

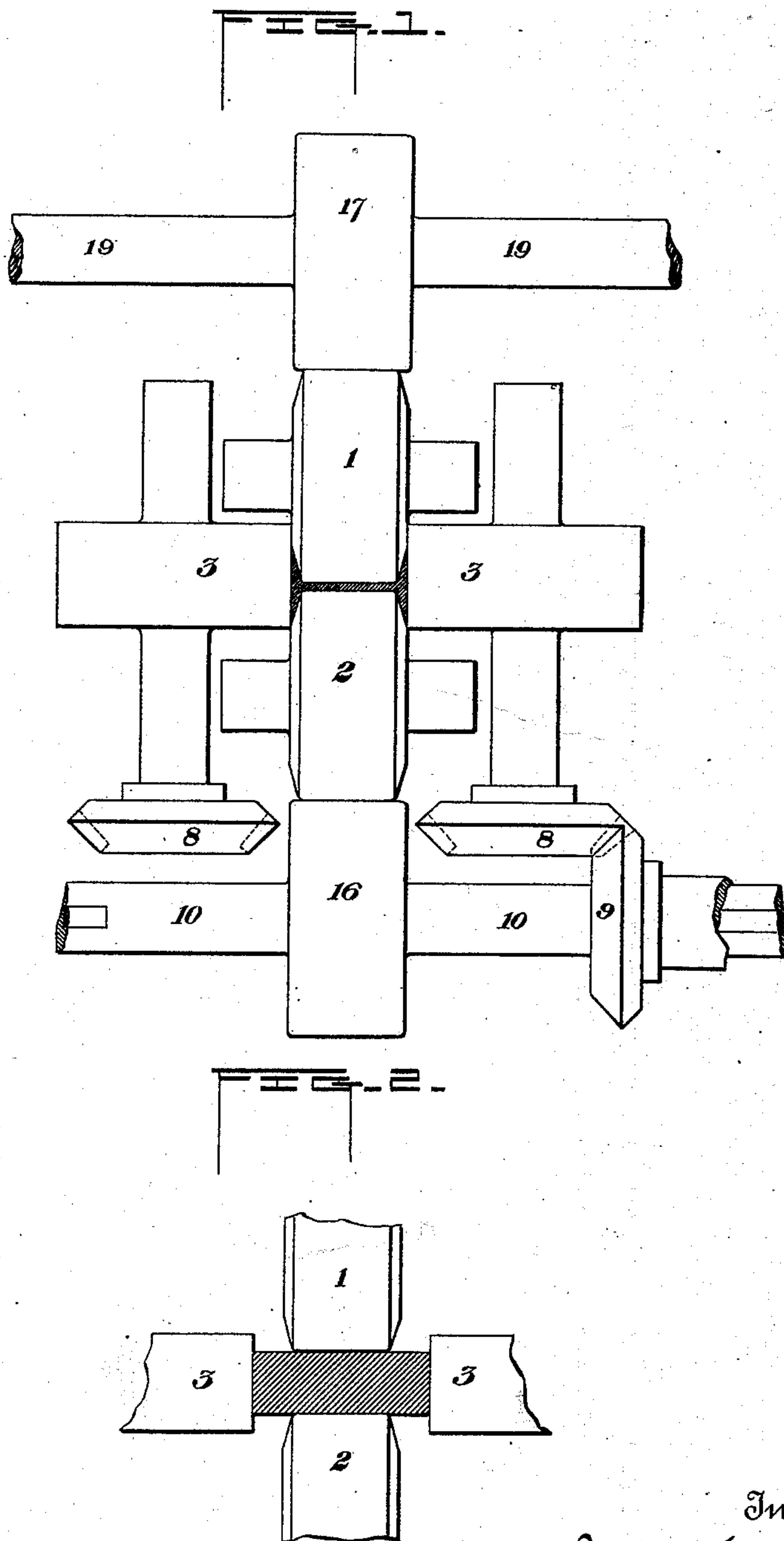
(No Model.)

2 Sheets—Sheet 1.

J. KENNEDY & H. AIKEN.
ART OF ROLLING FLANGED BEAMS.

No. 410,107.

Patented Aug. 27 1889.



Witnesses

A. L. Gill

N. T. Corwin

Inventors.

Julian Kennedy

Henry Aiken

By W. B. Baskett & Sons
Attorneys.

