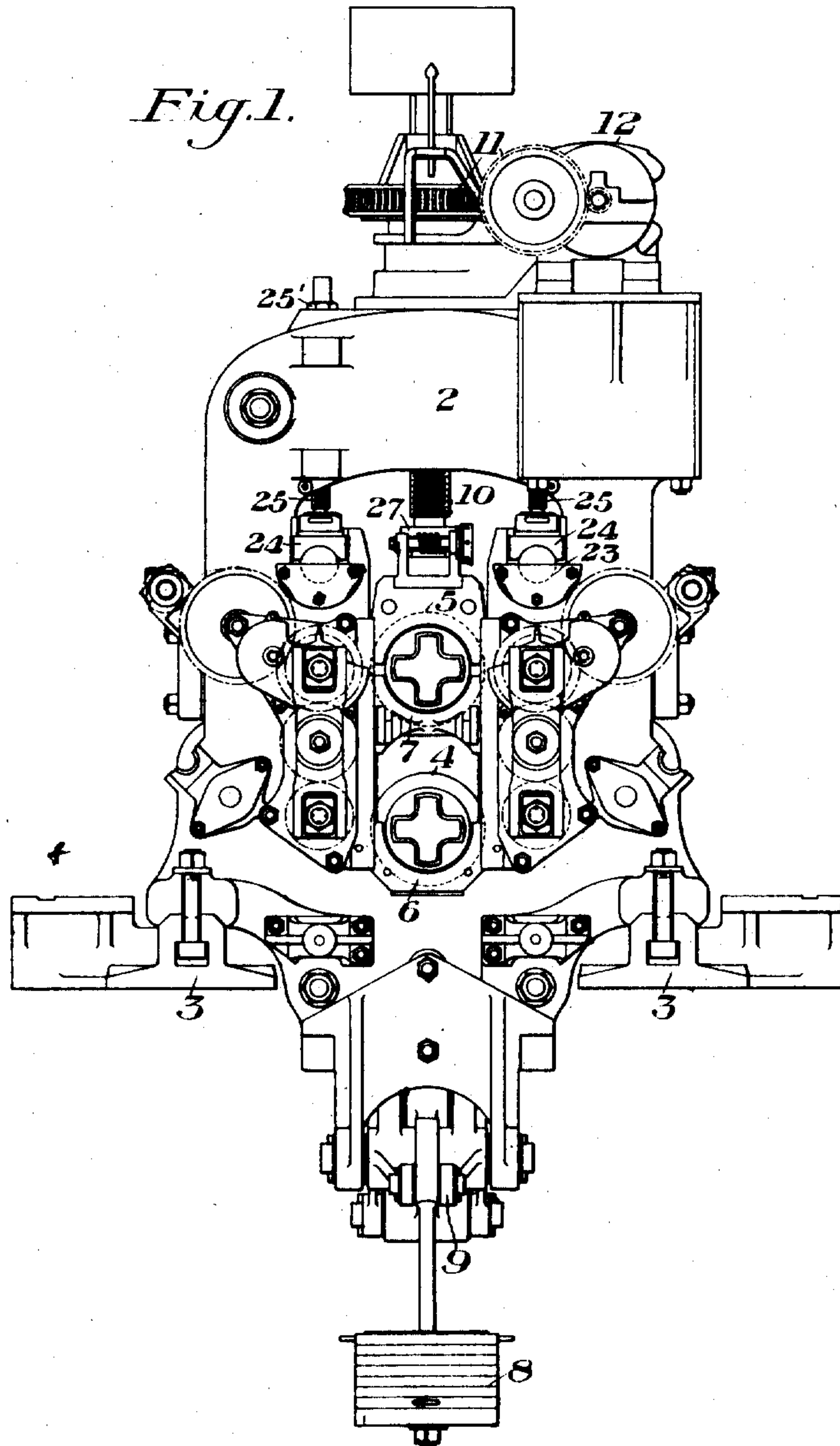


901,233.

Patented Oct. 13, 1908.

