No. 614,324. Patented Nov. 15, 1898.

S. V. HUBER.

ROLLING MILL.

(Application filed Mar. 1, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

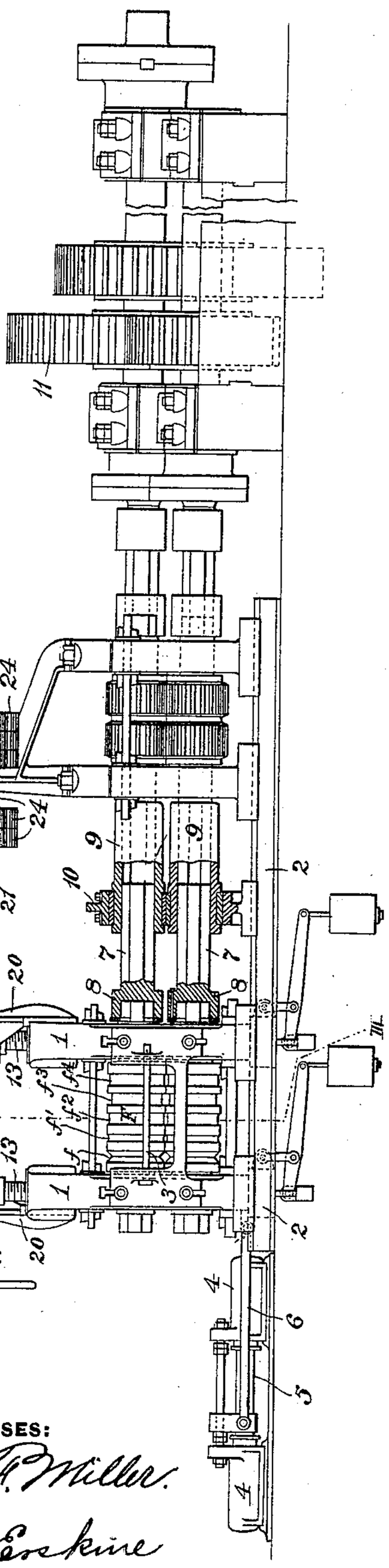

FIG. 2.

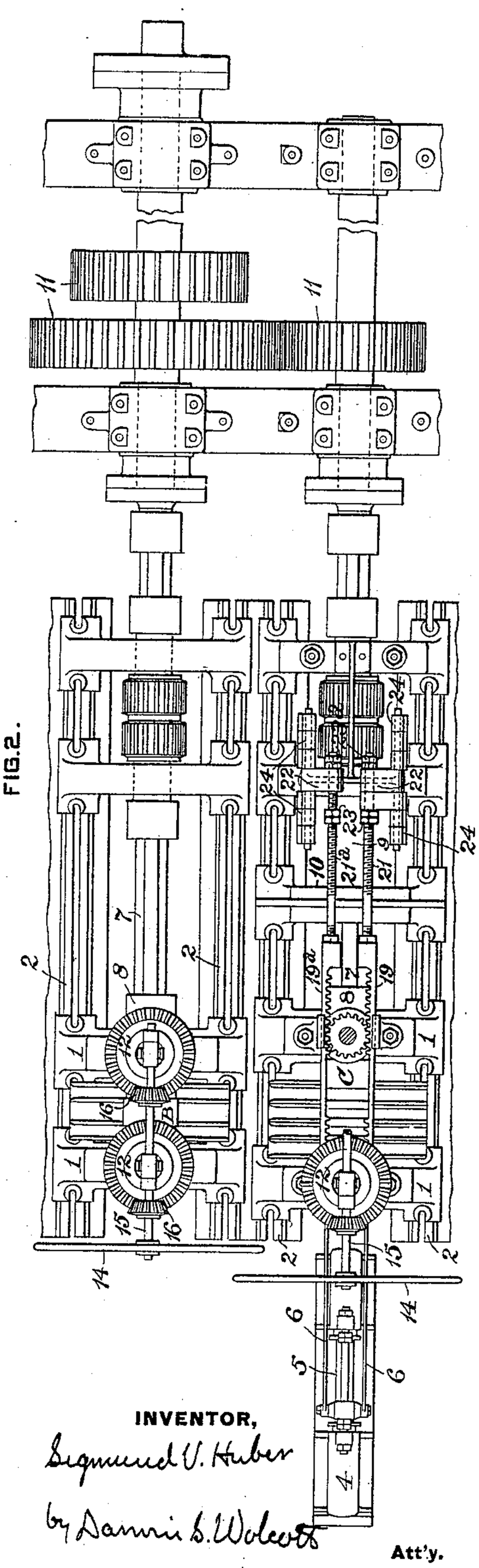

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FIG. 3.

