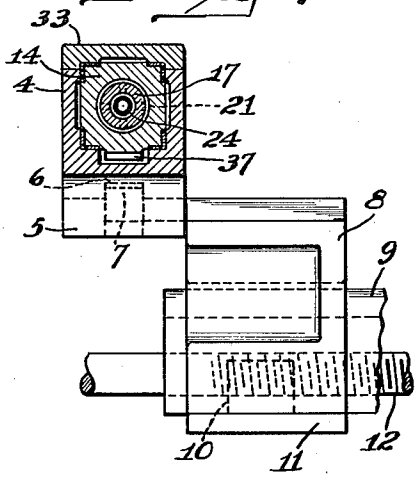
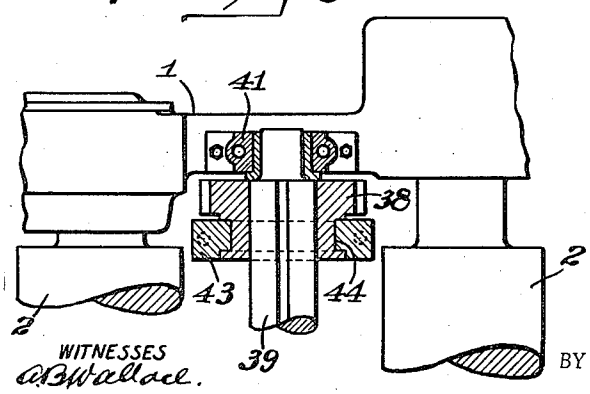


Fig. 5.



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UNITED STATES PATENT OFFICE

2,067,505

SLAB PUSHER

Maurice P. Sieger, Pittsburgh, Pa., assignor to United Engineering & Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application February 3, 1936, Serial No. 62,051

14 Claims. (Cl. 271—55)

This invention relates to apparatus for pushing slabs and the like into or out of machinery, such as broadside mills, shears, and the like, that performs some operation on the slabs. Although the word "slab" is used herein, it is to be understood that it is employed merely for convenience and that the apparatus disclosed can be used for pushing bars, plates and the like.

Slab pushers known heretofore have generally been massive apparatus the initial and maintenance costs of which are high, and they have been mounted above feed tables where they obstruct the view of operators located in pulpits.

It is among the objects of this invention to provide a slab pusher which is compact and relatively light in weight, simple and inexpensive in construction, and inexpensive to operate and maintain. Other objects are to provide such a slab pusher which is mounted where it will not obstruct the view of an operator, which engages slabs of any width at the opposite ends of their rear edges, and which is adjusted laterally of the feed table simultaneously with and by adjustable side guards, edgers or the like.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of a roller feed table with a slab pusher associated therewith; Fig. 2 is a longitudinal section through the table; Fig. 3 is an enlarged transverse section taken on the line III—III of Fig. 1; Fig. 4 is an enlarged vertical section take on the line IV—IV of Fig. 1; Fig. 5 is a horizontal section taken on the line V—V of Fig. 4; Fig. 6 is an enlarged vertical section of a slab pusher cylinder and associated parts; and Fig. 7 is a vertical section through the cylinder and side guard taken on the line VII—VII of Fig. 2.

Referring to Figs. 1 and 2 of the drawings, there is shown a roller feed table 1 of well-known construction having rolls 2 for delivering slabs or the like (not shown) to apparatus at one end of the table which operates on the slabs. For the purpose of illustration only, this apparatus has been shown as vertically reciprocable shears 3 that cut the slabs into predetermined lengths, but other apparatus with which slab pushers are used, such as broadside rolling mills, can be employed in place of the shears without affecting the invention.

Mounted above the sides of the table are laterally movable members, shown for the purpose of illustration as side guards each of which consists of a channel-like member 4 (Fig. 7) extending lengthwise of the table and having one or more depending portions 5 provided with an upwardly extending recess 6 into which a lug 7 on the outer end of a slide 8 projects (Figs. 1 and 7). This slide is slidably mounted on a guide 9 extending transversely of the table below the rolls. To move the two side guards simultaneously toward or away from each other for centering slabs of different widths, a half-nut 10 is rigidly supported inside of guide 9 at each end by a plate 11 secured to the adjoining slide 8. Threaded in the two nuts is a screw 12 the ends of which are oppositely threaded to move the slides and adjoining side guards toward and away from each other when the screw is rotated by any suitable means, such as a motor.

