R. B. KERNOHAN & N. C. RENDLEMAN.

UNIVERSAL MILL.

APPLICATION FILED OCT. 23, 1914.

1,228,782.

Patented June 5, 1917.

3 SHEETS—SHEET 1.

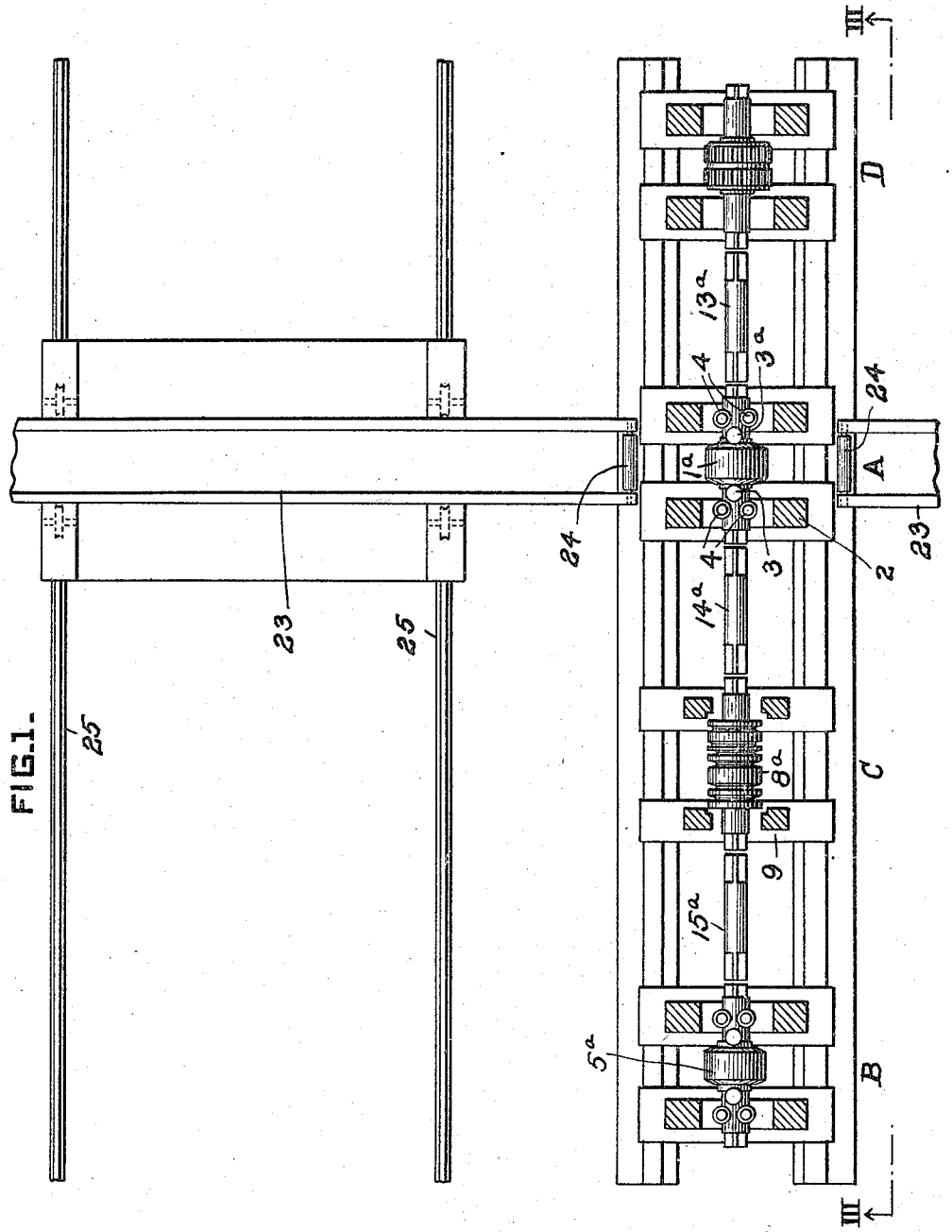


FIG. 1.

WITNESSES

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3 SHEETS—SHEET 2.

FIG. 2.

