R. M. SNYDER.

ROLLING MILL.

APPLICATION FILED FEB. 16, 1909.

946,828.

Patented Jan. 18, 1910.

3 SHEETS—SHEET 1.

FIG. 1.

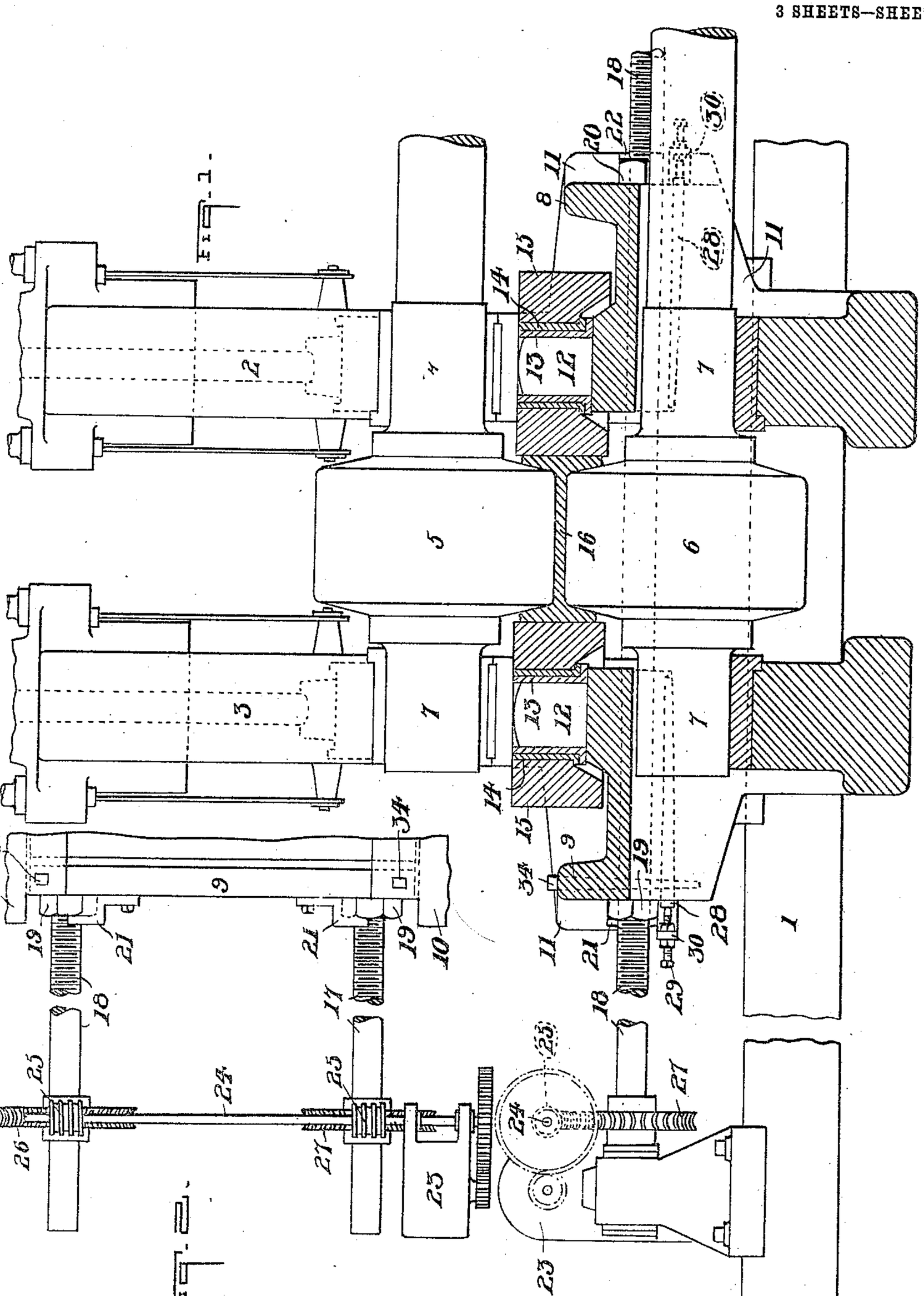

FIG. 2.

