No. 749,823. PATENTED JAN. 19, 1904.

A. T. KELLER.

UNIVERSAL MILL.

APPLICATION FILED JUNE 24, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

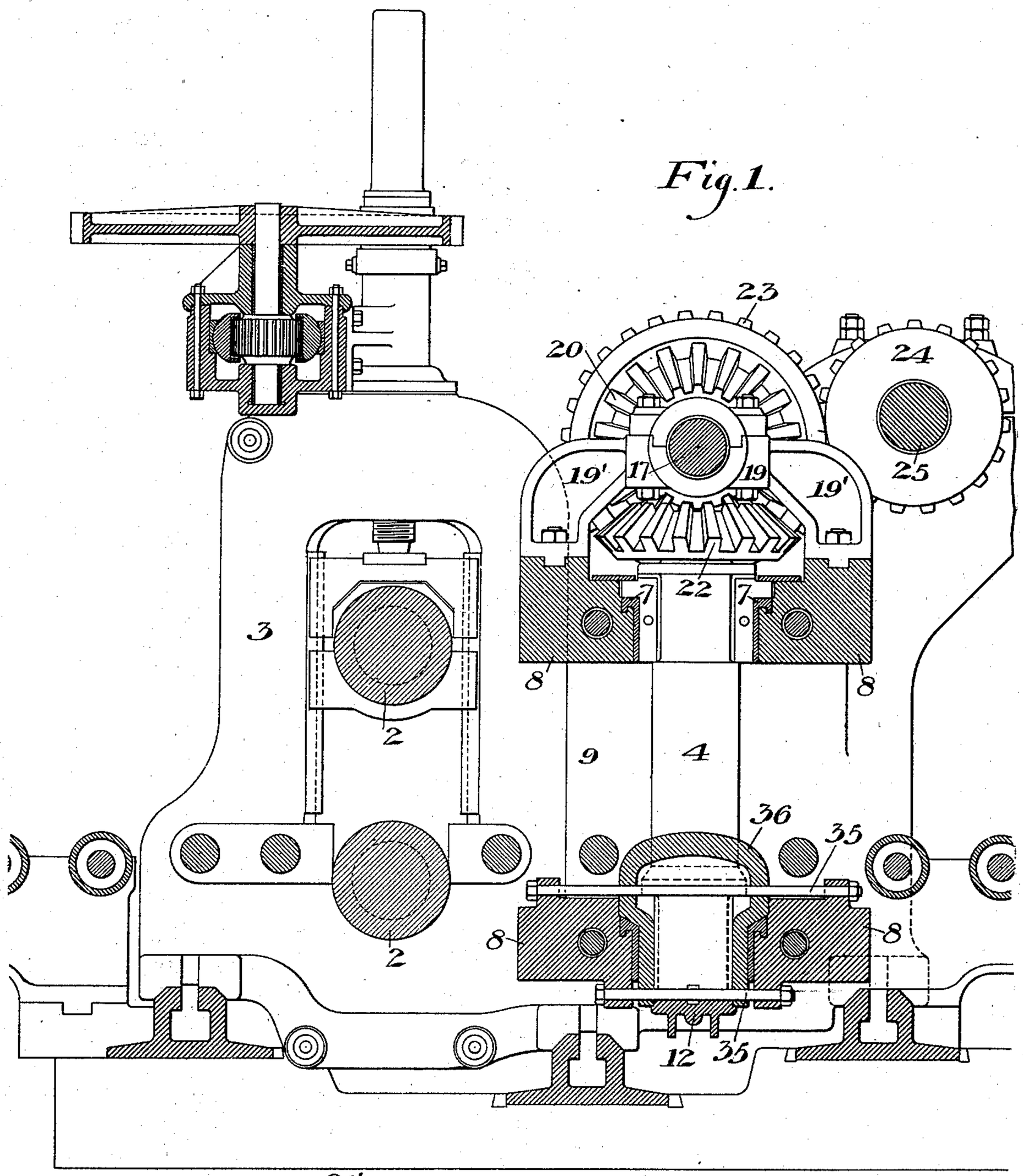
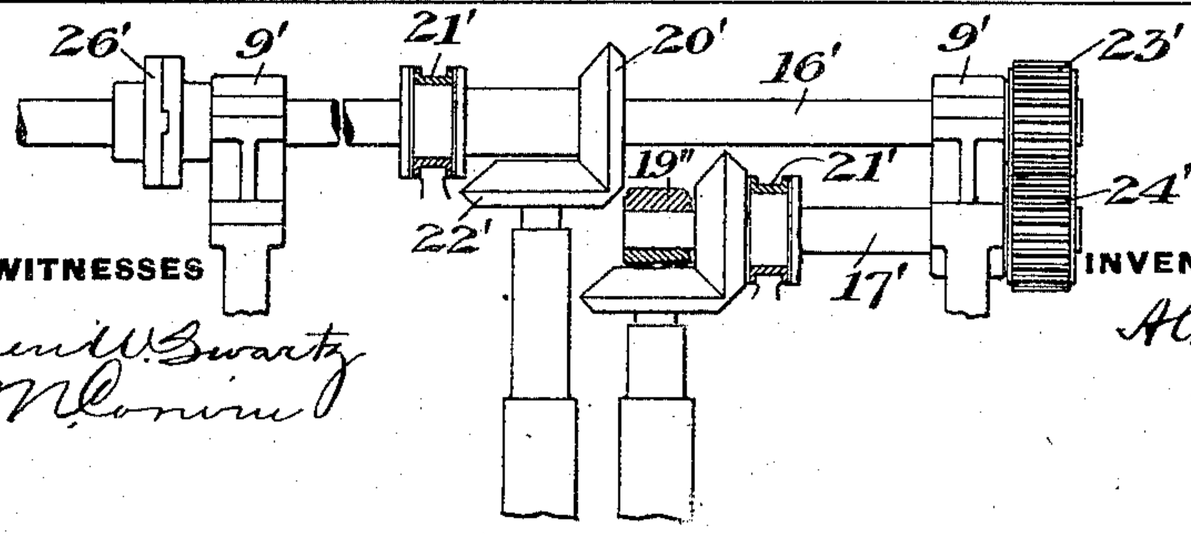