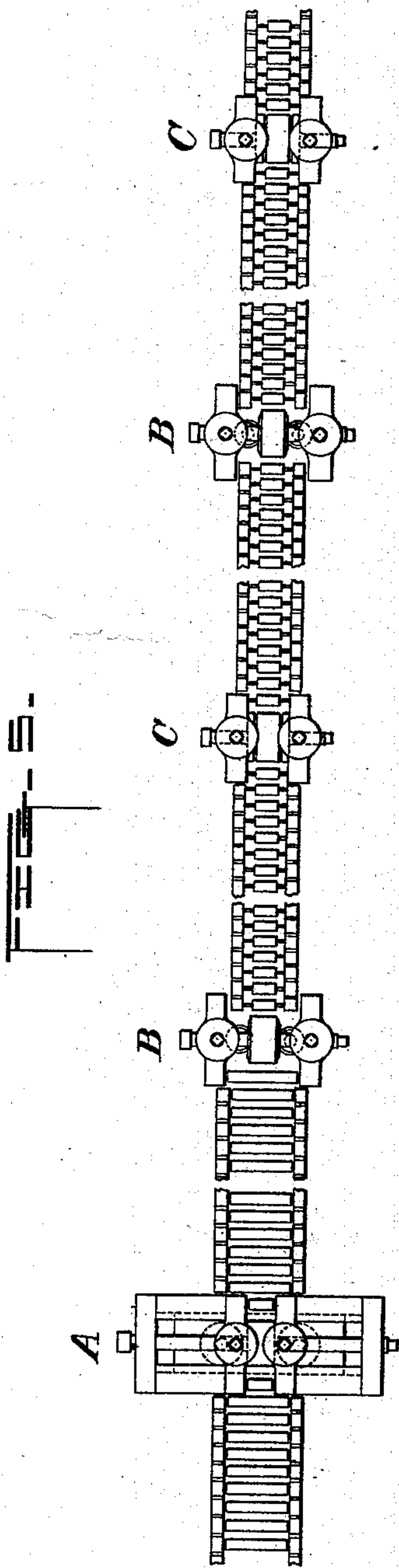
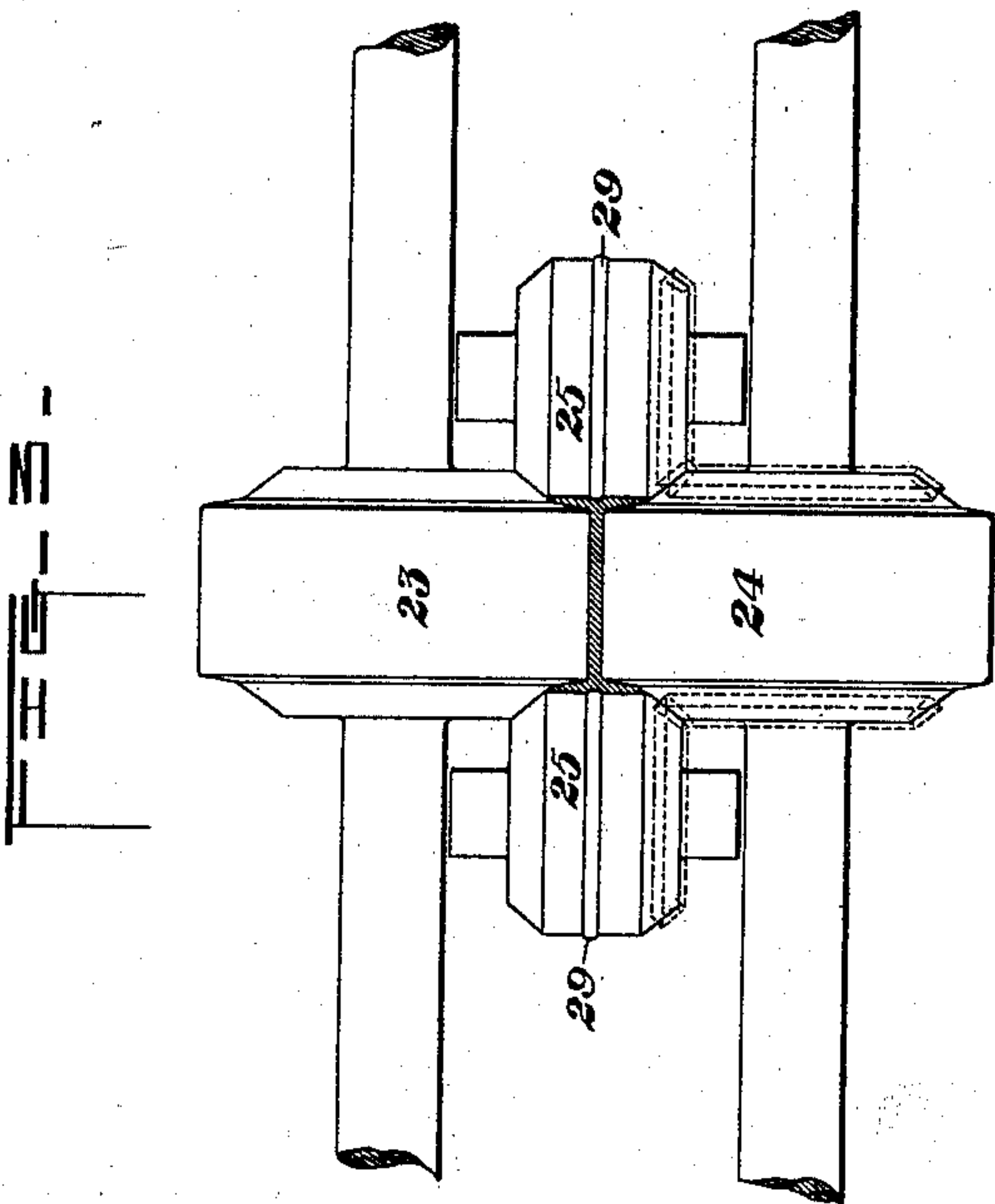
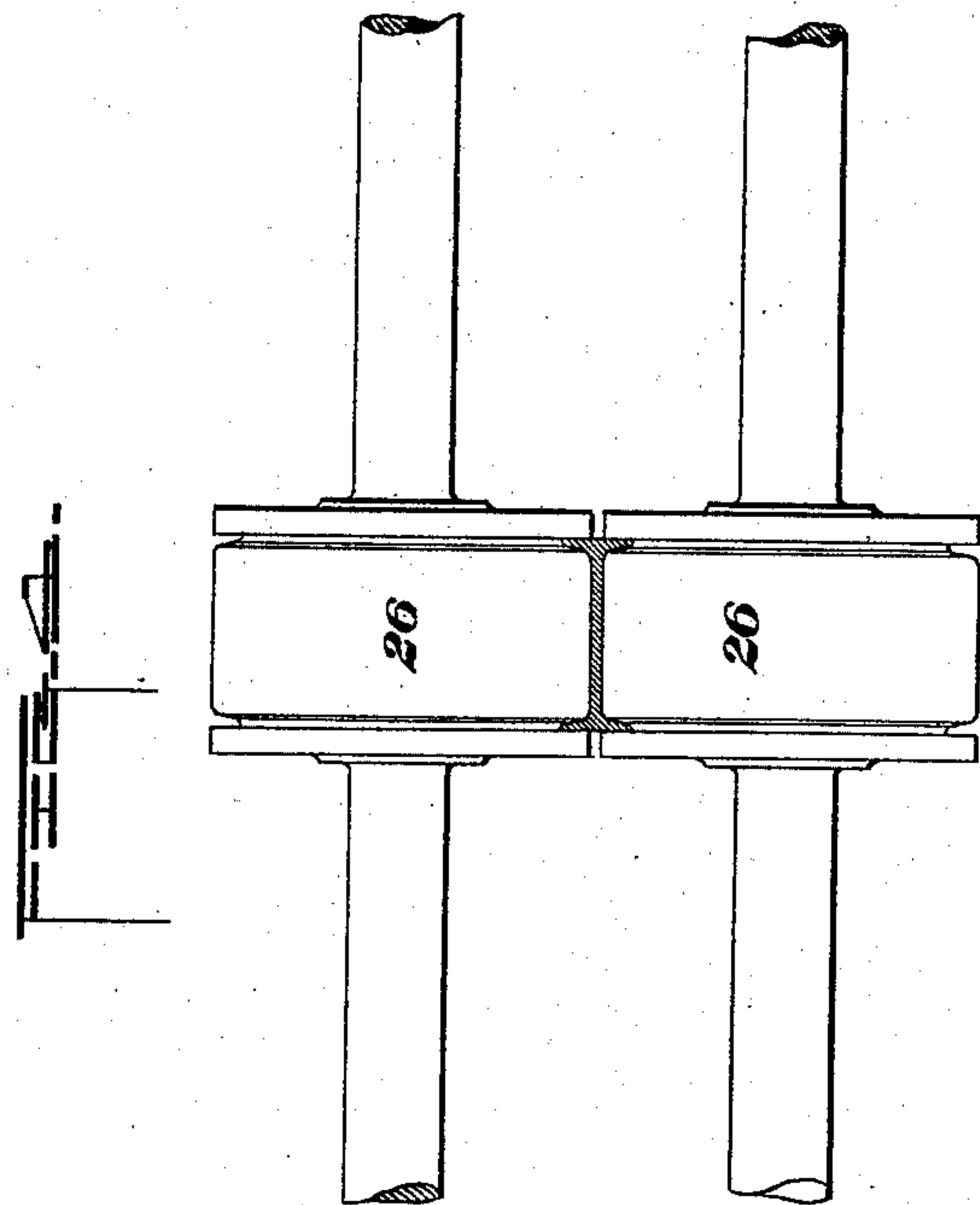
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by W. B. Randall & Sons
Attorneys

UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF LATROBE, AND HENRY AIKEN, OF HOMESTEAD,
PENNSYLVANIA.

ART OF ROLLING FLANGED BEAMS.

SPECIFICATION forming part of Letters Patent No. 410,107, dated August 27, 1889.

Application filed April 15, 1889. Serial No. 307,272. (No model.)

To all whom it may concern:

Be it known that we, JULIAN KENNEDY, of Latrobe, in the county of Westmoreland and State of Pennsylvania, and HENRY AIKEN, of Homestead, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Art of Rolling Flanged Beams, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of a universal rolling-mill adapted to use in practicing the first step of our improvement. Fig. 2 is a partial view of the rolls 1, 2, and 3, showing the ingot before it has been reduced. Fig. 3 is a front view of a second set of rolls. Fig. 4 is a front view of finishing-rolls. Fig. 5 is a diagram plan view of a rolling-mill plant comprising a universal mill for forming the beam, a set of rolls of the sort shown in Fig. 3 for working the sides of the flanges thereof, and a set of rolls of the sort shown in Fig. 4 for shaping the edges.

Like symbols of reference indicate like parts in each.

Our invention relates particularly to the manufacture of I-beams; but we do not limit ourselves thereto, as it is also applicable to and designed for use in rolling channel-bars and other forms of flanged beams or articles having longitudinal flanges by changing the working-faces of the rolls to conform to the shape desired.

Referring to Fig. 1 of the drawings, 1 and 2 are the horizontal rolls of a universal rolling-mill.

3 3 are the laterally-adjustable side rolls.

16 and 17 are outer rolls, which drive by friction and support the horizontal rolls.

10 19 are the driving-shafts of the rolls 16 and 17, and 8 and 9 are pinions connecting the lower necks of the side rolls with the driving-shaft 10. The roll 17 is vertically adjustable. The roll 1 is suitably counterbalanced, so as to remain in frictional contact with the periphery of the roll 17 at any position of the latter. The roll 16 is journaled in stationary bearings, and the roll 2 rests on its periphery.

We have not shown the housings and the means for adjustment of these several rolls,

because they do not form part of the invention covered by this patent, and they are fully illustrated and described in a pending patent application, Serial No. 291,210, filed November 19, 1888. Suffice it to say that to reduce the bloom or ingot to the form of an I-beam it is passed back and forth between the rolls, as shown in Figs. 1 and 2, a sufficient number of times to effect the desired reduction and change of form, at each pass the side rolls and horizontal rolls being brought by adjustment closer together as the metal elongates.

Fig. 1 shows the position of the rolls at the end of the reduction of the piece. Fig. 2 shows them at the first introduction of the piece.

