No. 863,137. PATENTED AUG. 13, 1907.

W. J. BAYRER.

DRILL PRESS.

APPLICATION FILED APR. 9, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

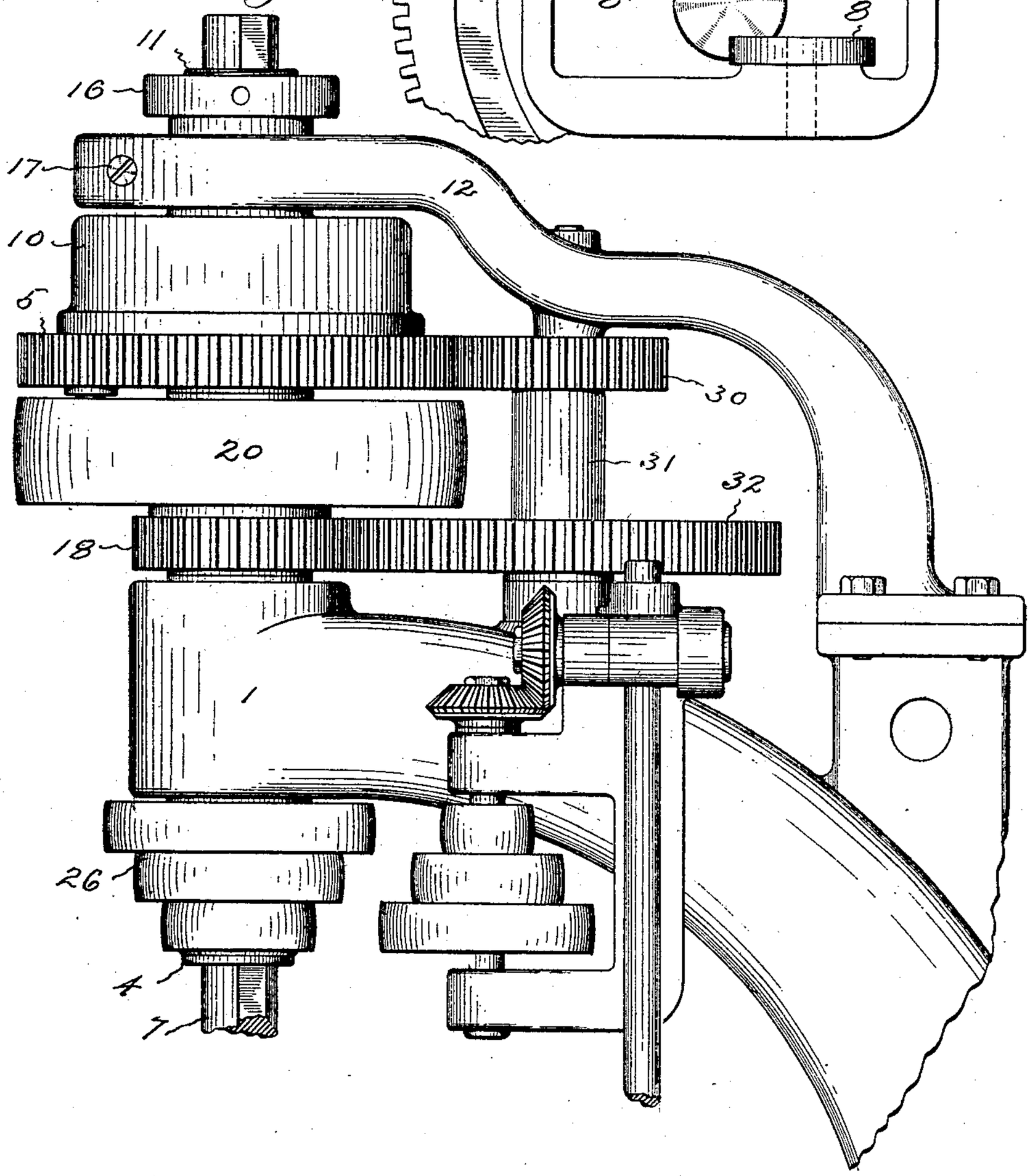
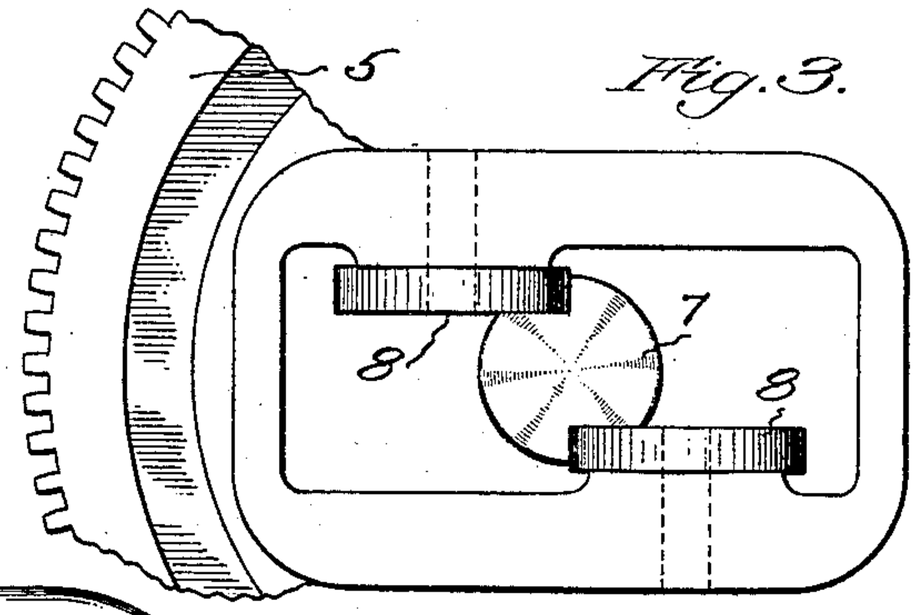


