No. 844,520. PATENTED FEB. 19, 1907.

S. V. HUBER.

ROLLING MILL.

APPLICATION FILED MAR. 24, 1906.

3 SHEETS—SHEET 1.

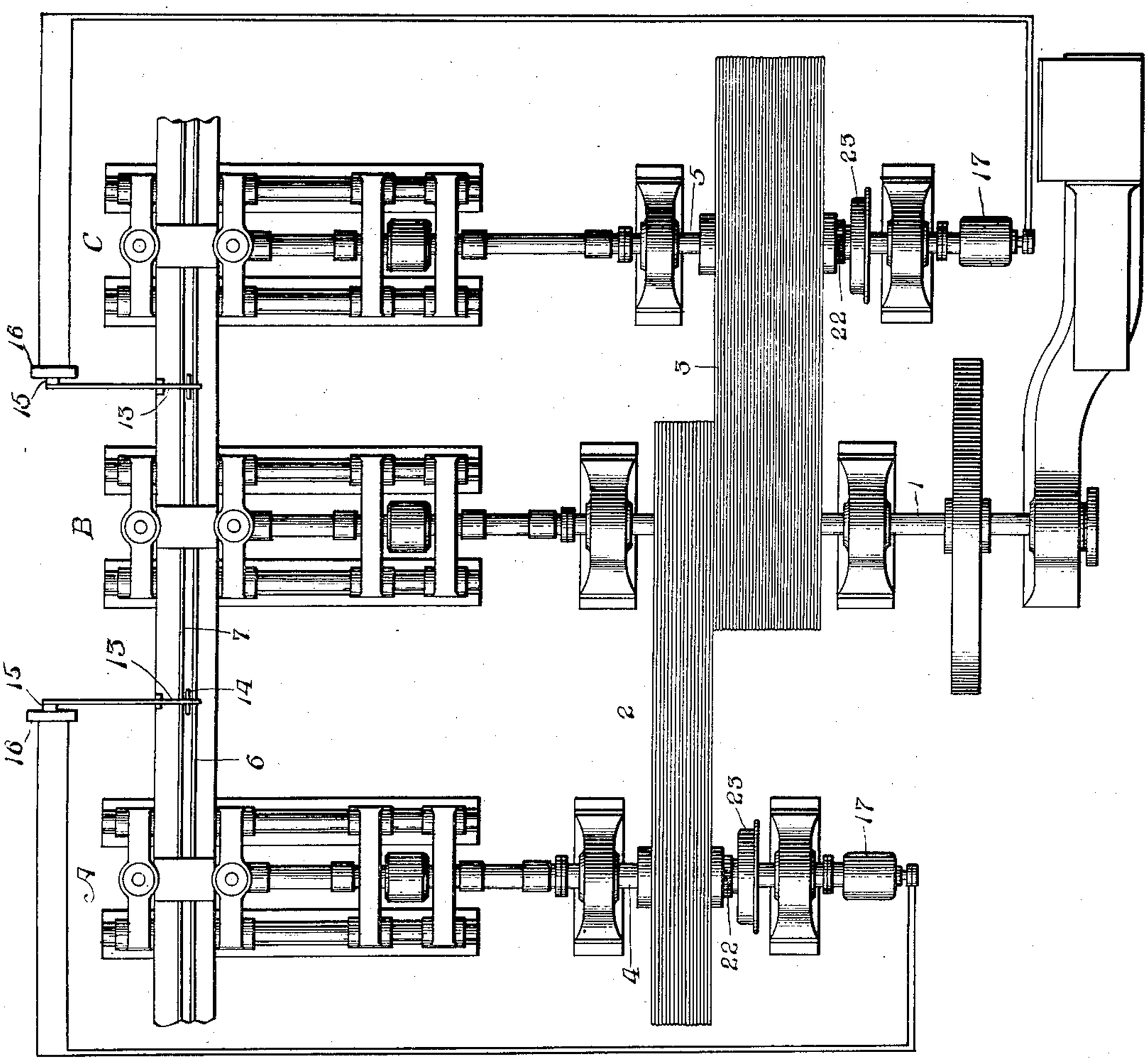

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

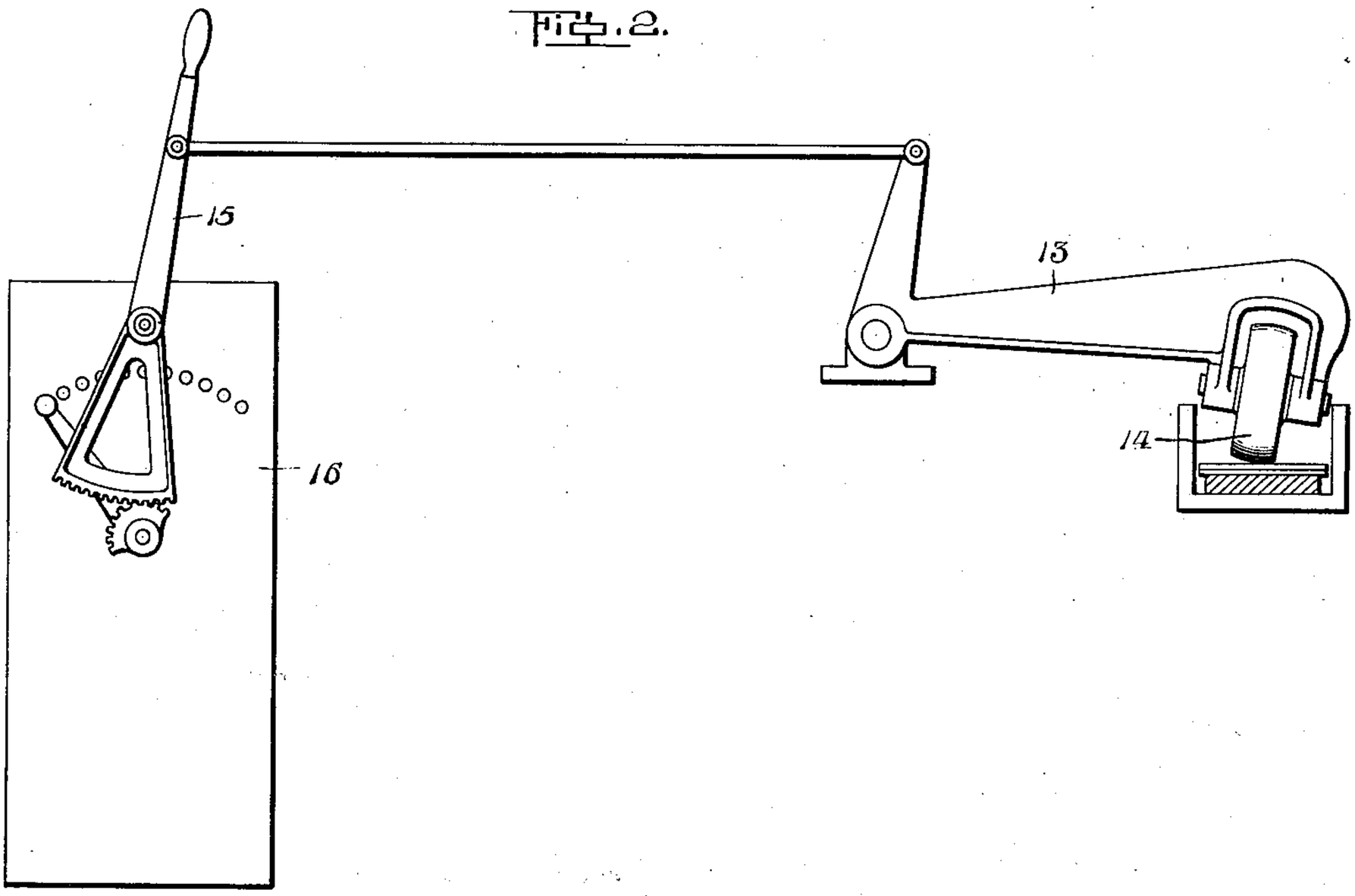


Fig. 3.