A universal mill such as we have described—by which we mean a mill having both horizontal and side rolls—while it reduces the metal to nearly the finished form, yet leaves the flanges and their edges in a somewhat unfinished condition; and in order to provide means for completing the beam after it has come from these rolls we employ the finishing-rolls shown in Fig. 3. Here there are two horizontal rolls 23 and 24, which are made of sufficient diameter to enable two vertical rolls 25 with short necks to be journaled between their necks. None of these rolls is necessarily adjustable; but they are beveled at the edges, and are so set that the bevels shall be in contact with each other, as shown in the drawings, and the faces of the rolls are shaped so as to afford a pass of the finished shape of the beam. The horizontal rolls are driven by gearing in the usual way; but the vertical rolls are not driven, except by contact with the horizontal rolls.

It will be noticed that the rolls are shaped in such way that their beveled portions form frusta of cones, whose apices are substantially at the points of intersection of the axial lines of the several rolls, if these lines be considered to be continued until they meet. This is the manner in which beveled gearing is commonly arranged, and by means of this construction the rolls can be operated without that destructive rubbing and grinding of their meeting faces which occur if the rolls are otherwise shaped and related to each other. These rolls afford a pass of constant size and

shape, and as their reducing action is directly on the sides of the flanges of the beam they serve to make the flanges true in outline.

If desired, the rolls 23, 24, and 25, or some 5 of them, may be positively connected by gear-teeth arranged around their peripheries, as we have shown by dotted lines in Fig. 3.

The rolls just described, while they true the flanges of the beam, yet, because their part- 10 ing is at the edges of the flanges, they are apt to produce a fin at that place. We therefore use in connection with them rolls which operate directly upon these flanges for the purpose of effacing the fin. In Fig. 4 we show the 15 construction of such rolls. They consist of a pair of horizontal rolls 26, provided with closed grooves, within which the flanges of the beam fit in its passage through the rolls. They therefore act directly on the edges of the 20 flanges, and reduce or efface any fin which may be there.

In Fig. 5 we show a rolling-mill plant comprising a series of the rolls which we have described used in combination. A represents 25 the universal mill through which the metal is first passed back and forth and by which it is reduced approximately to its finished form. B represents the rolls of the sort illustrated in Fig. 3, by which the sides of the flanges of 30 the I-beam are reduced, and C represents the rolls illustrated in Fig. 4, by which the edges of the flanges are reduced. Several sets of the rolls B and C may be arranged alternately in a series, as we have shown, and by their 35 use the sides of the flanges are reduced by the rolls B, and the fins on their edges are effaced by the alternately-arranged rolls C. We show two each of the sets B and C; but, if desired, a greater or less number may be used, 40 arranged alternately and in series, and the weight of the beam to be rolled may be determined by stopping the rolling at the proper pair of the series. Thus the greater the number of passes to which the beam is subjected 45 the greater its elongation and the less its weight per foot, so that if a light beam is desired it should be passed through the whole series, and if a heavy beam be desired it should be passed through only a part of the 50 series.

In order to provide against the formation

of fins on the outer sides of the flanges by the parting of the rolls C, we prefer to provide the rolls 25 of the sets B with small tongues 29, which serve to form slight longitudinal 55 grooves or depressions on the flanges of the beam at the lines which are opposite to the parting of the rolls 26. These grooves neutralize the tendency of the beam to fin along these lines. 60

The rolls 26 may be constructed in various ways, the only essential being that they shall be so shaped as to have a reducing action on the edges of the beam.

The advantages of our invention will be 65 appreciated by those skilled in the art. By means of the improvement above set forth we are enabled to produce flanged beams very rapidly and to make the beams of great uniformity and of fine finish. 70

We claim—

1. An improvement in the art of rolling flanged beams, which consists in forming such beams by reduction of metal blooms, and rolling such beams (at different passes between 75 rolls) on the sides of the flanges and on the edges of the flanges for the purpose of finishing the same, substantially as and for the purposes described.

2. An improvement in the art of rolling 80 flanged beams, which consists in forming such beams by reduction of metal blooms, and rolling such beams (at different passes between rolls) on the web and the sides of the flanges and on the edges of the flanges for the pur- 85 pose of finishing the same, substantially as and for the purposes described.

3. In the art of rolling flanged beams, wherein such beams are finished by means of rolls whose partings produce a fin on the outer 90 sides of the flanges, the improvement which consists in producing, prior to such finishing, grooves or depressions on said flanges on lines coincident with the lines of said fins, substantially as and for the purposes described. 95

In testimony whereof we have hereunto set our hands.

JULIAN KENNEDY.
HENRY AIKEN.

Witnesses:

THOMAS W. BAKEWELL,
W. B. CORWIN.