(No Model.) 2 Sheets—Sheet 1.

T. A. GRIFFIN.

BALANCING APPARATUS FOR WHEELS, &c.

No. 407,589. Patented July 23, 1889.

Fig. 1.

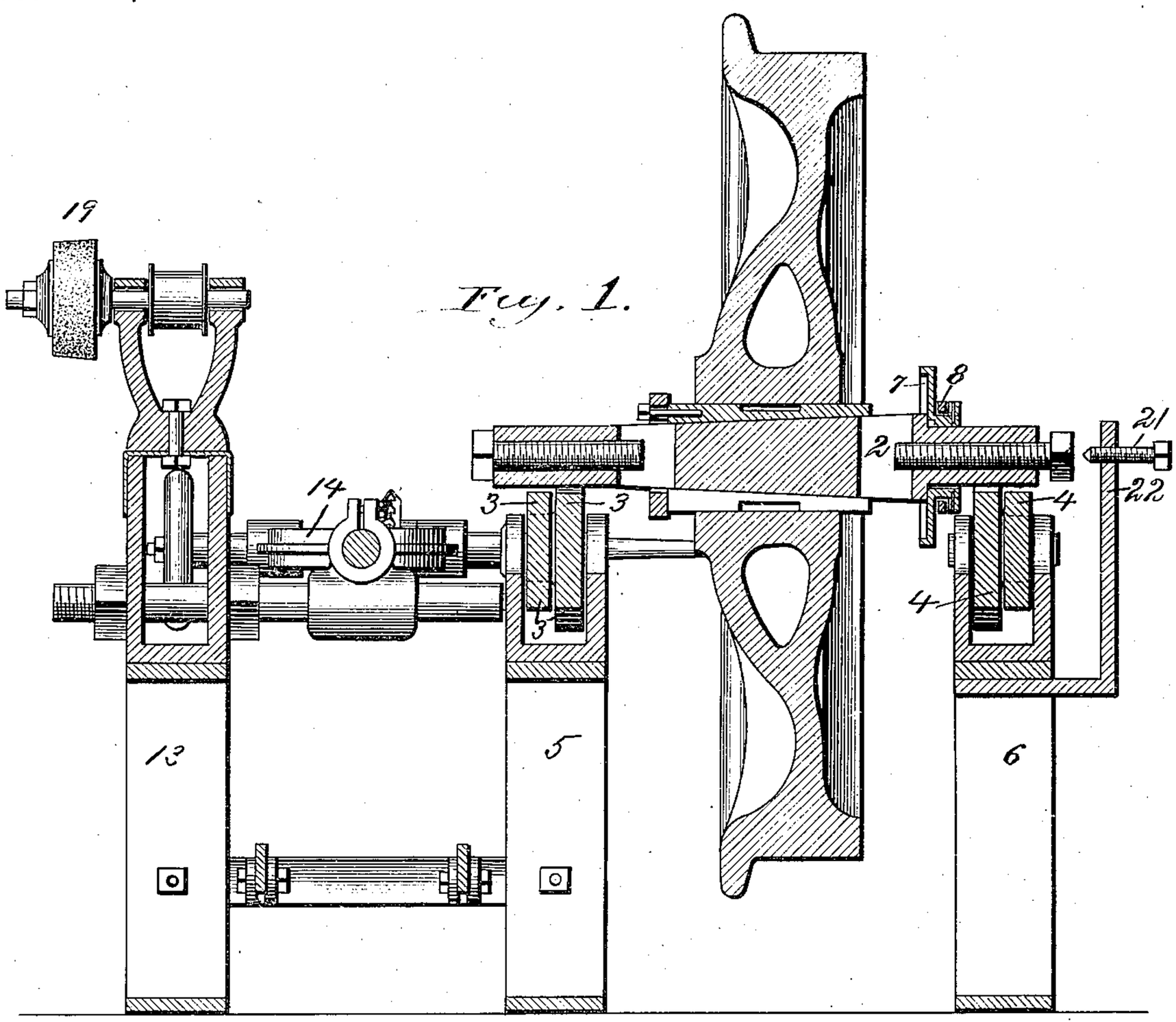
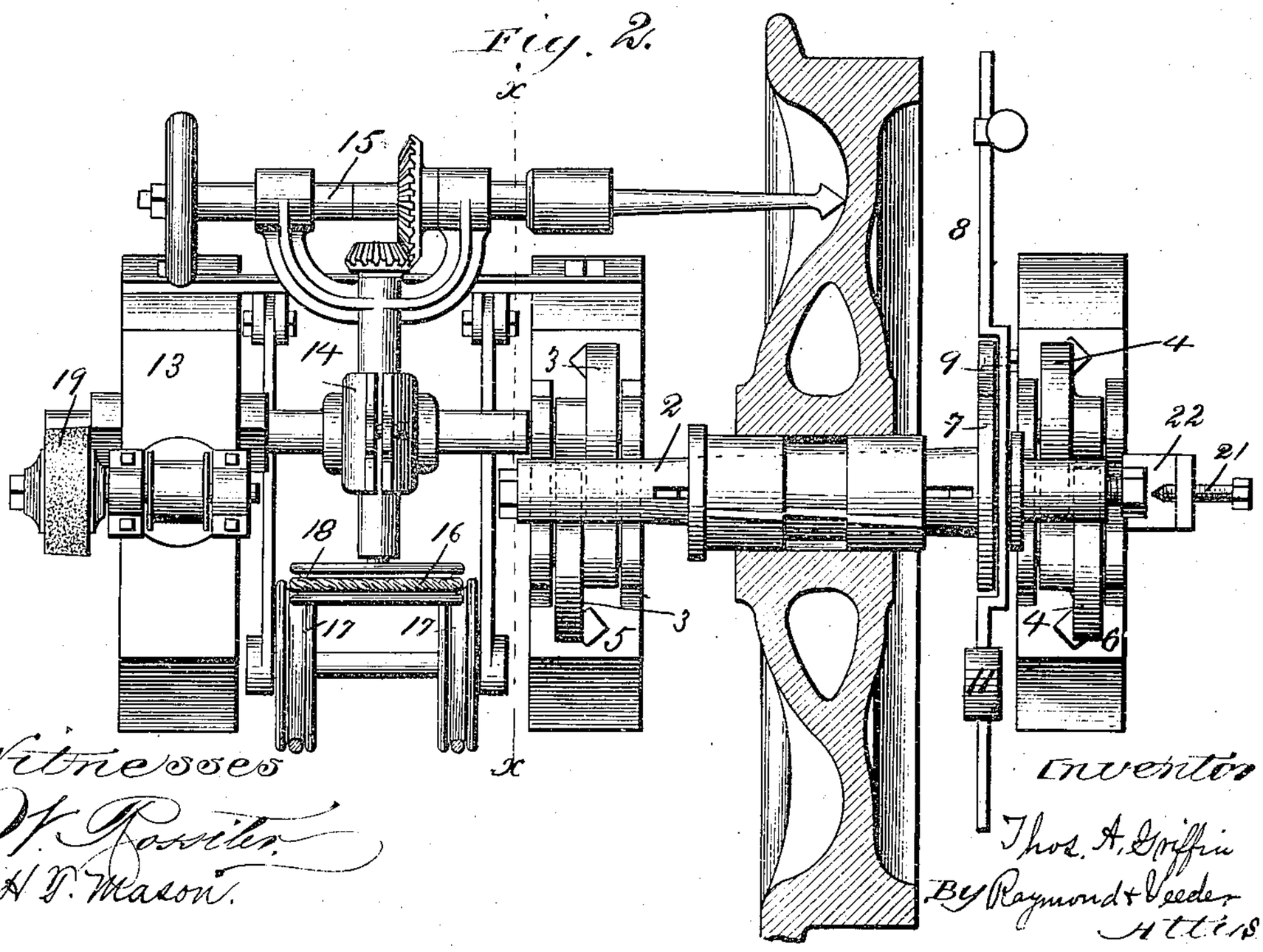


