United States Patent

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[73] Assignee Wean Industries, Inc. Youngstown, Ohio
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[33] Germany
[31] G 67 52 728.0

[54] **PILGER MILL DIE ADJUSTMENT**
10 Claims, 5 Drawing Figs.

[52] U.S. Cl. 72/220, 72/208
[51] Int. Cl. B21b 21/00
[50] Field of Search 72/208, 209, 193, 189, 249, 220, 214

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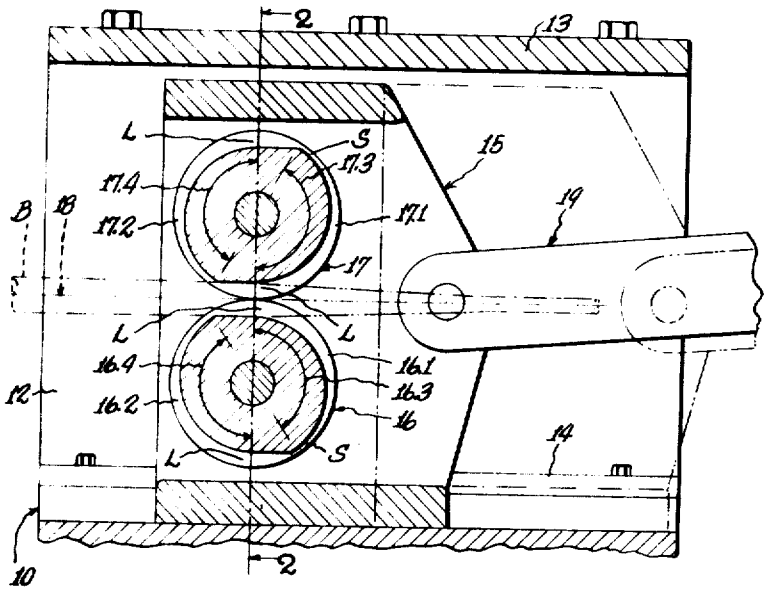
ABSTRACT: A pilger mill construction having an annular die rotatably mounted on a reciprocable carriage and geared to a normally stationary rack by a pinion. While the rack is stationary during normal use, it may be shifted when desired to facilitate selective use of annular die portions which are spaced circumferentially of each other.



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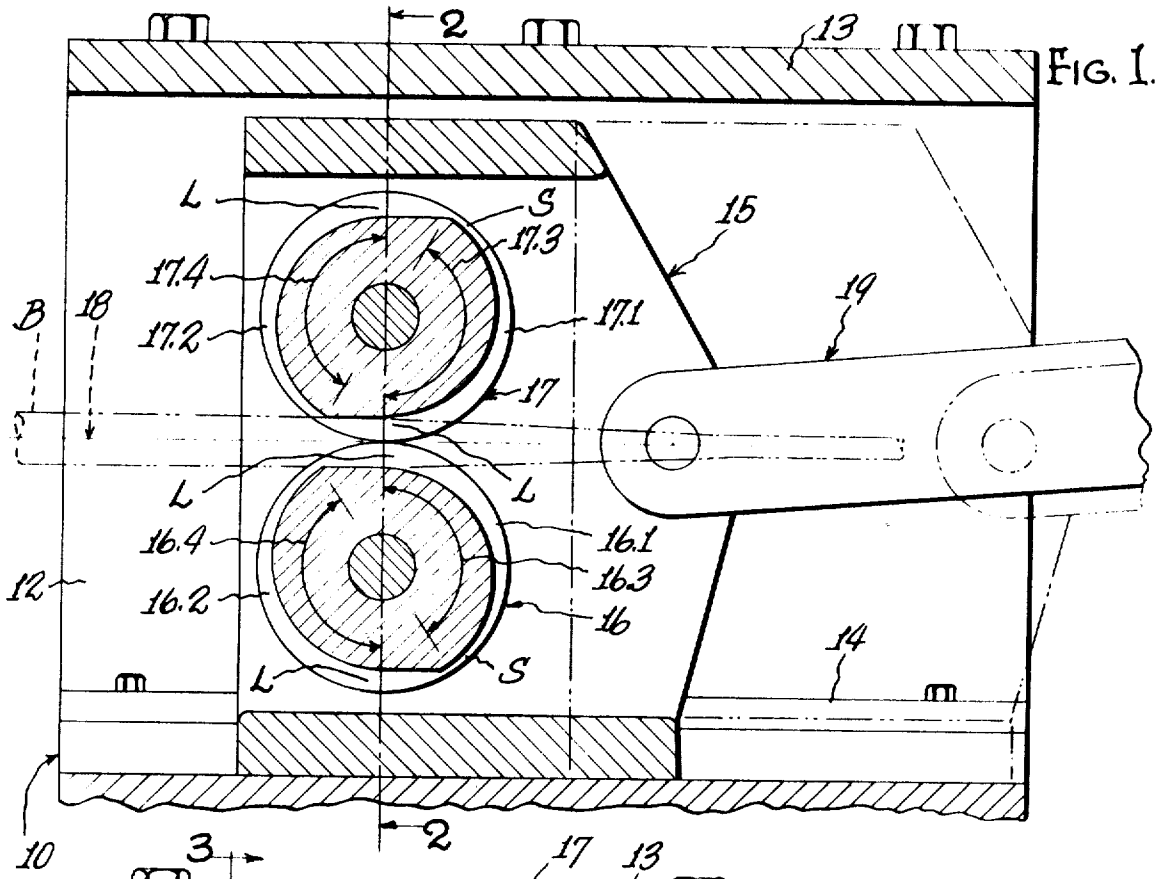