3 SHEETS—SHEET 1.



WITNESSES

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*R. Little*

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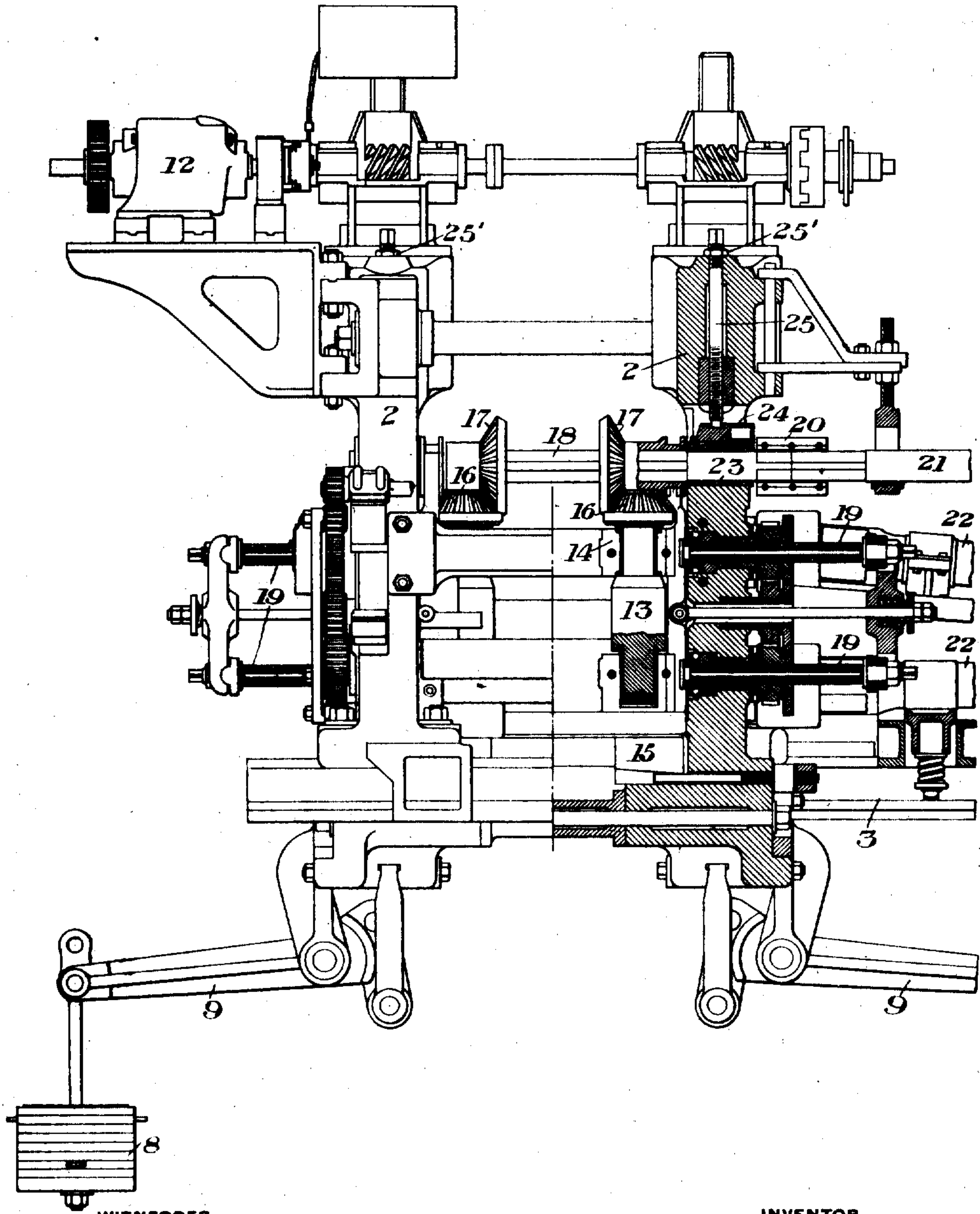
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3 SHEETS—SHEET 2.

Fig. 2.