Fig. 4.



WITNESSES

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

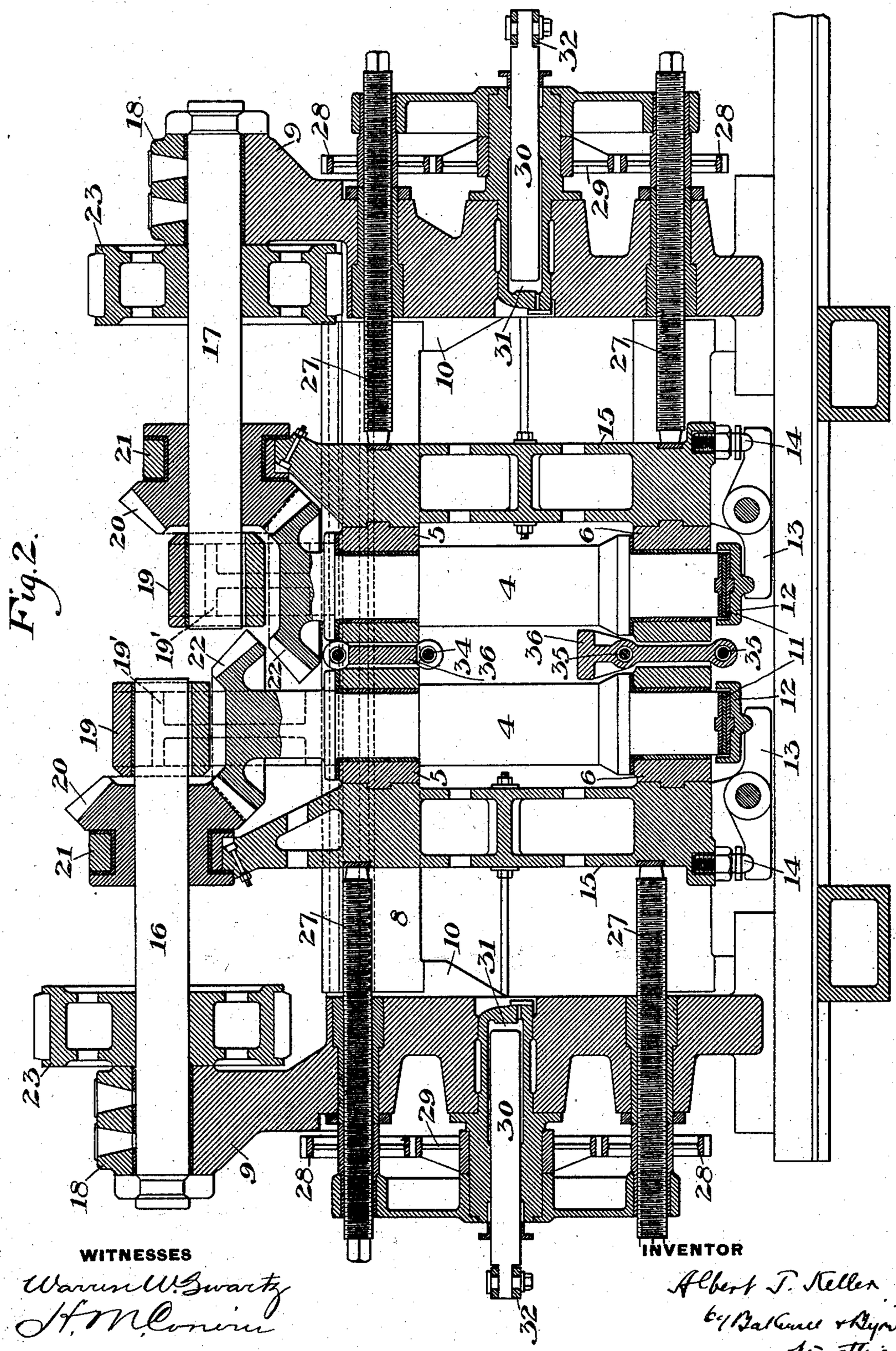

Fig. 2.

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APPLICATION FILED JUNE 24, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