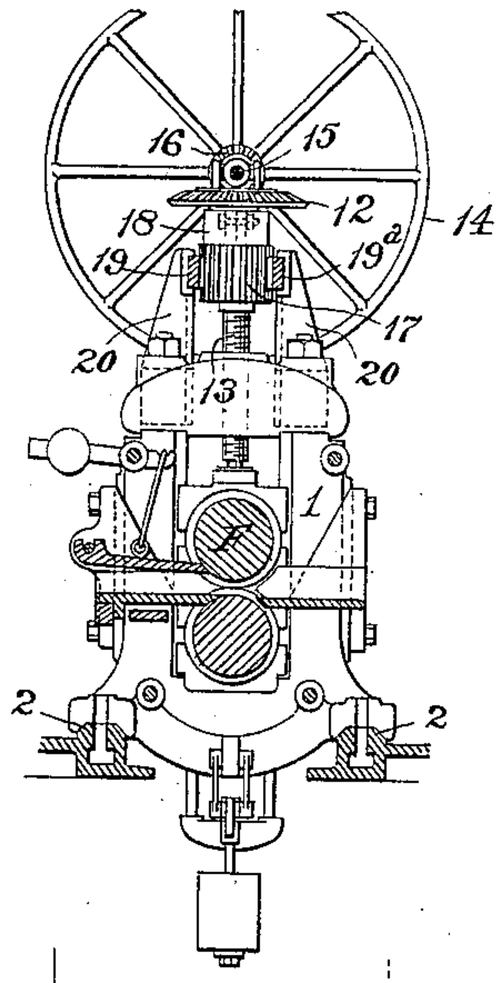
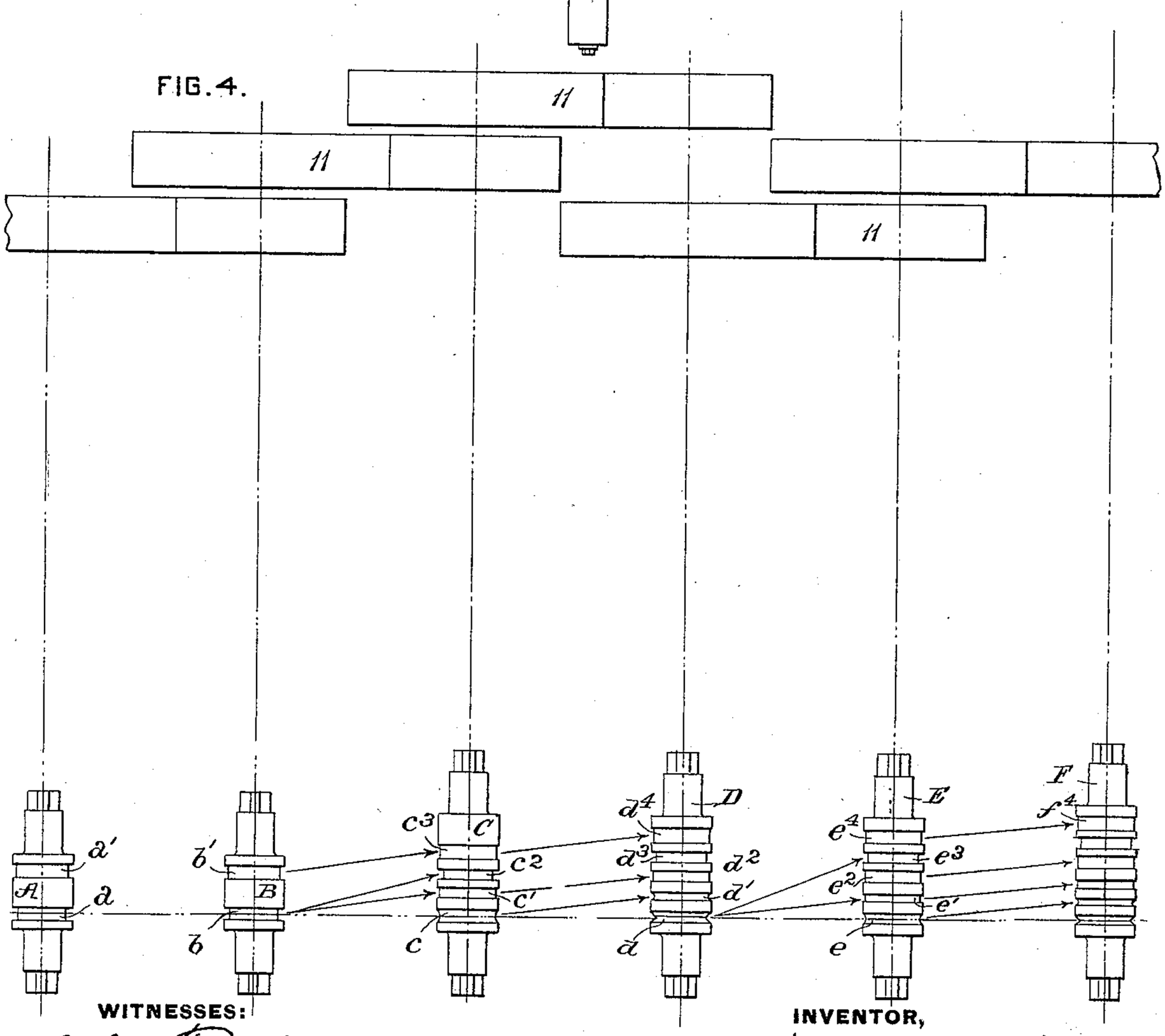