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3 SHEETS—SHEET 2.

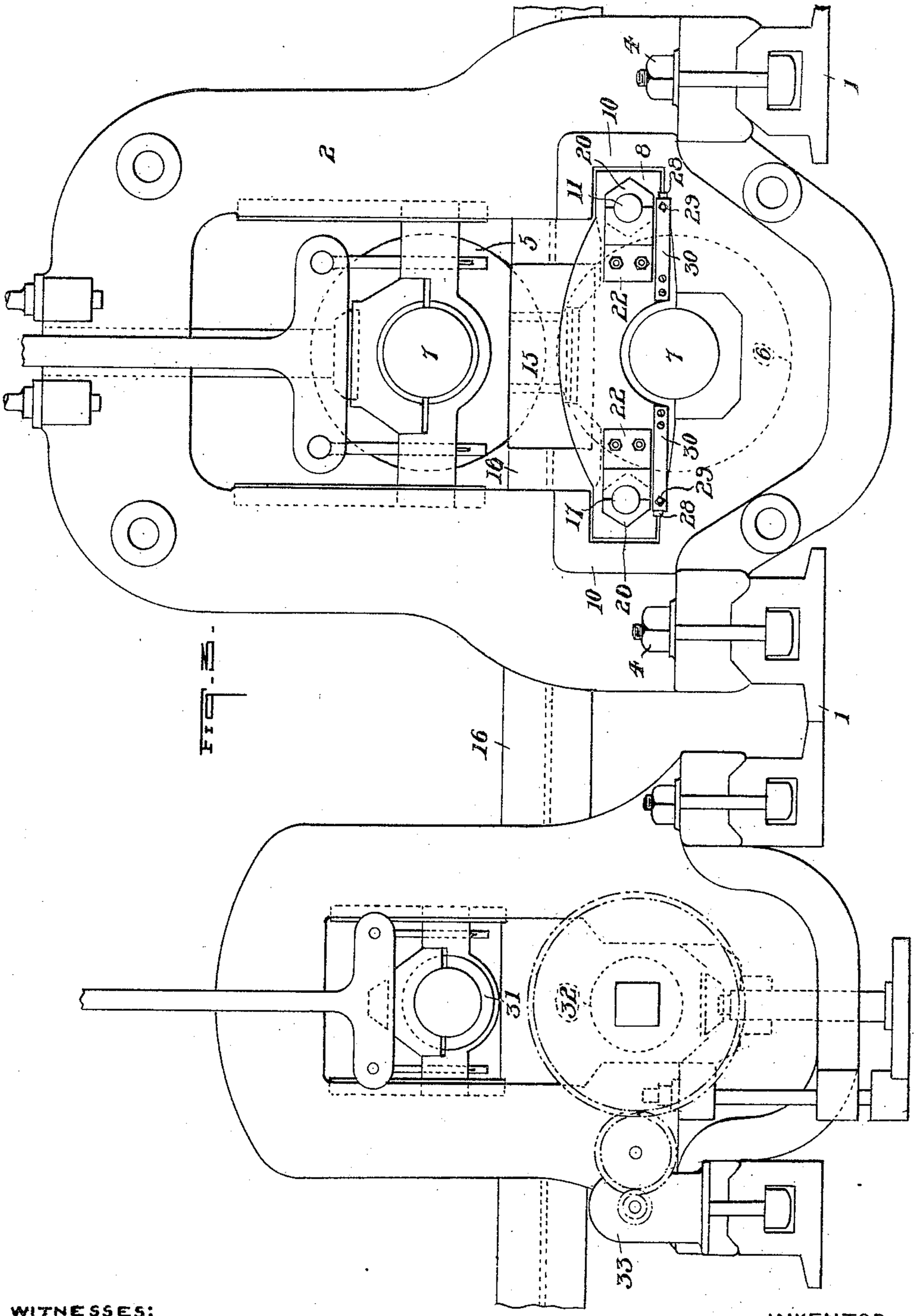

FIG. 3.