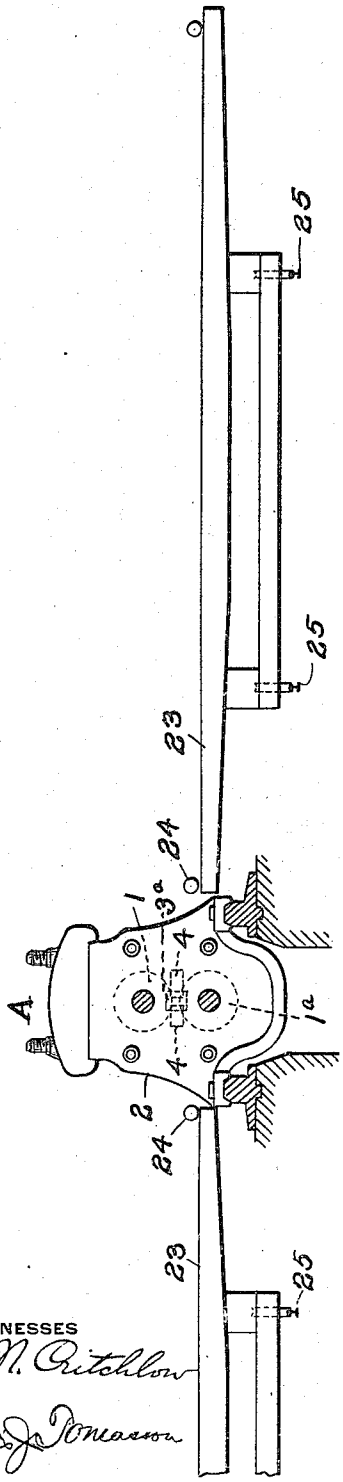
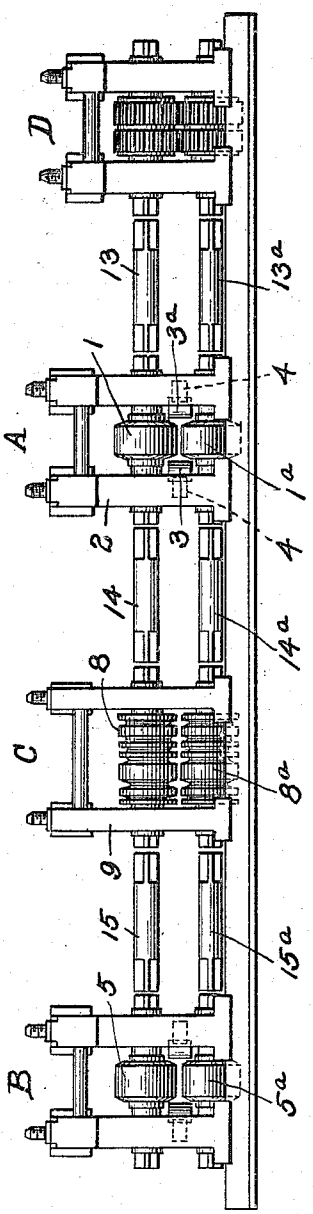


FIG. 3.



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3 SHEETS—SHEET 3.

FIG.5.

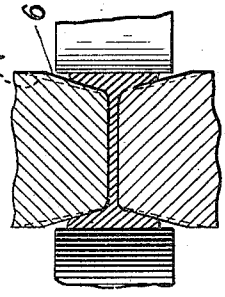


FIG.7.

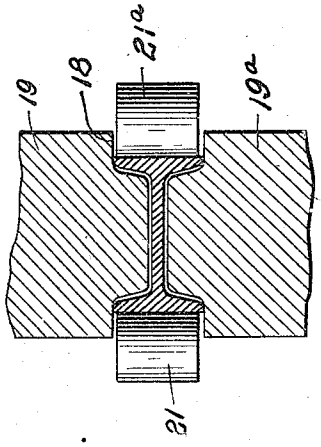


FIG.6.