FIG. 4.



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UNITED STATES PATENT OFFICE.

SIGMUND V. HUBER, OF YOUNGSTOWN, OHIO.

ROLLING-MILL.

SPECIFICATION forming part of Letters Patent No. 614,324, dated November 15, 1898.

Application filed March 1, 1898. Serial No. 672,175. (No model.)

To all whom it may concern:

Be it known that I, SIGMUND V. HUBER, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented or discovered certain new and useful Improvements in Rolling-Mills, of which improvements the following is a specification.

The invention described herein relates to certain improvements in rolling-mills, and has for its object a construction and arrangement of the stands of rolls forming a continuous mill or arranged in tandem, whereby several different sizes and shapes of merchantable iron or steel may be produced without changing any of the rolls of such mill.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view, partly in elevation and partly in section, of a stand of rolls constructed in accordance with my invention. Fig. 2 is a top plan view of two stands of rolls forming a portion of a continuous train. Fig. 3 is a sectional elevation of a stand of rolls, the plane of section being indicated by the line III III, Fig. 1; and Fig. 4 is a diagrammatic view illustrating the manner of operating my improved mill.

It has heretofore been the practice in continuous mills to construct all the rolls in the several stands with the same number of passes. For example, if the rolls of the first stand were provided with two, three, or four passes the rolls of the other stands would have the same number of passes, which would correspond in position on the rolls to those of the first stand and would differ therefrom only in shape and size. In such a mill only two, three, or more kinds or classes of articles could be produced without changing the rolls, and all the articles of the same class or kind must be of the same cross-sectional dimensions.

In the practice of my invention the rolls of the first stand A are provided with one, two, or more roughing-passes a a', and the stand is preferably stationary on its shoes. The second stand of rolls may be adjustably mounted on its shoes, as hereinafter described, and the rolls of such stand are provided with two, three, four, or more passes b b', &c., which preferably differ from the passes in the rolls of stand A only in cross-sectional size. The remaining stands of rolls C, D, E, and F have their housings adjustably mounted on their supporting-shoes, and the rolls of each such stands are preferably provided with one more reducing-pass than the rolls of the preceding stand and also with a blank pass, which is made of such size as will permit an article from the passes in the rolls of stand B to pass through without reduction or change of shape. The reducing-passes in each of these rolls differ from each other in cross-sectional contour or in size or in cross-sectional contour and in size, as shown in Fig. 1.

In such a mill a four-by-four billet is fed into pass a of stand A, and if a small square bar is desired the succeeding stands will be so adjusted that the billet will be fed through passes b, c, d, e, and f. If a three by three-fourths inch flat is desired, the stands C, D, E, and F will be so adjusted on their shoes that passes c', d^2, e^2, and f^3 will be brought into a common line of feed with passes a and b. To produce a three-inch square the blank passes c^3, d^3, and f^4 are brought into line with pass b. To produce a two-inch square, the stands E and F would be adjusted to bring their blank passes e^3 and f^4 into line with pass d, which is adapted to reduce an article fed thereto to such cross-sectional dimensions.

The foregoing description is merely illustrative of the manner in which various classes or kinds of articles can be produced in a mill constructed in accordance with my improvements by forming suitable grooves in the rolls of the several stands and then adjusting one or more of such stands relative to the others.

In order to permit of the adjustment of the stands of rolls as hereinbefore described, the housings 1 of the stands are so secured upon their shoes 2 as to permit of the sliding of the housings along the shoes. To effect the movement, the housings of each stand are firmly tied together by rods 3, and one of the housings is connected at or near its lower end to a suitable shifting mechanism, such as the fluid-pressure cylinders 4, which have their

plungers or piston-rods 5 connected by bars 6 to the housings, as clearly shown in Figs. 1 and 2.