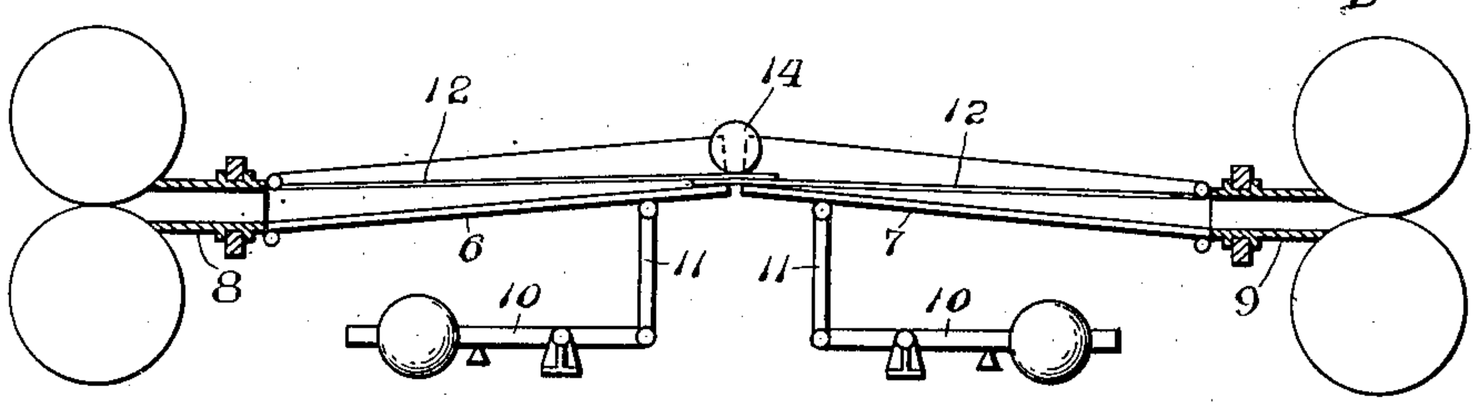
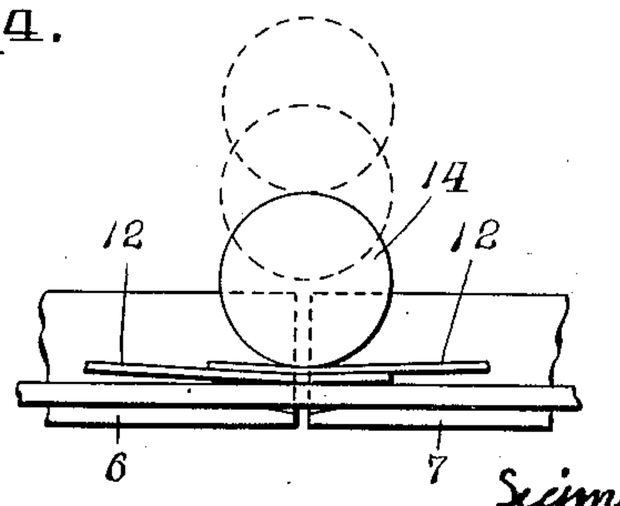


Fig. 4.



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3 SHEETS—SHEET 3.

FIG. 6.

FIG. 5.

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UNITED STATES PATENT OFFICE.

SIGMUND V. HUBER, OF PITTSBURG, PENNSYLVANIA.

ROLLING-MILL.

No. 844,520. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed March 24, 1906. Serial No. 307,907

To all whom it may concern:

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

In the operation of continuous mills it is the practice to drive each succeeding pair of rolls at a speed higher than that of the preceding pair, proportional to the reduction effected in the latter. It is practically impossible to so proportion the speeds of the several stands of rolls as to prevent at some times a looping out of the article between two pairs of rolls and at some times subjecting the same to a stretch or pull. This inequality of action is due to many causes, the principal one being the variation in the temperature of the article operated on.

The object of the present invention is to provide for an adjustment of speeds automatically controlled by the article, so as to prevent any material looping out or subjecting the article to injurious tension.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a top plan view of a mill consisting of three stands of rolls having my improvement applied thereto. Figs. 2 and 3 are detailed views showing a means for controlling the speeds of the various stands of rolls. Fig. 4 is a detailed view of a portion of the feed-trough, on a large scale, showing the manner of constructing such trough for the control of the speed. Figs. 5 and 6 are sectional views showing the expanding pulley and means for varying its perimeter.

In the practice of my invention as illustrated in Fig. 1 the power is applied to one of the pair or stands of rolls A, B, or C, preferably the middle one, although it may be applied to any of the others, as desired. On the power-shaft 1 are secured driving-drums adapted for rope transmission, and around these drums pass the ropes 2 and 3 and also around expansible pulleys or drums on the shafts 4 and 5. The shafts 1, 4, and 5 are connected in the usual or any suitable manner to rolls of stands A, B, and C. Between these stands of rolls are arranged suitable troughs or guides adapted to be shifted up and down by the article passing along the same between two stands of rolls. A desirable construction of trough is shown, consisting of the main or body portions 6 and 7, hinged to stationary guiding portions 8 and 9 adjacent to the rolls, so that the inner or adjacent ends of the portions 6 and 7 can move up or down, as hereinafter described. These portions 6 and 7 are supported near their inner ends by means of weighted levers 10, connected by links 11 to the trough-sections. These supporting means are so adjusted and constructed that the trough-sections at their inner ends are slightly above the stationary portions 8 and 9, and the bottoms of such sections will form an angle to each other. By reason of this construction it follows that if an article, as a rod, when passing along between the rolls A and B is subjected to a pull or tension it will depress the inner ends of the trough-sections. Within these trough-sections are pivotally arranged plates 12, adapted to rest upon the article passing along the trough. These lifting-plates overlap at their inner ends and are made light, so that in case of a tendency of the article to loop out of the trough these plates will be raised. By arranging the sections 6 and 7 at an angle to each other and arranging the plates 12 to overlap at the apex of the angle formed by the troughs any tendency to loop out will be localized at that point and act on the plates.