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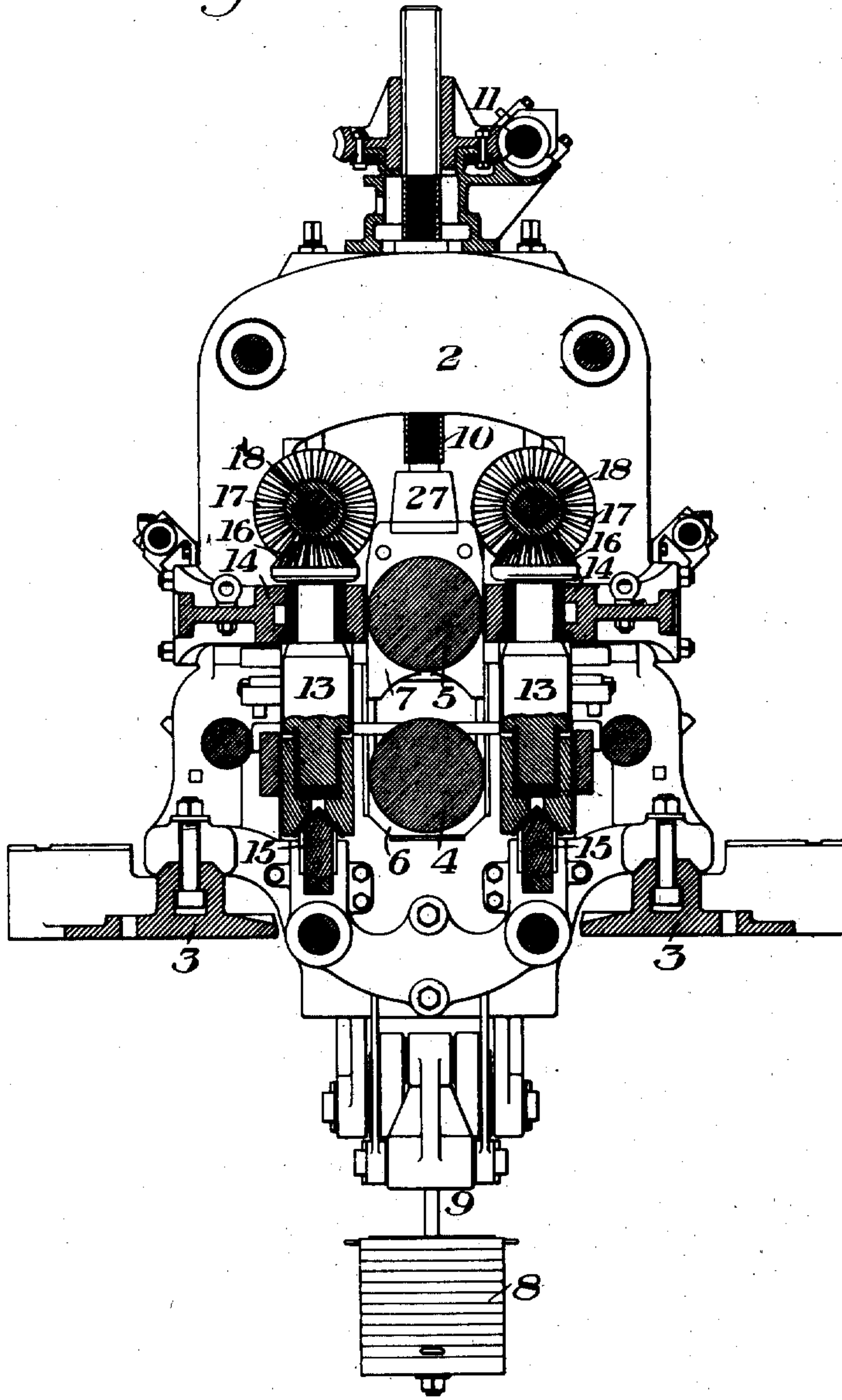
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**3 SHEETS—SHEET 3.**

*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

FRANK I. ELLIS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO UNITED ENGINEERING & FOUNDRY COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## UNIVERSAL ROLLING-MILL.

No. 901,233.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed May 4, 1908. Serial No. 430,674.

*To all whom it may concern:*

Be it known that I, FRANK I. ELLIS, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Universal Rolling-Mills, 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—

10 Figure 1 is an end elevation of a universal mill built in accordance with my invention, and showing the outer side of the horizontal roll housings; Fig. 2 is a longitudinal side elevation of the mill, partly in section so as  
15 to show the vertical rolls and horizontal driving shaft for these rolls; Fig. 3 is a sectional end elevation showing the vertical and horizontal rolls in position in the housings of the mill.

20 My invention relates to the type of rolling mills known as universal mills, in which both the vertical and horizontal rolls are positively driven and the object of the invention is to provide an improved driving  
25 mechanism for the vertical rolls by the use of which the difficulties experienced in keeping such mills in operative condition are greatly lessened, the time lost in the operation of the mills is reduced, and the expense  
30 of operating such mills is correspondingly lessened.

In universal mills as heretofore constructed, the horizontal shaft driving the vertical rolls has been mounted in capped bearings  
35 located on the top of the housing, the caps being removed in order to permit the horizontal driving shaft to be removed and replaced. In other of such mills the horizontal driving shaft for the vertical rolls has  
40 been placed in dead-eye bearings formed in the top part of the housings for the horizontal rolls. Frequently in the operation of such mills, the horizontal driving shaft for the vertical rolls will become bent or other-  
45 wise distorted, or the bevel gears on this shaft will become broken so as to make it necessary to remove and replace such shaft and gears. Where the horizontal driving shaft is mounted in cap bearings on the top  
50 of the housing, the length of the neck of the vertical roll must be very largely increased over that wherein the horizontal driving shaft is placed in dead-eye bearings formed in the horizontal roll housings. Where the  
55 horizontal driving shaft is located in dead-

eye bearings and becomes bent in service, it is extremely difficult to remove the bent shaft from the bearings and it frequently becomes necessary to destroy the shaft by severing it into pieces, in order to remove it  
6 from the bearings. Such operations result in great difficulties in removing and replacing a defective shaft and loss of time in the operation of the mill, which results in an enormous loss in the earning power of the  
6 mill.