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

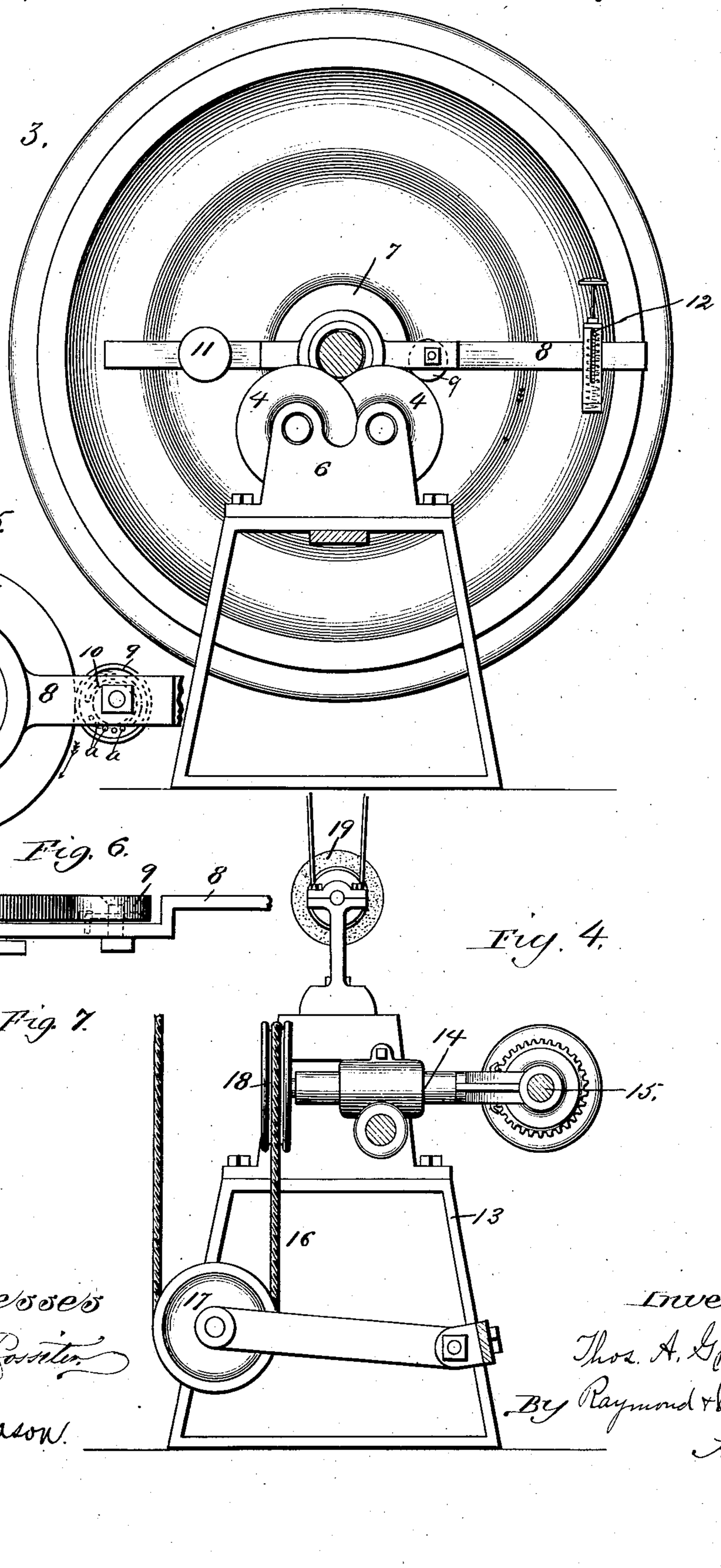

Fig. 5.

Fig. 6.

Fig. 7.

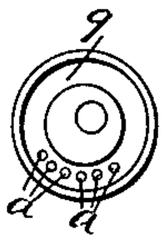

Fig. 4.

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UNITED STATES PATENT OFFICE.

THOMAS A. GRIFFIN, OF CHICAGO, ILLINOIS.

BALANCING APPARATUS FOR WHEELS, &c.

SPECIFICATION forming part of Letters Patent No. 407,589, dated July 23, 1889.

Application filed April 26, 1889. Serial No. 308,736. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. GRIFFIN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Balancing Apparatus, of which the following is a specification.

The object of my invention is to facilitate the balancing of pulleys, car and fly wheels, and other parts of machinery which are destined to revolve at high speeds, by providing means for ascertaining the amount the pulley or other part is out of balance, and for locating the position of the heaviest part with expedition. In addition, to further assist in the attainment of the object of my invention, I provide means for preparing and attaching the counterbalancing-weight to the pulley or wheel while in position in the balancing-machine.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved apparatus, showing a car-wheel in position for balancing. Fig. 2 is a plan view of the apparatus, the car-wheel being shown in section. Fig. 3 is an elevation looking from the right of Fig. 2. Fig. 4 is an elevation of the part to the left of the dotted line *x x*, Fig. 2. Figs. 5, 6, and 7 are detail views on an enlarged scale.

2, Figs. 1 and 2, is a mandrel upon which the pulley or wheel is mounted for balancing. It may be of any sort, but as shown it is an expanding mandrel, that form being preferable by reason of the facility with which it may be inserted and removed. No novelty is claimed for the expanding devices, and as the essential features of construction appear in the drawings no further description of this portion is necessary.