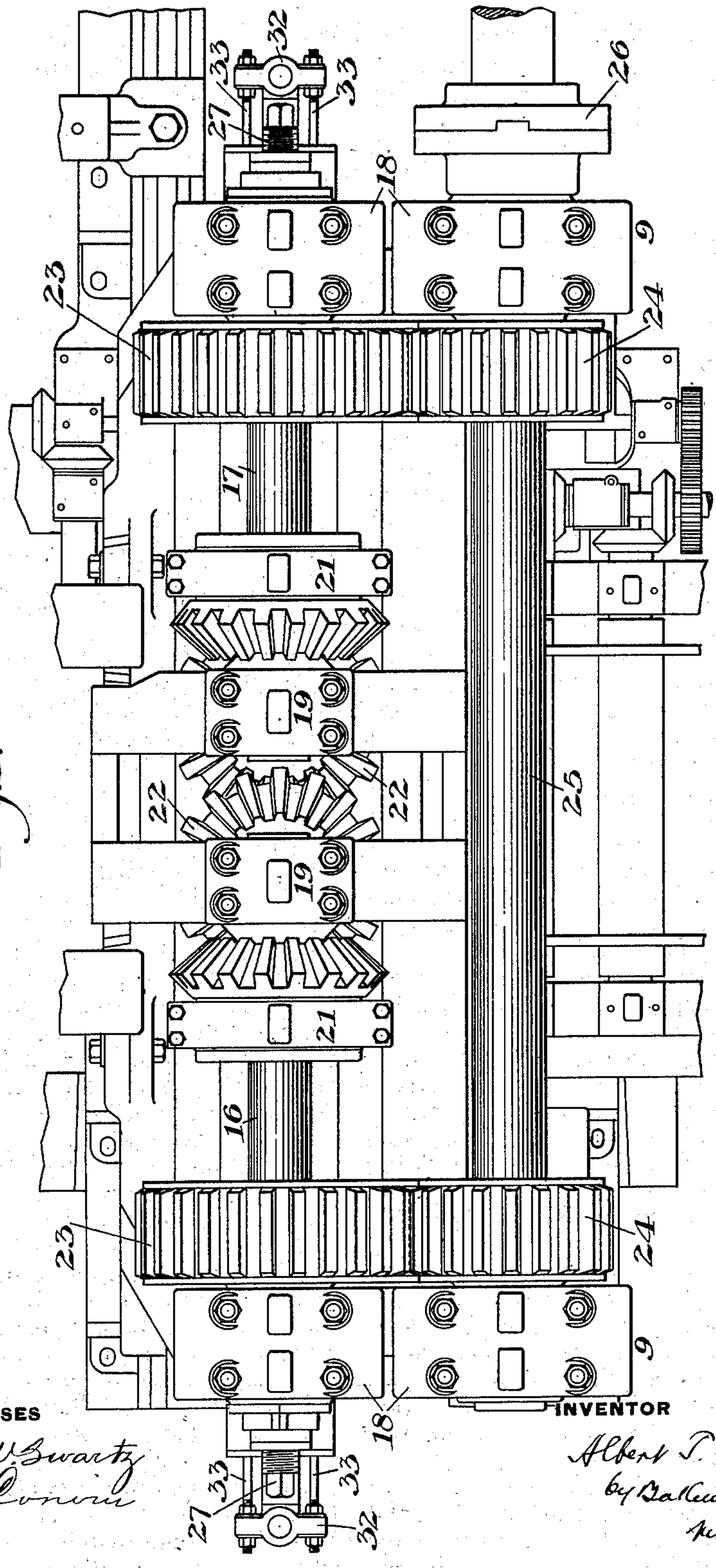

Fig. 3.

WITNESSES

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No. 749,823. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

ALBERT T. KELLER, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO MESTA MACHINE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

UNIVERSAL MILL.

SPECIFICATION forming part of Letters Patent No. 749,823, dated January 19, 1904.

Application filed June 24, 1903. Serial No. 162,889. (No model.)

To all whom it may concern:

Be it known that I, ALBERT T. KELLER, of Wilkinsburg, Allegheny county, Pennsylvania, have invented a new and useful Universal Mill, 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 sectional end elevation showing one form of my improved mill. Fig. 2 is a longitudinal vertical section on the plane of the vertical rolls. Fig. 3 is a top plan view of the form of Figs. 1 and 2, and Fig. 4 is a partial front elevation showing a modified arrangement of the driving connections for the vertical rolls.

My invention relates to the class of universal rolling-mills, and is designed to provide an improved arrangement of the vertical rolls and their driving connections.

Heretofore the vertical rolls have ordinarily been driven from a continuous horizontal shaft extending from one end housing to the other above the rolls. In this construction the horizontal driving-shaft is liable to sag and produce heavy strains and excessive wear.

My invention does away with this difficulty; and it consists in driving each vertical roll by a separate series of connections, both the connections being at the same end of the rolls.

It further consists in providing a separate driving-shaft for each roll, both shafts being at the same end of the roll, and also in placing these shafts at different levels and having overlapping gears to enable the rolls to be brought near to each other to form the desired path.

It further consists in the means for supporting the lower ends of the vertical rolls in rest-bars upon which the vertical rolls are carried and adjusted, and in the construction and arrangement of the parts, as hereinafter more fully described and claimed.

In the drawings, referring to the form of Figs. 1, 2 and 3, 2 2 represent the horizontal rolls of the universal mill, which are mounted in the usual end housings 3. The vertical rolls 4 4 are carried in bearings 5 and 6, the side portions of which are formed as slides 7, which move upon guideways formed in transverse rest-bars 8 8, extending between the end housings 9 9. These housings are preferably formed with inwardly-projecting ledges 10, upon which the upper rest-bars are carried, the lower rest-bars being supported on the foot of each housing. The vertical rolls are further supported upon thrust-plates 11, carried in rocking step-bearings 12, each bearing being loosely supported at the end of a lever 13, whose rear arm is engaged by the rounded lower end of the bolt 14, extending into the lower end of the sliding traveler 15. By adjusting the nut of the bolt 14 the vertical roll may be adjusted in a vertical direction.