FIG. 1.

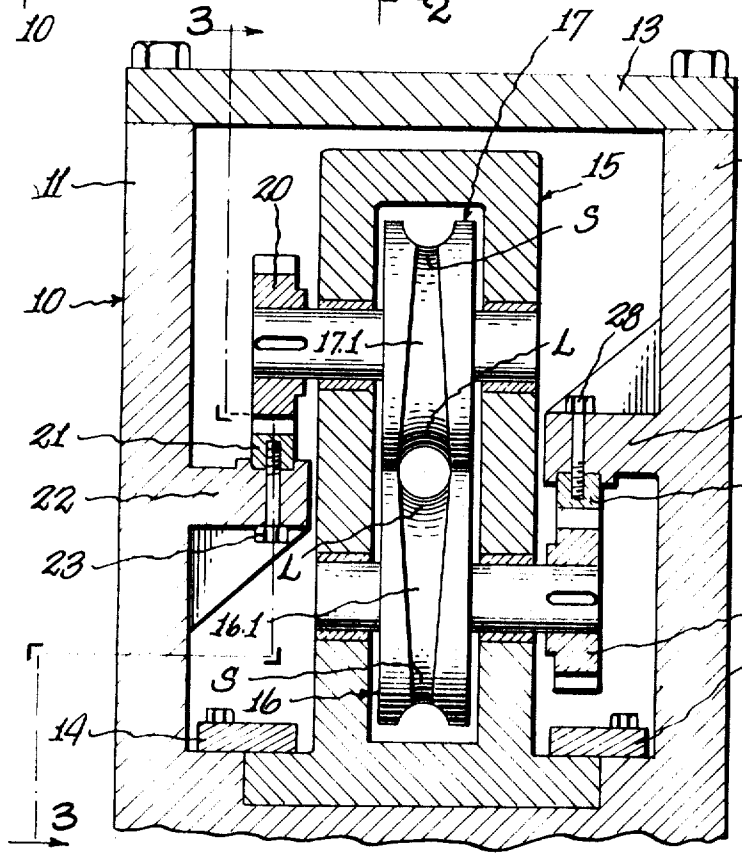

FIG. 2.