To push the crop end of a slab out of the shear a slab pusher is provided, it being a feature of this invention that the pusher is connected to the side guards with which it is adjustable transversely of the table instead of being independently mounted above the table as heretofore. Accordingly, a cylinder 14, which is generally rectangular in cross section as shown in Fig. 7, is slidably mounted in each channel 4, each cylinder and its associated parts being the same. As shown in Fig. 6, a piston 16 is disposed in each cylinder in the rear end of which a hollow piston rod 17 is slidably mounted. The rear end of this hollow rod is connected to one end of a passage 18 in a block 19 rigidly mounted in channel 4, and its front end is provided with radial ports 21 opening into the bore of cylinder 14. The opposite end of passage 18 is connected by a conduit 22 to a two-way valve 23, or the like, by which fluid pressure can be admitted to or exhausted from the piston rod as desired. Disposed in the hollow piston rod and spaced from its inner wall is a tube 24 that opens at its front end into the cylinder in front of the piston. The rear end of this tube extends through block 19 and is connected by a conduit 26 to valve 23.

Extending transversely through the forward head of the cylinder is a horizontal pin 27 on the projecting ends of which a bifurcated arm of a slab-engaging member 28 is pivotally mounted. This member has another arm 29 offset inwardly of the side guard to permit it to extend forwardly over the table for engaging a rear corner of a slab. The bottom of member 28 normally rests on a forwardly projecting ledge 31 (Fig. 6) of the cylinder head to support slab-engaging arm 29 above the feed table rolls.

Due to the pivotal connection between the slab-pushing member and the cylinder, and to the fact that the lower surface of arm 29 is inclined downwardly and forwardly, slabs moving forward on the table raise that arm and slide under it. If desired, arm 29 can be manually swung up and back out of the path of slabs to the position shown in dotted lines in Fig. 2.

When it is desired to move the cylinders forward in their guide channels to cause arms 29 to push a slab over the table, the two-way valves 23 are turned to admit fluid pressure to tubes 24 and to open hollow piston rods 17 to the atmosphere. The pressure of the fluid between the front ends of the pistons and the heads of the cylinders causes the cylinders to move forward on rods 17. To retract the cylinders and slab-engaging members valves 23 are turned to open tubes 24 to the atmosphere and to supply fluid under pressure to the hollow piston rods from which it passes through ports 21 into the cylinder bores between the pistons and the rear heads of the cylinders. The pistons being held stationary by tubular piston rods 17 and 24, the rear heads of the cylinder are moved backward away from the pistons by the pressure fluid flowing through tubes 24.

To permit arm 29 of each slab-engaging member to project laterally from the adjoining side guard, the front portion of channel 4 has its inner flange removed from a point behind the bifurcated arm of the slab-engaging member to the front end of the side guard, as shown in Figs. 1, 2 and 3. Likewise, the outer flange 32 at the front portion of the channel is offset outwardly to leave room for the outer end of pin 27. Preferably, the top of the channel is provided with a cover plate 33 extending from a point adjacent block 19 to the front end of the inner flange of the channel.

For relieving the laterally adjusting means of the side guards from the backward pressure of the guards when the slab pushers engage heavy slabs, a buffer 34 (Figs. 1 and 2) is rigidly mounted transversely of the table between a pair of the conveyor rolls, its front face being engaged by depending lugs 36 on the bottoms of the guards.

Due to the fact that when fluid pressure is admitted to the cylinders to move the slab pushers forward it may not always be admitted at exactly the same rate to both cylinders, it is desirable that means be provided for synchronizing the movements of the pushers so that they will be reciprocated in unison and their slab-engaging ends maintained in a common transverse plane throughout their movements. Accordingly, as shown in Figs. 3, 4 and 6, the bottom of each cylinder is provided with a rack 37 extending longitudinally thereof and meshing with a pinion 38. These pinions are splined on a shaft 39 journaled in bearings 41 mounted in the sides of the table between two conveyor rolls, and project up through the side guards through slots 42. As both pinions are splined on the same shaft, the pusher cylinders must necessarily reciprocate in unison. To aid in sliding the pinions along the shaft as the guards are adjusted laterally, each of the guards is provided below its inner flange with a depending portion 43 (Figs. 3, 4 and 5) that straddles an inner extension of the adjoining pinion 38 in an annular groove 44. Projecting into the lower half of the groove is a concave block 46 secured to the bottom of depending portion 43. Consequently, when the side guards are moved across the table, pinions 38 are carried along with them.

A slab pusher constructed in accordance with this invention is mounted at the sides of the conveyor where it does not obstruct the view of an operator located in a pulpit. By mounting it in the side guards it is partly concealed, space is saved and it is automatically adjusted when the side guards are adjusted. It is also compact, comparatively light in weight, and simple and inexpensive in construction and operation.

If desired, the slab pusher disclosed herein can be mounted on a delivery table adjacent a shear, and used as a stop gage for measuring off predetermined lengths of material to be cut off by the shear. In such a case the pusher arms 29 are used as work-engaging stops which periodically hold the work stationary while it is being sheared. Suitable calibrations may be shown at any convenient place, such as at 51 in Fig. 1 on the bottoms of the side guards, to permit the work-engaging ends of arms 29 to be set at any desired distance from the shear blades.