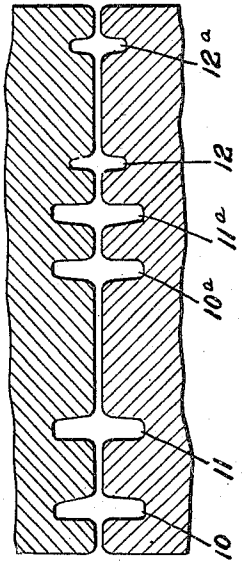
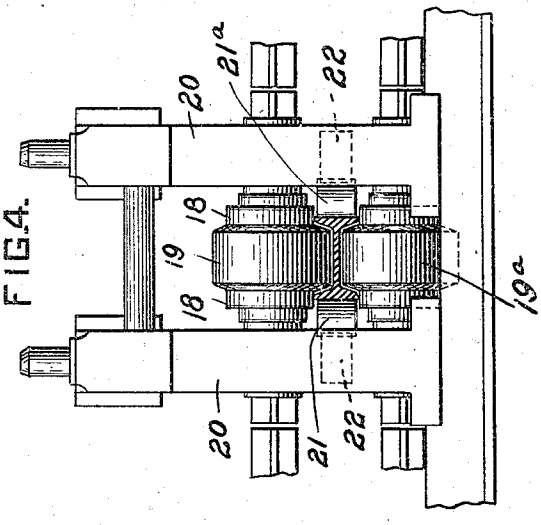


FIG.4.



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UNITED STATES PATENT OFFICE.

ROBERT B. KERNOHAN AND NORMAN C. RENDLEMAN, OF PITTSBURGH, PENNSYLVANIA.

UNIVERSAL MILL.

1,228,782. Specification of Letters Patent. Patented June 5, 1917.

Application filed October 23, 1914. Serial No. 868,190.

To all whom it may concern:

Be it known that we, ROBERT B. KERNOHAN and NORMAN C. RENDLEMAN, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented or discovered certain new and useful Improvements in Universal Mills, of which improvements the following is a specification.

The invention described herein relates to mills for rolling, by the universal process, H-sections, I-beams, and like flanged sections, and has particularly to do with mills wherein the rolling is principally effected by two sets and types of rolls, one known as the universal rolls, and the other as the edging rolls. The universal rolls, as is well known, comprise a pair of horizontal and a pair of vertical rolls having their several axes arranged in substantially a common plane, the horizontal rolls operating upon the web and inner flange surfaces of a blank, and the vertical rolls upon the outer faces of the flanges. The edging rolls comprise essentially a pair of horizontal rolls which operate upon the opposite edges of both flanges, and may be of various specific constructions.

The usual practice in mills of this sort is to arrange the universal and edging rolls in line with each other, that is in tandem, so that the blanks at each pass must necessarily pass through each set at each pass, or in such a manner that a single edging pass may not be given without passing the blank twice through the edging rolls. The objection to such an arrangement is that the best results, as far as the product as well as mill efficiency is concerned, may not always be obtained by a substantially equal number of edging and universal roll passes, or by invariably alternating such passes, or by passing the blank through the edging rolls twice where but a single operative pass is desirable. Furthermore, when the arrangement of rolls is such that an edging pass may not be effected without a simultaneous universal pass, the blank is partially dragged through the edging rolls, which consequently become worn very rapidly and must be frequently turned down.

The primary object of the invention is, therefore, to provide a rolling mill of the general character described, but wherein the blank may, at any time and at the option of the operator, be passed through either the universal or edging rolls any required number of times. A further object is, by an improved arrangement of the several essential sets of rolls, and by a particular construction of the edging rolls, to increase the efficiency of such rolling mills.

In the accompanying drawings, forming part of the specification, the preferred embodiment of the invention is illustrated. Figure 1 is a plan view of several sets of rolls arranged end-to-end and transfer tables for conveying a blank from one set of rolls to another; Fig. 2 a left end view of the construction shown in Fig. 1; Fig. 3 a side elevation of the rolls, the plane of view being indicated by the line III—III, Fig. 1; Fig. 4 an elevation to enlarged scale of a different form of edging rolls than those shown in Figs. 1 and 3; Fig. 5 an enlarged detail view of the universal rolls; Fig. 6 a detailed view of the edging rolls of Figs. 1 and 3; and Fig. 7 a similar view of the edging rolls of Fig. 4.

In the several figures like numerals are used to designate like parts.