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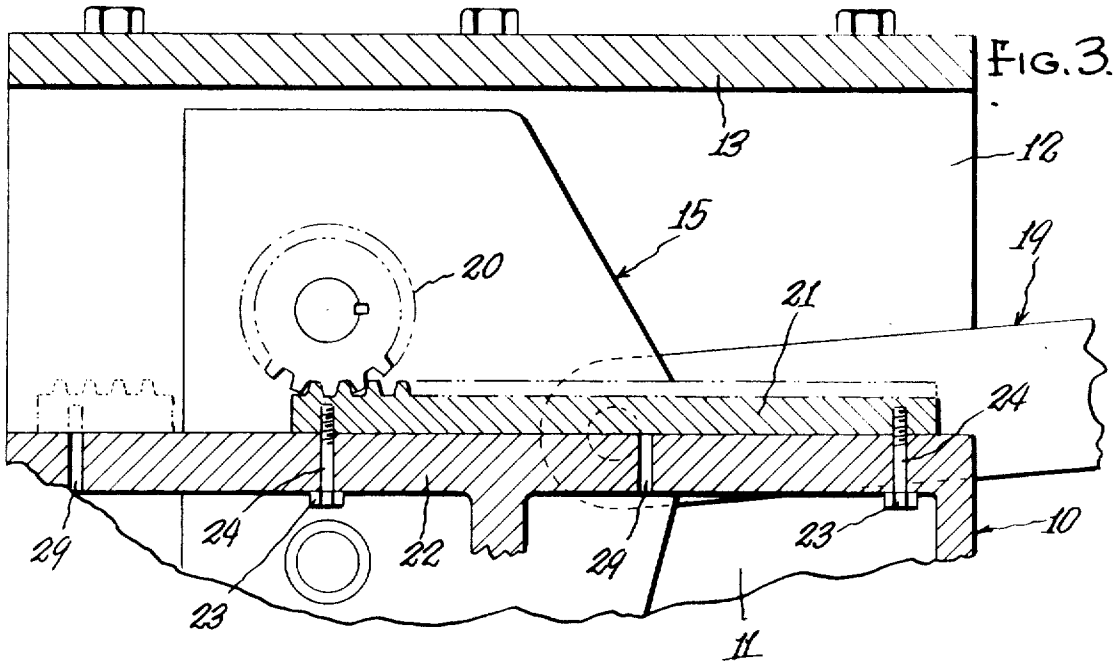

FIG. 3.

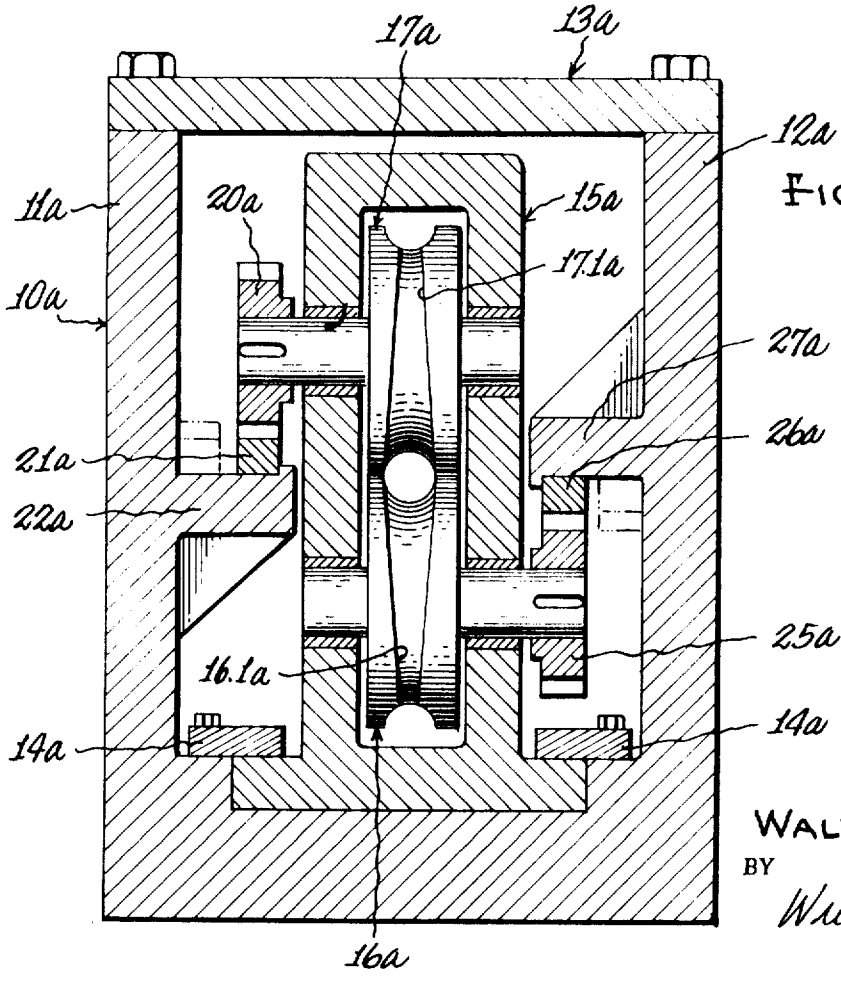

FIG. 4.