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

I claim:

1. The combination with a work conveyor and laterally movable work-engaging means mounted at one side of the conveyor, of a member independent of said conveyor adapted to engage one end of work on the conveyor, said member being connected to said laterally movable means for movement laterally as a unit therewith, and means for moving said member longitudinally of said laterally movable means.

2. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith and comprising means reciprocable longitudinally of said guard.

3. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith and comprising means reciprocable longitudinally of said guard, a part of said means projecting laterally over said table for engaging slabs and pushing them longitudinally of the table.

4. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith comprising means mounted on the side guard and reciprocable longitudinally thereof, and means connected to said reciprocable means and projecting laterally therefrom over said table for engaging the ends of slabs and pushing them longitudinally of the table.

5. The combination with a feed table adapted to feed slabs to operating apparatus at one end

of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith comprising means mounted on the side guard and reciprocable longitudinally thereof, and means connected to said reciprocable means and projecting laterally therefrom over said table for engaging the ends of slabs and pushing them longitudinally of the table, said laterally projecting means being movable relative to said reciprocable means to permit it to be moved out of the path of slabs traveling over the table.

6. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith comprising means mounted in the side guard and reciprocable longitudinally thereof, and means projecting laterally over said table from said reciprocable means for engaging the rear end of a slab and pushing it longitudinally of the table, said laterally projecting means being pivotally connected to said reciprocable means to permit it to be swung out of the path of slabs on the table.

7. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith comprising means mounted in the side guard and reciprocable longitudinally thereof, and a bell-crank-shape member having one of its arms extending longitudinally of the table for engaging the rear end of a slab, and having its other arm pivotally connected to said reciprocable means on a horizontal axis, whereby said first-mentioned arm is adapted to be swung up out of the path of slabs on the table.

8. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a pusher connected to said side guard for movement laterally as a unit therewith comprising means mounted in the side guard and reciprocable longitudinally thereof, and a bell-crank-shape member having one of its arms extending longitudinally of the table for engaging the rear end of a slab, the lower surface of said arm being inclined downwardly and forwardly, and the other arm of said member being pivotally connected to said reciprocable means on a transverse horizontal axis, whereby said first-mentioned arm is adapted to be swung upwardly by slabs traveling over the table.

9. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, of a hollow side guard mounted at the side of the table, means for adjusting said guard laterally across the table, a piston member and cylinder member disposed in said side guard with one of said members rigidly connected to the guard and the other of said members slidable longitudinally therein, fluid pressure means for reciprocating said slidable member, and a slab-pushing member connected to said slidable member and projecting laterally over said table.

10. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, of a hollow side guard mounted at the side of the table, means for adjusting said guard laterally across the table, a piston rigidly mounted in said side guard, a cylinder slidably mounted on said piston and reciprocable longitudinally within said guard, fluid pressure means for reciprocating said cylinder relative to the guard and piston, and a slab-pushing member connected to the cylinder and projecting laterally over said table.

11. The combination with a feed table adapted to feed slabs to operating means at one end of the table, a side guard mounted at each side of the table, means for moving said guards simultaneously toward and away from each other across the table, of a slab pusher connected to each of said side guards for movement laterally as a unit therewith and reciprocable longitudinally thereof, each of said pushers including means projecting laterally over said table for engaging the rear end of a slab and pushing it longitudinally of the table.

12. The combination with a feed table adapted to feed slabs to operating means at one end of the table, a side guard mounted at each side of the table, means for moving said guards simultaneously toward and away from each other across the table, of a slab pusher connected to each of said side guards for movement laterally as a unit therewith and reciprocable longitudinally thereof, each of said pushers including means projecting laterally over said table for engaging the rear end of a slab and pushing it longitudinally of the table, and means for holding said pushers in fixed position relative to each other, whereby their slab-engaging ends are maintained in a common transverse plane throughout their movement.

13. The combination with a feed table adapted to feed slabs to operating means at one end of the table, a side guard mounted at each side of the table, means for moving said guards simultaneously toward and away from each other across the table, of a slab pusher connected to each of said side guards for movement laterally as a unit therewith and reciprocable longitudinally thereof, each of said pushers comprising a piston member and a cylinder member disposed in the adjoining side guard with one of said members rigidly connected to the guard and the other of said members slidable longitudinally thereof, fluid pressure means for reciprocating said slidable member, a slab-engaging member connected to said slidable member and projecting laterally over said table, a rack connected to said slidable member and extending longitudinally of the table, a shaft journaled transversely of the table, and a pinion splined on the shaft and meshing with each rack, whereby said slidable members are reciprocated in unison throughout their strokes.

14. The combination with a feed table adapted to feed slabs to operating apparatus at one end of the table, a side guard mounted at one side of the table and adjustable laterally across it, of a slab pusher connected to said side guard for movement laterally as a unit therewith and comprising means reciprocable longitudinally of said guard, means rigidly disposed transversely of the guard, and means connected to said guard and engaging said rigidly mounted means for holding the guard against backward movement when said pusher engages a slab.

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