By means of my improved construction, the difficulties incident to removing the bent shaft from the mill are removed, while the length of the vertical roll is kept down to the  
71 minimum.

In the drawings, 2 represents the horizontal roll housings mounted upon the usual shoes 3, 3.

4 and 5 are the horizontal rolls, carried in  
75 bearings 6 and 7 which are mounted in the windows of the housings 2. The top roll is counterbalanced by means of the counterweights 8 and counter-balancing levers 9. These rolls are provided with the usual ad-  
80 justing screws 10 which are connected by means of slow-down gearing 11 to the screw operating motor 12 which may be of any desired type.

The vertical rolls 13 are mounted in bear-  
85 ings 14, these bearings being mounted upon shoes 15 which are secured between the horizontal roll housings 2 so as to be adjustable toward and away from each other in a plane  
90 parallel with the vertical axis of the horizontal rolls. The vertical rolls 13 are provided with the usual bevel gears 16 which mesh with similar gears 17 on the horizontal driving shaft 18 by which the vertical rolls  
95 13 are actuated. The gears 17 are splined to the shaft 18 so as to be longitudinally movable upon the shaft. The vertical rolls are provided with adjusting screws 19 by which they are adjusted toward and away  
100 from each other during the operation of the mill.

The horizontal driving shaft 18 by which the vertical rolls are actuated is connected by means of any suitable type of coupling  
105 20 to the driving shaft 21 through which the shaft 18 is connected to the driving pinions which are actuated by any suitable type of motor.

The horizontal rolls 4 and 5 are driven by means of the customary spindles 22 which  
110



are connected to the driving pinions for the horizontal rolls which in turn are connected to the driving motor.

The top portion of the window in the housings 2 is recessed and is provided with half-bearings 23 in which is mounted the horizontal driving shaft 18 for the vertical rolls 13. A suitable cap 24 is provided for each of these bearings in order to retain the driving shaft 18 in place, and preferably, these bearings are kept in position by means of a screw bolt 25, which extends downwardly through the top of the housing, its lower end coming into engagement with the cap and securely holding the cap in place although these caps may be secured in place in any desired manner. A suitable lock nut 25' is provided for securing the cap holding screw 25 in its adjusted position.

It will be seen that by removing the breaker blocks 27 from their place on top of the horizontal roll bearings and by removing the top bearings for the top roll 5 of the horizontal mill when the caps 24 are removed from the shaft 18, these shafts can be easily and quickly removed and replaced by shifting them endwise through the window of the housing 2. The shaft can be stripped from the spool bevel gears 17 by removing it endwise through the window of the housing 2, or the gears 17 and shaft 18 may both be removed through this window. This is of particular advantage in cases where the shaft becomes bent in such manner that the removal of the gears 17 is prevented.

The advantages of my invention will be appreciated by those skilled in the art. By constructing the window of the horizontal roll housing as shown, so as to secure the horizontal driving shafts for the vertical rolls in half-bearings formed in the top portion of the window of the housing, these shafts can be easily and quickly removed and replaced in position on the mill. The necessity for long delays for removing bent or otherwise mutilated driving shafts from

the mill is removed, while by the simple and compact construction shown, the length of the neck of the vertical rolls is shortened greatly, and the strength of these rolls is very largely increased.

Variations in the construction and arrangement of the parts may be made without departing from my invention.

I claim:—

1. A universal mill having closed top housings provided with windows for the horizontal rolls, a horizontal driving shaft for the vertical rolls, and bearings for said driving shaft located in said windows, substantially as described.

2. A universal mill having closed top housings provided with windows for the horizontal rolls, a horizontal driving shaft for the vertical rolls, bearings provided with caps for said shaft and located in said windows, said bearings supported on the under side by a portion of the housing which defines the windows, and means extending downward from each housing into securing engagement with the corresponding cap, the portions of the frame adapted to support the bearings constructed and arranged to permit of lateral movement of the horizontal shaft toward the center of the windows when the cap-securing means is in disengaged position, substantially as described.

3. A universal mill having closed top housings provided with windows for the horizontal rolls, horizontal driving shafts for the vertical rolls, and bearings for said shafts, the said windows being extended laterally and vertically to receive said bearings and to permit said shafts to be removed through said windows, substantially as described.

In testimony whereof, I have hereunto set my hand.

FRANK I. ELLIS.

Witnesses:

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