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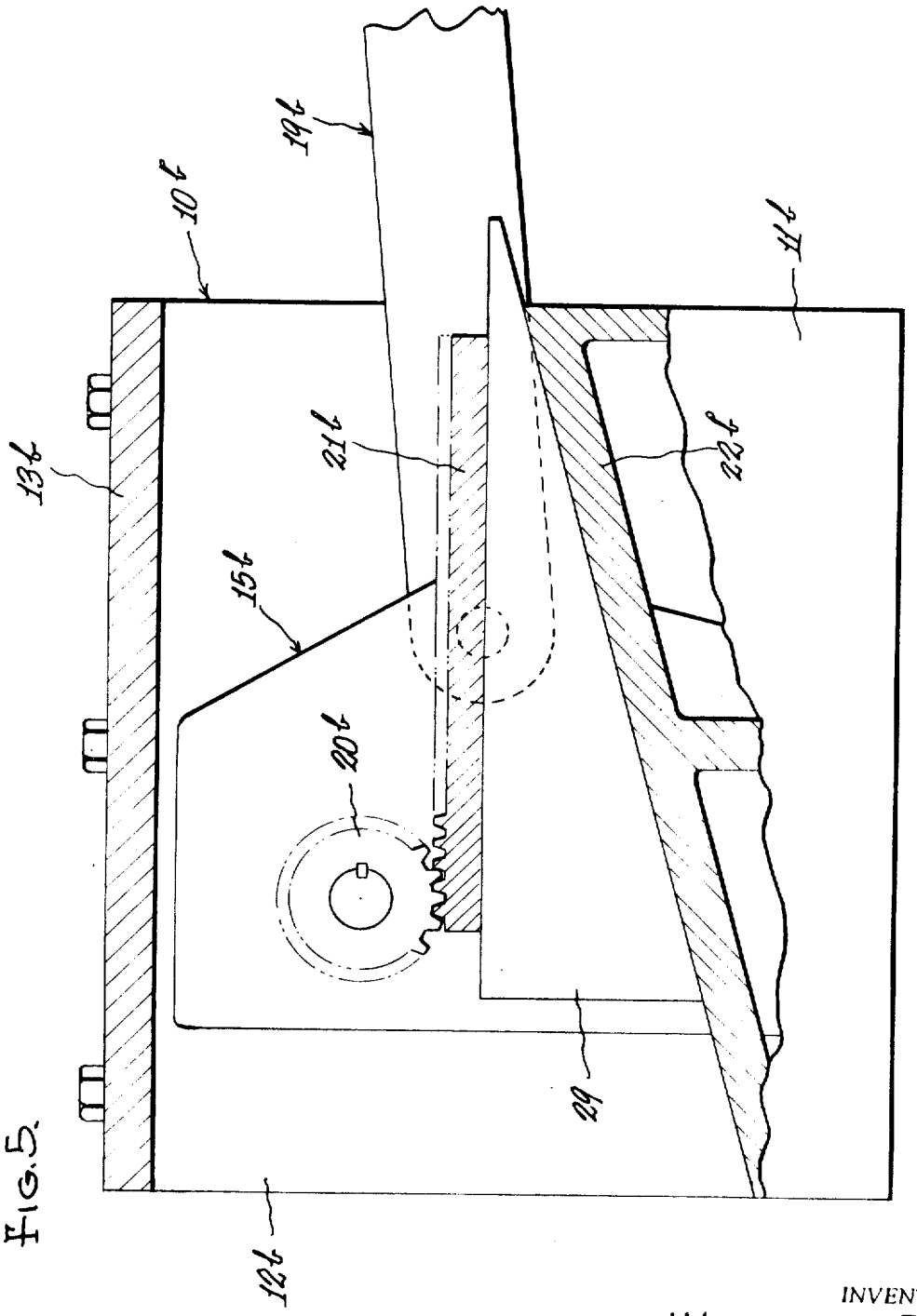

FIG. 5.

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PILGER MILL DIE ADJUSTMENT

BACKGROUND AND SUMMARY

Pilger mills have long been used for the cold reduction of metal bars and, it has been common practice to form the dies thereof as opposed rolls, each having a pair of circumferentially spaced die grooves therein. During normal use of the mill, a groove of one roll will cooperate with a groove of the other roll until such time as the grooves being used become too worn for further use. At such time, the rolls will then be rotated so as to present for use the previously unused grooves in respective rolls.

Since the dies, or rolls of pilger mills are geared to a fixedly mounted rack, prior art designs have necessitated removal of the rolls, bearings, etc., to permit such repositioning of the rolls that the change aforesaid, from use of one groove to the other, may be made. Such changeover in prior art apparatus has been time consuming with attendant costly production losses.