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3 SHEETS—SHEET 3.

FIG. 4.

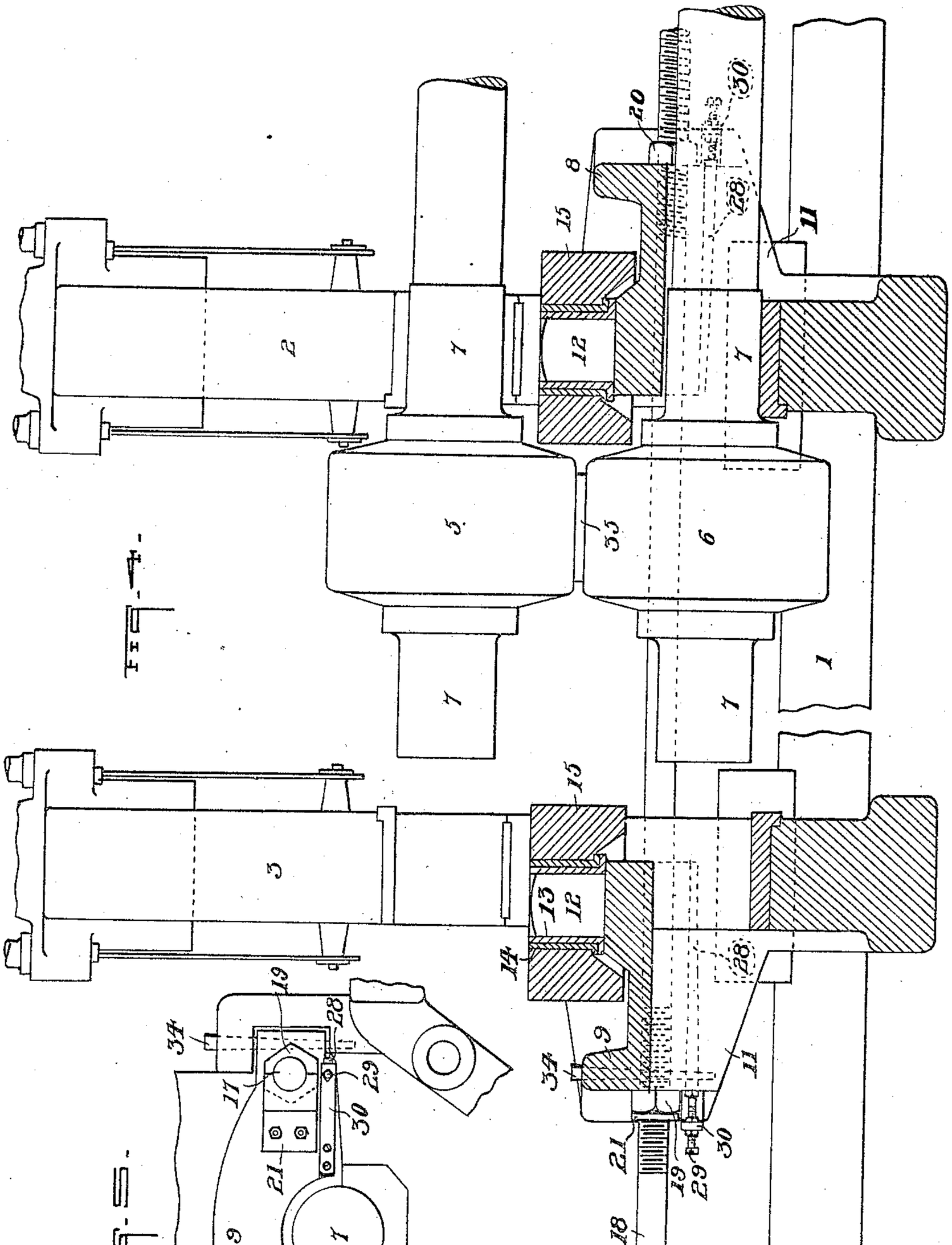

FIG. 5.

WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT M. SNYDER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HORACE E. SMYTHE, OF PITTSBURG, PENNSYLVANIA.

ROLLING-MILL.

946,828. Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed February 16, 1909. Serial No. 478,309.

To all whom it may concern:

Be it known that I, ROBERT M. SNYDER, a citizen of the United States, residing at Wilkinsburg, county of Allegheny, and State of Pennsylvania, have invented or discovered new and useful Improvements in Rolling-Mills, of which the following is a specification.

My invention relates to machines for rolling structural shapes and has particular reference to machines for making I-beams, though I do not limit its employment or adaptation to the same.

One object of my invention is to provide a rolling mill with both horizontal and vertical rolls, having their axes all in the same vertical plane.

Another object is to provide means for making the edges of the flanges of the rolled shapes even.

A further object is to provide simple means for adjusting the vertical rolls and for separating the roll housings so that the horizontal rolls may be easily accessible for changing.

Other objects will appear hereinafter.

Referring to the accompanying drawings which illustrate only one of the several mechanisms in which the principles of my invention may be embodied, Figure 1 is a vertical section through the center of the vertical rolls; Fig. 2, a plan of the mechanism for operating the shafts 17 and 18; Fig. 3, a side view of my invention; Fig. 4, a view similar to Fig. 1 but with one of the housings moved endwise to give access to the horizontal rolls; and Fig. 5, an end view of the lower part of Fig. 4, showing in particular the means for causing the housing and one of the vertical rolls to move together.

On the drawings, 1 represents a pair of shoes, on which the housings 2 and 3 rest and are movable, one toward or from the other, when released by the nuts 4.

5 and 6 are two horizontal rolls, their axes being in the same vertical plane and their necks 7 having bearings in boxes in the housings 2 and 3.

The roll carriers 8 and 9 are slidable in guides 10 in the housings 2 and 3 and are seated, one in each housing, between the necks 7 of the rolls 5 and 6. In order to give the carriers 8 and 9 long bearings, the housings are provided with the outwardly extending bosses 11. Each carrier has a vertical trunnion 12 with its vertical center in the plane of the axes of the horizontal rolls. Each trunnion 12 has thereon the bushing 13, on which revolves the bushing 14 secured within the vertical roll 15. The rolls 15 are situated between the necks 7 of the rolls 5 and 6. As shown in Fig. 1, the rolls 5 and 6 are arranged and shaped to form the web and the inner faces of the flanges of the I-beams 16, and the rolls 15 are arranged and shaped to form the outer faces of the flanges of the I-beams. It will be readily understood that this arrangement of the rolls will permit the formation of beams with much wider flanges than would be possible with a pair of grooved rolls only.

17 and 18 represent two parallel shafts extending through the housings 2 and 3 and having threaded portions in the ends of the carriers 8 and 9. The openings in the carriers for the shafts 17 and 18 are not threaded, the threaded portions of the rods having thereon next to the outer ends of the carriers, the nuts 19 and 20, which may be held from rotation by means of the blocks 21 and 22 secured to the outer faces of the carriers and engaging the sides and outer faces of the nuts. The threads at one end of the shafts 17 and 18 are right-handed and at the other left-handed. The plan views of the blocks 22 are exactly the same as those of the blocks 22 shown in Fig. 2.

23 is a motor which drives the shaft 24. This shaft has thereon the two worms 25 meshing with the worm wheels 26 and 27 which are keyed to the shafts 17 and 18, respectively.

The carriers 8 and 9 are held in their guides by the wedges 28 placed between the carriers and the bottom of their guideways. The wedges are adjusted by the screws 29 having their ends screwed to the wedges 28, and engaging the brackets 30, by means of nuts on both sides. The brackets 30 are secured to the carriers 8 and 9, respectively.