The vertical rolls are shown as driven by gearing connection at the top from two shafts 16 and 17, whose axes are in the same vertical plane, the shafts being staggered vertically. The outer end of each shaft is carried in suitable bearings 18 in the end housing 9, while the inner end is carried in the stationary bearing 19, supported upon brackets 19′, extending inwardly from the rest-bars 8. The shafts 16 and 17 are thus short and are supported at both ends, so that there is no danger of their bending or getting out of alinement. Each of the driving-shafts 16 and 17 is provided with a sliding bevel-wheel 20, splined thereto and having a hub with a surrounding collar 21, to which the traveler 15 is secured. The bevel-wheel 20 intermeshes with a bevel-wheel 22, secured to the upper projecting end of the trunnion of the driven roll. The wheels 22 for these two rolls are placed one below the other and overlapping, so that the rolls may be brought close together, when desired, to form the pass. The shafts 16 and 17 are provided with toothed wheels 23, which intermesh with toothed wheels 24, secured to a shaft 25, extending between the housings in front of the shafts 16 17. One end of this shaft 25 is connected by a suitable coupling 26 to a driving-spindle.

The travelers 15 have side flanges or projections which rest upon the guideways of the top and bottom rest-bars and slide thereon as the vertical rolls are adjusted. Each of these travelers is adjusted by the usual screw 27 at their upper and lower portions, which screws extend through the housings and may be rotated by ordinary mechanism, such as toothed wheels 28, intermeshing with a common intermediate wheel 29. The traveler is held against the screw by a pull-back plunger 30, moving in the single-acting hydraulic cylinder 31 in the end housing, the plunger having an outer cross-head 32, with side rods 33, which are bolted to the traveler.

In order to strengthen the rest-bars at their middle points, I preferably bolt them together by upper bolts 34 and lower bolts 35, which preferably extend through spacing-blocks 36. The lower spacing-block is preferably curved on its upper face, as shown in Fig. 1, to act as a guide for the metal passing between the vertical rolls.

Instead of using two short shafts 16 and 17 at one end of the vertical rolls, as shown in Figs. 1, 2, and 3, I may employ two shafts, one of which extends over the other, as shown in Fig. 4. In this figure the upper shaft 16′ forms the driving-shaft for both the vertical rolls, this shaft having an end coupling 6′ with the driving-spindle. This shaft extends between the end housings and is far enough above the shaft 17′ so that the gears will not interfere with each other. In this case the shafts 16′ and 17′ are provided with intermeshing toothed wheels 23′ and 24′. The bearing 19″ for the inner end of the shaft 17′ will be carried on the side rest-bar, while the upper shaft 16′ will be carried in bearings in end housings 9′.

The advantages of my invention result from providing a separate driving-shaft for each vertical roll, these driving-shafts being at the same end of the rolls. Each shaft may thus be supported so as to prevent bending or sagging, and by placing the shafts one above the other the gearing connections for them do not interfere. It will be noted that when in inner position the gears for the two vertical rollers overlap and do not interfere with each other. The adjustable supports at the lower ends of the vertical rolls provide simple and efficient means for adjusting them slightly in a vertical direction.

The two driving-shafts may both be placed below the lower ends of the vertical rolls instead of above them, the arrangement of the shafts may be varied, and many other variations may be made in the form and arrangement of the parts without departing from my invention.

I claim—

1. A universal mill having two separate driving-shafts for the vertical rolls, both of said shafts being at the same end of the rolls; substantially as described.

2. A universal mill having a separate driving-shaft for each vertical roll, the two shafts being out of alinement and having gearing connections with the vertical rolls at the same ends thereof; substantially as described.

3. In a universal mill, a pair of vertical rolls, and a separate driving-shaft for each roll, said shafts being staggered relatively to each other, and connected to the same ends of the rolls, at least one of said shafts having a supporting-bearing at its inner end; substantially as described.

4. In a universal mill, a pair of vertical rolls, a separate actuating-shaft for each roll, said shafts being at the same end of the rolls and arranged at different levels, and a driving-shaft having gearing connections with said two actuating-shafts; substantially as described.

5. In a universal mill, a pair of vertical rolls, separated step-bearings at the lower ends of said rolls, separated levers on which the step-bearings are supported, mechanism for adjusting the levers independently of each other, and driving connections at the upper ends of said vertical rolls; substantially as described.

6. A universal mill having horizontally-extending rest-bars, vertical rolls carried on and movable along the rest-bars, and two separate driving-shafts for the vertical rolls, both of said shafts being at the same end of the rolls; substantially as described.

In testimony whereof I have hereunto set my hand.

ALBERT T. KELLER.

Witnesses:
GEO. B. BLEMING,
H. M. CORWIN.