In contrast, the present invention reduces downtime to but a few moments wherever a changeover from one roll groove to another is to be made. This is accomplished in one embodiment by shifting a normally stationary rack longitudinally from one position to another thus rotating the roll having geared engagement therewith. In other embodiments, the rack is shifted transversely to disengage it from its roll pinion whereupon the roll can be positioned as required prior to return of the rack to pinion engagement.

These and other advantages will readily become apparent from a study of the following description and from the appended drawings.

DRAWING DESCRIPTION

In the drawings accompanying this specification and forming a part of this application there is shown, for purpose of illustration, embodiments which the invention may assume, and in these drawings:

FIG. 1 is a fragmentary sectional view of apparatus embodying the present invention,

FIG. 2 is a sectional view generally corresponding to line 2—2 of FIG. 1,

FIG. 3 is a fragmentary sectional view generally corresponding to the line 3—3 of FIG. 2,

FIG. 4 is a view similar to FIG. 3 but of another embodiment which the invention may assume, and

FIG. 5 is a view similar to FIG. 3 but of still another embodiment.

DETAILED DESCRIPTION

With reference to FIGS. 1 and 2, there is shown a pilger mill construction providing a base 10 having spaced-apart, upright sidewalls 11 and 12 joined by a top wall 13. Disposed between the base sidewalls 11 and 12 and slidable along ways in part formed by gibs 14, is a carriage 15 rotatably mounting juxtaposed annular dies, or rolls 16 and 17 arranged in opposed relation to a stock pass line 18.

With reference first to roll 16, the latter has opposed die grooves 16.1, 16.2 formed in its periphery in circumferentially spaced relation and each groove is tapered from maximum size at L to minimum size at S. The extent of the working portion of die groove 16.1 is shown by the arrow 16.3 while the extent of the working portion of die groove 16.2 is shown by the arrow 16.4. As herein disclosed, the die grooves 16.1, 16.2 are identical.

Roll 17 is preferably identical to roll 16 and provides die grooves 17.1, 17.2 which correspond to grooves 16.1, 16.2. Grooves 17.1, 17.2 are tapered from a maximum at L to a minimum at S respectively, and the extent of the working portion of grooves 17.1, 17.2 is shown by respective arrows 17.3, 17.4.

With the parts thus far described positioned as seen in FIGS. 1 and 2, carriage 15 is shown in the former in full lines in one of its extreme positions. At this position, the large end L of roll grooves 16.1, 17.1 are in registry to closely receive the stock B which is to be reduced. With the stock held at the left of FIG. 1 against longitudinal movement by any convenient gripping mechanism (not shown), carriage 15 will be moved to the right (FIG. 1) to its phantom-line position by a suitably driven link means 19.

As the carriage moves to the right, the rolls 16, 17 will rotate in counterclockwise, clockwise directions respectively at peripheral speeds equal to that of carriage movement. During such carriage movement and roll rotation, the tapered grooves 16.1, 17.1 will squeeze the stock down from the size represented by the groove ends L to the smaller size represented by the groove ends S. After movement to its phantom-line position, carriage 15 will be returned to its full-line position, the stock B will be slightly advanced to the right and the operation will be repeated until the entire length of stock has been reduced.

As will be evident from the foregoing, only the grooves 16.1, 17.1 are being used and this will continue until such time as these grooves become worn. When this occurs and as will later appear, the position of rolls 16, 17 will be changed so that the roll grooves 16.2, 17.2 are positioned for cooperation with each other in the same manner as were the roll grooves 16.1, 17.1.

To effect the above-described rotation of the roll 17 during carriage reciprocation, a pinion 20 (FIGS. 2 and 3) is keyed to the shaft of roll 17 in mesh with a rack 21 mounted on a ledge 22 formed on the sidewall 11. The rack, of course, extends along the direction of carriage movement and such rack may normally be affixed to the upper surface of the ledge by screws 23 passing through respective apertures 24 in the ledge.

Similarly, the shaft of roll 16 mounts a pinion 25 in mesh with a rack 26 mounted on a ledge 27 formed on the opposite base sidewall 12. Rack 26 is coextensive with rack 21 and is secured to the undersurface of ledge 27 by suitable screws 28.

As the carriage 15 is reciprocated by the link means 19 in the manner previously described, the pinions 20, 25 will walk along respective racks 21, 26 to effect the described oscillatory movement of the rolls 16, 17.