On Fig. 3 I have shown the two rolls 31 and 32 parallel with the rolls 5 and 6 and arranged with their pass in line with the pass of the latter rolls. Preferably the lower roll is driven by the motor 33, so that the rolls 31 and 32 may feed the beams to the pass of the rolls 5 and 6, or may feed them in the opposite direction after they leave the rolls 5 and 6.

In Figs. 4 and 5, I have shown the loose keys 34 inserted in the guides of the housing 3 and the carrier 9, the nut-holding blocks 22 being removed from the right-hand end. The operation is as follows: The heated metal bar from which the I-beam 16 is to be made is passed back and forth in the pass formed by the four rolls 5, 6, 15, 15, the roll 5 being fed down from time to time in a manner well known and therefore not specifically shown, and the rolls 15 being adjusted from time to time by the motor 23 which operates the carriers 8 and 9, as hereinbefore described. As the beam passes back and forth, its edges are engaged by the rolls 31 and 32 and made even. The feeding mechanism of these rolls is also omitted as it is well known in the art. I have attempted with reference to these rolls and the rolls 5 and 6 to show merely that they are adjustable, leaving the adjusting means to be arranged in various well-known ways. The rolls 31 and 32 are preferably used to smooth the edges of the beam flanges which are more or less ragged because they are not engaged by any shaping device on the rolls 5 and 6.

In case one only of the carriers for the rolls 15 should need horizontal adjustment, this could be effected by removing the blocks 22 and 22 secured to the remaining carrier and rotating the motor 23 in the proper direction. The nuts not restrained by any blocks will be rotated with the shafts and have no effect on their associated carrier.

In case it is desired to change the rolls 5 and 6, the housing 3 is slid along the shoes 1 as follows: The blocks 22 at the right-hand side of the mill are removed so that, in the rotation of the shafts 17 and 18, the carrier 8 will not be disturbed. The motor 23 is rotated so as to move the carrier 9 toward the outer end of the boss 11. After the loose keys 34 are inserted through the guides 10 and the carrier 9, the further rotation of the motor will obviously move the housing along with the carrier, the housing having been previously unclamped from the shoes. The housing 3 can be moved so as to permit access to the rolls and their removal. The roll 5 should be blocked up as by the block 35 before the housing 3 is removed.

I do not limit myself to any definite number of rolls in the mill. I have shown a two-high mill but the type of mill may be different.

I claim—

1. In a rolling mill, a pair of horizontal rolls with reduced necks, a pair of vertical rolls between the necks of the horizontal rolls, a carrier to support and guide each vertical roll, and a pair of screws each connecting the carrier and each provided with right and left threads for adjusting the carriers simultaneously.

2. In a rolling mill, a pair of horizontal rolls, a pair of housings therefor, a pair of vertical rolls, a pair of carriers guided in said housings and constructed to support the vertical rolls, means extending between the carriers and adapted to move them apart, an abutment carried by one of the housings and arranged to be engaged by one of the carriers, whereby said means may move the housing along with the carrier.

3. In a rolling mill, a pair of horizontal rolls, a pair of housings therefor, a pair of vertical rolls, a pair of carriers guided in said housings and constructed to support the vertical rolls, adjusting means extending between the carriers and adapted to move them apart, and means for making the adjusting means inoperative for either carrier.

4. In a rolling mill, a pair of vertical rolls, a pair of horizontally adjustable rolls, a carrier for each vertical roll, a vertical trunnion on each carrier to form bearings for the said vertical rolls, wedging means located beneath each carrier and adjustable toward and from the roll pass, to prevent the same from tilting, and means for adjusting the wedging means.

Signed at Hummelstown, Pa., this 11 day of February, 1909.

ROBERT M. SNYDER.

Witnesses:

CLARA C. WIKEL,

CARRIE E. HUMMEL.