The ends of the mandrel 2 rest on anti-friction rollers 3 3 4 4, journaled in the standards 5 6, which constitute a part of the frame of the machine. A disk 7 is rigidly secured to the mandrel 2, and a lever 8 is hung thereon so that it may vibrate in proximity to the disk. Upon the lever 8 is pivoted an eccentric 9, whose edge is in contact with the edge of the disk 7. The structure of the eccentric 9 is shown in Figs. 5, 6, and 7. A curved or coiled spring 10, (seen in dotted outline in Fig. 5,) one of its ends being inserted in one of the holes *a a*, &c., in the eccentric, and the other end in the arm or lever 8, maintains the contact between the disk 7 and eccentric 9. The eccentric 9 is thus adapted to act as a friction-clutch, and is arranged so that when the lever 8 is moved in the direction of the arrow, Fig. 3 or 5, the disk 7 and the attached mandrel and pulley or wheel will be rotated, while the lever will be freed when moved in the opposite direction. The lever 8 projects on both sides of the mandrel 2, one end being provided with a balancing-weight 11, by which the lever itself may be poised, while the other end is provided with a spring-scale 12 or other device by which the force applied in turning the mandrel and pulley may be determined. The balancing of the lever 8 by the weight 11 is not essential, as will be evident when the operation comes to be considered; but is a convenience because the scale will then correctly indicate the force required to rotate the mandrel.

Mounted at the rear of the apparatus between the standards 5 and 13, Figs. 1 and 2, is a drilling-machine 14, the drill-spindle 15 of which is made adjustable by well-known devices, so that it may be fixed at any angle or in any position within its range. Power for driving the drill is transmitted through the rope 16, passing round the pulley 18 and tightener-pulleys 17, Figs. 2 and 4. An emery-wheel 19 is also mounted at the rear of the machine, and is used for fitting and reducing the counterbalance-weight when the precise weight needed has been ascertained.

The mode of using the apparatus hereinabove described is as follows: The mandrel 2 is driven into the wheel or pulley to be balanced and placed upon the rollers 3 3 4 4. The spring-scale 12 is slid along the lever or scale beam 8 to any convenient point, varying with the size and weight of the pulley operated upon, but preferably to a position corresponding to the radial distance proposed for the counter-weight. Pressure barely sufficient to turn the mandrel is applied to the spring-scale and its reading noted. Another portion of the pulley or wheel is then brought uppermost and the pressure required to turn it again noted. Several diametrically-opposite points are thus tested. As the frictional resistance is the same for all positions, the comparison of the different readings will show the location of the heaviest spot, and one-half the differ-

ence between the greatest and least opposite readings will be the amount of counterbalance needed if placed at the radial distance of the weighing-scale. A weight of the proper size, being selected or prepared by grinding on the wheel 19 or otherwise, is then temporarily secured to the pulley or wheel, and if desired its sufficiency tested by noting whether the pressure required to revolve the wheel is the same in all positions. The counterbalance-weight is then permanently secured by drilling through it and the wheel before the latter is removed from the balancing-machine and inserting a rivet or other fastening. The thrust of the drill against the wheel is taken by the screw 21, passing through the brace 22, Figs. 1 and 2, and abutting against the end of the mandrel.

I claim—

1. The combination, with the mandrel adapted to receive the wheel or pulley to be balanced, and supports for said mandrel on which it may revolve, of a lever adapted to revolve said mandrel and provided with a device for weighing the force applied in revolving the mandrel, substantially as described.

2. The combination, in a balancing apparatus, of a mandrel adapted to receive the wheel or pulley to be balanced, supports for said mandrel on which it may revolve, a vibratable lever, a clutch connecting said lever to said mandrel and adapted to move it in one direction only, and a device attached to said lever for weighing the force applied to revolve the mandrel, substantially as described.

3. The combination, in a balancing apparatus, of a mandrel adapted to receive the wheel or pulley to be balanced, supports for said mandrel in which it may revolve, a vibratable lever hung upon said mandrel and connected by a clutch thereto, and a weighing device adjustable on said lever to correspond with the intended position of the counterweight, substantially as described.

4. The combination, in a balancing apparatus, of a mandrel adapted to receive the pulley or wheel to be balanced, supports for said mandrel on which it may revolve, a lever having a weighing device attached and adapted to revolve the mandrel, and a drill adjustably mounted in the frame carrying the supports for the mandrel, whereby the entire operation of balancing a wheel or pulley may be completed prior to its removal from the apparatus.

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