Suitable means are employed whereby when the trough or their plates 12 change position a corresponding change will be effected in the driving mechanism—as, for example, in the dimensions of the expanding pulleys of the rope-drive. A desirable means for transmitting this movement consists of a belt-crank arm 13, carrying a roller 14, resting upon the plates 12. This arm is connected in any suitable manner to the movable part or arm 15 of an electric controller 16, said controller being arranged, as shown in Fig. 1, to control the circuit of electric motors 17. When by reason of a tension applied to the article the troughs are depressed, the controller will be operated so as to change the current leading to the motor 17, controlling rolls B, that the motor will operate in a manner to increase the speed of the rolls A. When the lifting-plates are raised, the controller will be shifted in the

opposite direction, so as to again change the current to the motors, and thereby decrease the speed of the rolls A.

It will be understood that when the regulating mechanism between rolls B and C is operated by the article that an increase of tension on the article will effect a decrease in the speed of rolls C, while a tendency on the part of the article to loop out will cause an increase in the speed of rolls C.

As shown in Figs. 5 and 6, the expanding pulleys have their perimeters formed of sections 18, carried by slides 19, moving in ways in the sides of the pulleys. These slides 19 are connected by links to disks 20, loosely mounted on the shaft of the pulley and movable longitudinally to the same. It will be understood by moving these disks 20 toward each other the sections 18 will be drawn inward, and an outward movement of such sections will be effected by moving the disks apart. These disks are shifted by means of right and left hand screws 21, provided at their ends with pinions 22, intermeshing with teeth of the hub of an internal gear-wheel 23. This gear-wheel is loosely mounted upon the shaft and is adapted to be rotated around the same by the shaft 24 of the motor 17, operating through pinion 25 and gear-wheel 26. It will be understood by those skilled in the art that when the levers 13 are shifted by reason of a too high proportional speed of the rolls B the controllers will be shifted so as to operate the motors 17, controlling rolls A and C, in such a direction that the expanding-sections will be moved inward, thereby decreasing the diameters of the expanding pulleys relative to that of the driving-pulley of the shaft 1, thus increasing the speed of the rolls A and C. When the controllers are shifted by the levers 13 by reason of a too slow proportional speed of rolls B, the reverse operation occurs, and the sections 18 of the expanding pulley are increased in diameter relative to that of the pulley on the driving-shaft, so that the rolls A and C will be driven at a lower speed. It will be understood that the rolls B may have too high a speed relative to rolls A and at the same time have a proper speed relative to rolls C. In such case only the driving mechanism of rolls A will be adjusted.

I claim herein as my invention—

1. A continuous rolling-mill having in combination two or more stands of rolls arranged in a common line of feed, means having a variable speed for driving said rolls, guide-troughs extending between adjacent stands of rolls and having portions movable by the article being rolled, and means controlled by said movable portions to control the roll-driving means.

2. A continuous rolling-mill having in combination two or more stands of rolls arranged in common line of feed, means having a variable speed for driving said rolls, guide-troughs having a movable section, a movable plate arranged to bear on the article being rolled, and means adapted to be shifted by the trough-section and plate to control the roll-driving means.

3. A continuous rolling-mill having in combination two or more stands of rolls arranged in a common line of feed, a power-shaft having drums or pulleys, shafts for driving the stands of rolls provided with pulleys, the driving or driven pulleys having variable perimeters and means controlled by the article being rolled for changing the perimeters of said pulleys.

4. A continuous rolling-mill having in combination two or more stands of rolls arranged in a common line of feed, a power-shaft, shafts for driving the rolls, drums and ropes connecting the driving with the driven shafts, one of each pair of transmitting-drums having movable peripheral sections, an electric motor on the shafts carrying said drums, connections from said motors to the movable sections, and a controller operative by the article being rolled for controlling the motor.

In testimony whereof I have hereunto set my hand.

SIGMUND V. HUBER.

Witnesses:

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WILLIAM WILSON.