In the practice of the invention the universal and edging rolls are placed out of alinement with each other so that a blank issuing from one set does not enter the other. In other words they are placed one at the side of the other, preferably end-to-end, and suitable transfer tables are arranged, preferably at each side of the line of rolls. The illustrative embodiment of the invention shows two stands of universal rolls A and B with an intervening stand of edging rolls C, the stand A being the main or roughing universal rolls and the stand B the finishing pass. The stand A of universal rolls comprises a pair of horizontal rolls 1, 1^a rotatably mounted in a housing 2, and a pair of vertical rolls 3, 3^a of smaller diameter than, and arranged between and one at each side of, the horizontal rolls. The vertical rolls are preferably not driven and are each backed in the usual manner by a pair of bearing rolls 4. The stand of rolls B may be exactly the same as the stand A, or they may be the same except for the shape of the horizontal rolls 5, 5^a, in which the surfaces bearing on the inside of the flanges of a blank may have less slope than in the rolls 1, 1^a. This difference of slope is illustrated in Fig. 5 wherein the full lines 6 represent the flange-engaging faces of the rolls 1, 1^a,

and the dotted lines 7 the corresponding faces of the rolls 5, 5ª. The finishing rolls, whether of the same or different shape than those of the stand A, will, because called upon to do relatively little work on a blank, remain in better condition than those of the stand A.

Two forms of edging rolls are illustrated, those of the stand C of Figs. 1 and 3 being the preferred form and consisting of a pair of horizontal grooved rolls 8, 8ª rotatably mounted in a suitable housing 9. Instead of providing a separate set of grooved edging rolls for each size of sections to be rolled, as is the usual practice in this type of edging rolls, the grooves are arranged for overlapping edging passes, thereby making it possible to edge various sections by one set of rolls. Any desired arrangement of grooves may be made for such overlapping passes, as for example as seen in Fig. 6, the grooves 10, 10ª may be for one size, the grooves 11, 11ª for another, and the groove 12, 12ª for still another size of beams; or, if desired, the several sets of grooves may be arranged for different passes of the same section. In the alternate form of edging rolls shown in Figs. 4 and 7, the edging is effected by offset ends 18 of a pair of horizontal rolls 19, 19ª. These horizontal rolls are mounted in a suitable frame 20 in substantially the same manner as the horizontal rolls of the universal stands A and B, and a pair of vertical rolls 21, 21ª, backed by rollers 22, are provided as lateral supports for the flanges.

The adjusting and further operating and controlling mechanism for the several sets of rolls may be of any suitable form and construction, such matters being well understood by those skilled in the art and needing no illustration or explanation herein.

The driving of the several sets of rolls may be effected in any desired manner, but there is preferably a single driving means, thus eliminating a multiplicity of engines. As shown herein, all the rolls are driven primarily from a single stand of pinions D, adapted to receive power from any suitable source. The line of driving connections of the upper horizontal rolls is, from right to left as viewed in Fig. 3, through shaft 13, roll 1, shaft 14, roll 8, shaft 15 and roll 5; while for the lower rolls it is through shaft 13ª, roll 1ª, shaft 14ª, roll 8ª, shaft 15ª and roll 5ª.

Suitable means are provided to convey the blanks from one to the other sets of rolls, and, to the end that it will not be necessary to give a blank an even number of passes through one stand of rolls where but a single or odd number of passes are desirable, there is a conveyer at each side of the stands of rolls. The conveyers may be of any desired form or construction, those shown herein consisting of transfer tables 23, provided with rolls 24, and mounted on tracks 25.

In the operation of the rolling mill, a previously grooved blank may be brought first to the universal roughing rolls A and given as many passes through them as desired. As frequently as the operator finds it necessary, he may, by means of the transfer tables, carry the blank to, and pass it through, the proper grooves in the edging rolls. The transfer between the universal and edging rolls may be made as many times as desirable or necessary, and any desired number of passes may be given through one set of rolls independently of the other set. When properly reduced the blank is given its final form by passing it a suitable number of times through the finishing stand B, and, if necessary, again through the edging rolls.

We claim as our invention:

1. In a universal mill for rolling flanged sections, the combination of a set of universal rolls for rolling the web and sides of the flanges of a blank, a set of edging rolls placed adjacent to said universal rolls and adapted to roll the edges of the flanges of such blank, and a conveyer at each side of said sets of rolls whereby a blank may be given a single pass through one of said sets of rolls and between two passes through the other of said sets of rolls.

2. In a universal mill for rolling flanged sections, the combination of a set of universal rolls for rolling the web and sides of the flanges of a blank, a set of edging rolls placed end-to-end of said universal rolls and adapted to roll the edges of the flanges of such blank, and a conveyer at each side of said sets of rolls whereby a blank may be given a single pass through one of said sets of rolls and between two passes through the other of said sets of rolls.

In testimony whereof we have hereunto set our hands.

ROBERT B. KERNOHAN.
NORMAN C. RENDLEMAN.

Witnesses:
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ARTHUR EINERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."