In order to maintain a driving connection between the rolls and their motor when the stands are shifted, the spindles 7 are provided at one end with crabs or boxes 8 for the reception of the wabblers on the ends of the rolls, while the opposite ends of the spindles are adapted to slide back and forth in the sleeves or boxes 9. These sleeves or boxes are mounted at or near one end in the bearings 10, while their opposite ends are operatively connected in any suitable manner to the driving-gears 11, which are so constructed as to impart the desired relative speeds to the rolls of the several stands.

Bevel gear-wheels 12 are secured to the upper ends of the adjusting-screws 13, which are rotated to shift the rolls by a hand-wheel 14 on the shaft 15, having bevel-pinions 16, intermeshing with the gear-wheels 12.

In the operation of this kind of mill it may happen that some of the passes are used more than others and that the rolls must be adjusted together to compensate for the wear incident to such use. By such adjustment all the passes in the adjusted rolls are effected, so that if the stand be shifted to bring a pass either heretofore unused or only slightly worn the rolls must be moved apart to bring the pass which it is desired to use and which is unworn to the proper dimensions. This readjustment may of course be effected by the hand-wheels 14, but would involve considerable delay. In order that this may be effected quickly and automatically on the shifting of the stands of rolls, broad-faced pinions 17 are loosely mounted on the stems of the adjusting-screws 13 and are provided at their upper ends with clamping-rings 18, adapted to fit around bosses 12^a, formed on the gear-wheels 12. By means of suitable bolts and nuts these rings may be caused to tightly grip the hubs of the gear-wheels, so that the latter and the adjusting-screws will rotate with the pinions 17. Rack-bars 19 and 19^a are held in engagement with opposite sides of the pinions 17 by brackets 20, secured to the housings. These bars are provided with threaded stems 21 21^a, which extend through openings in abutments 22, secured to some stationary portion of the mill. Nuts 23 and 23^a are placed on these threaded stems on opposite sides of the abutments, as clearly shown in Figs. 1 and 2.

In using the adjusting mechanism the rolls of any stand are adjusted by the hand-wheel 14 so as to bring the pass most worn—as, for example, the pass d of stand D—to the proper size. The clamps 18 are then tightened, and the nuts 23 are adjusted on the stem 21 of the rack-bar 19 so that when the stand D is shifted to bring the pass d^2 in line with the pass c of stand C the nuts will strike against the abutment and hold the rack-bar, whereby the pinions 17 are rotated during such portion of the movement of the stand as will be necessary to effect the required readjustment or separation of the rolls. The nuts 23^a on the same stem are also adjusted so that on the return movement of the stand D the rolls will be returned to the original position. While not necessary, it is preferable to employ a second rack-bar 19^a for effecting a reverse adjustment of the rolls—as, for example, if it were necessary to close the rolls or move them toward each other when shifting the stand to bring the pass d^2 into line with the pass c, then the nuts 23 and 23^a on the stem of rack-bar 19^a would be adjusted as above stated. It will be understood that when one rack-bar is in use the nuts on the stem of the other rack-bar will be so adjusted as not to strike against the abutment during the shifting of the stand.

In order to provide for the adjustment of the rolls when the stand is shifted to an intermediate position—as, for example, to bring the pass d' into line with the pass c without changing the positions of the nuts 23 23^a on the stems—slotted filling-blocks 24, pivotally mounted on the abutment, are shifted between the nuts and the abutments. The blocks are made of such thickness that although the stand is moved a shorter distance the rolls will be given the necessary adjustment.

I claim herein as my invention—

1. In a rolling-mill the combination of two or more stands of rolls arranged in tandem, the rolls of each succeeding stand having a series of passes which differ from each other, and means for shifting the succeeding stands of rolls so as to bring any of the passes in said rolls into line with any of the passes in the rolls of the preceding stands, substantially as set forth.

2. In a rolling-mill the combination of two or more stands of rolls arranged in tandem, the rolls of succeeding stands having passes differing from each other, and with a blank pass and means for shifting the succeeding stands of rolls so as to bring any of the passes in said rolls into line with any of the passes in the rolls of the preceding stands, substantially as set forth.

3. In a rolling-mill, the combination of two or more stands of rolls, means for shifting succeeding stands so as to bring any passes in the rolls of such stands into line with any of the passes in rolls of preceding stands and mechanism for automatically adjusting the rolls when the stands are shifted, substantially as set forth.

In testimony whereof I have hereunto set my hand.

SIGMUND V. HUBER.

Witnesses:
DARWIN S. WOLCOTT,
F. E. GAITHER.