When the roll grooves 16.1, 17.1 become worn from repeated use and it is desired to reposition the rolls so that grooves 16.2, 17.2 may be used, the screws 23 securing the rack 21 will be removed and the rack longitudinally shifted (FIG. 3) from its full-line to its phantom-line position and secured therein by passage of the bolts 23 through ledge apertures 29. This will rotate the pinion exactly 180°, disengaging certain pinion teeth from the rack and engaging certain other pinion teeth therewith, so that the positions of the roll grooves 17.1, 17.2 are reversed. In a similar manner the screws securing rack 26 will be removed and after repositioning such rack in the same manner as rack 21, the screws will be reinstalled to retain the rack in its new position. Repositioning of the rack 26, of course, effects 180°-rotation of the pinion 25 to thereby reverse the positions of the roll grooves 16.1, 16.2. With the positions of the roll grooves thus reversed, stock reduction operations may continue as before, until such time as the grooves 16.2, 17.2 become too worn for further use whereupon replacement of the rolls will next be necessary.

In the embodiment of the invention seen in FIG. 4 wherein corresponding parts are identified with the same reference characters as before but with the suffix "a" appended, racks 21*a*, 26*a* are adapted to be shifted axially of their pinions from their normal full-line positions to the phantom-line positions shown whenever it becomes desirable to reverse the positions of the roll grooves. In their phantom-line positions, the racks are disengaged from their pinions and thus respective rolls may be rotated to achieve the required groove registry. After so rotating the rolls, the racks will be returned to their full-line, pinion-engaged positions and secured therein by any convenient means.

In the embodiment seen in FIG. 5 wherein corresponding parts are identified with the same reference characters as before but with the suffix "b" appended, it will be noted that the rack **21***b* rests upon a wedge member **29** which in turn rests upon the ledge **22***b* which, in this case, is inclined to match the inclination of the wedge lower surface. Although not shown, rack **21***b* and wedge **29***b* will be maintained in the normal positions shown by any suitable means. Moreover, and also not shown, a similar construction will be provided to support the rack member associated with the lower roll.

When it becomes necessary to reverse the positions of the rolls of the embodiment of FIG. 5, it is only necessary to shift the wedge **29** to the left thus permitting the rack **21***b* to be shifted radially away from engagement with the pinion **20***b*. With the rack thus disengaged from the pinion, the upper roll may be repositioned as required and the wedge and the rack then returned to and secured in their original positions. Of course, the opposite wedge and rack (not shown) will be similarly shifted to permit repositioning of the lower roll whereupon they too will be returned to and secured in their original positions.

I claim:

1. In a pilger mill construction having a pair of rolls disposed on opposite sides of a stock pass line and said rolls being rotatably mounted on a reciprocable carriage with one roll having a pair of circumferentially spaced die grooves in its periphery for selective presentation to the pass line of the stock, a pinion unitarily rotatable with said one roll and having certain teeth adapted to be engaged with a normally stationary rack for presentation of one groove of said one roll to said stock pass line and having certain other teeth adapted to be engaged with said rack for presentation of said other groove of said one roll to said stock pass line, and means for effecting reciprocation of said carriage longitudinally of said rack to effect rocking movement of said one roll, the improvement comprising

means releasably retaining said rack in position, said rack being selectively shiftable sufficiently to effect disengagement of certain pinion teeth therewith and provide for engagement of certain other pinion teeth therewith thereby changing, from presentation of said one roll groove to said stock pass line, to presentation of said other roll groove to said stock pass line.

2. The construction of claim **1** wherein said rack is shiftable in a longitudinal direction for purpose aforesaid.

3. The construction of claim **1** wherein said rack is shiftable in a direction transversely of its longitudinal axis toward and away from operable engagement with said pinion for purpose aforesaid.

4. The construction of claim **3** wherein said rack transverse shifting is in a direction axially of said pinion.

5. The construction of claim **3** wherein said rack transverse shifting is in a direction radially of said pinion.

6. The construction of claim **1** wherein each of said rolls has a pair of circumferentially spaced die grooves in its periphery,

wherein a pinion is unitarily rotatable with each of said rolls and each pinion is engaged with a respective rack,

and wherein each of said racks is selectively shiftable for purpose aforesaid.

7. The construction of claim **6** wherein each of said racks is shiftable in a longitudinal direction for purpose aforesaid.

8. The construction of claim **6** wherein each of said racks is shiftable in a direction transversely of its longitudinal axis toward and away from operable engagement with its pinion for purpose aforesaid.

9. The construction of claim **8** wherein said rack transverse shifting is in a direction axially of its pinion.

10. The construction of claim **8** wherein said rack transverse shifting is in a direction radially of its pinion.