Fig. 3.



Witnesses.

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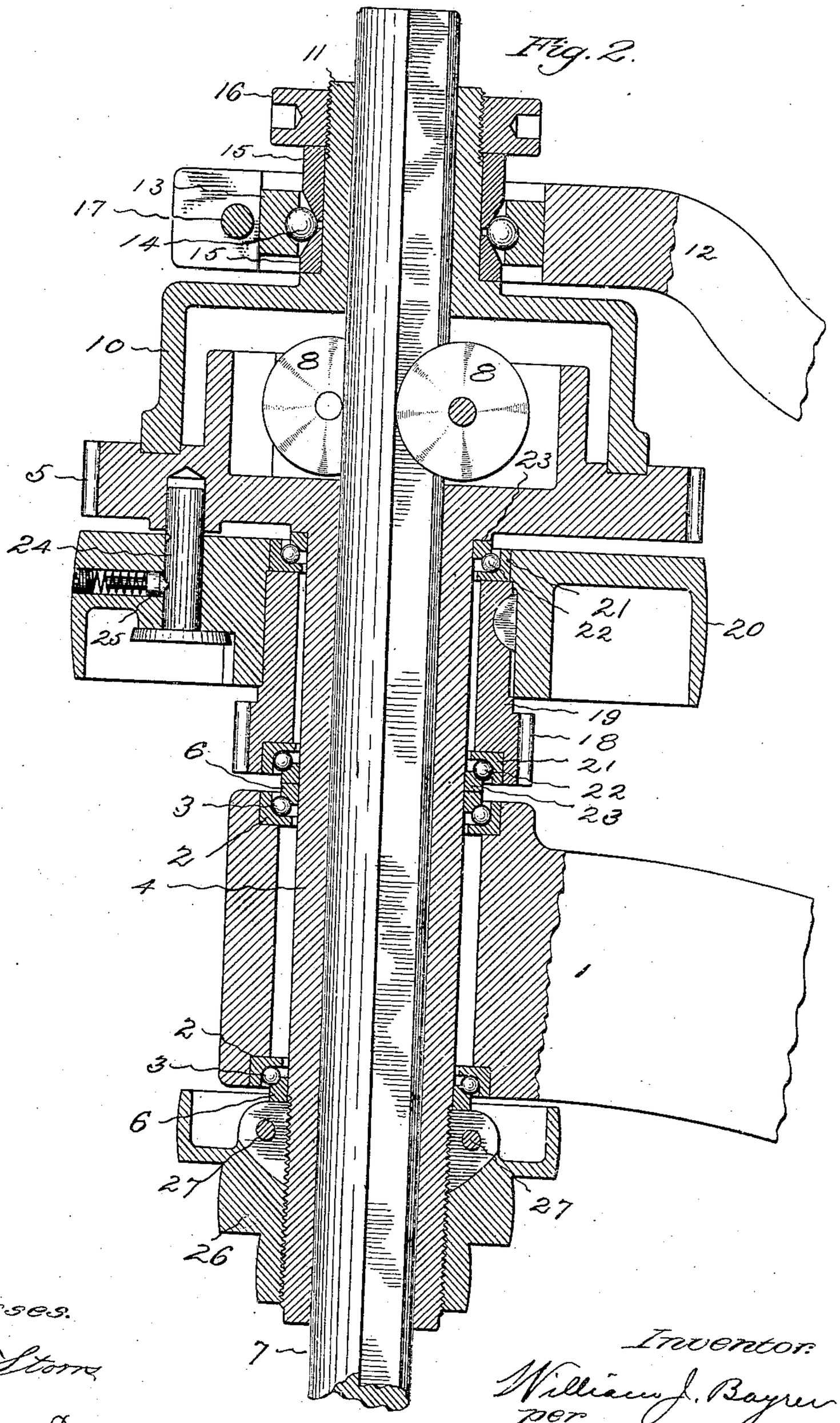
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

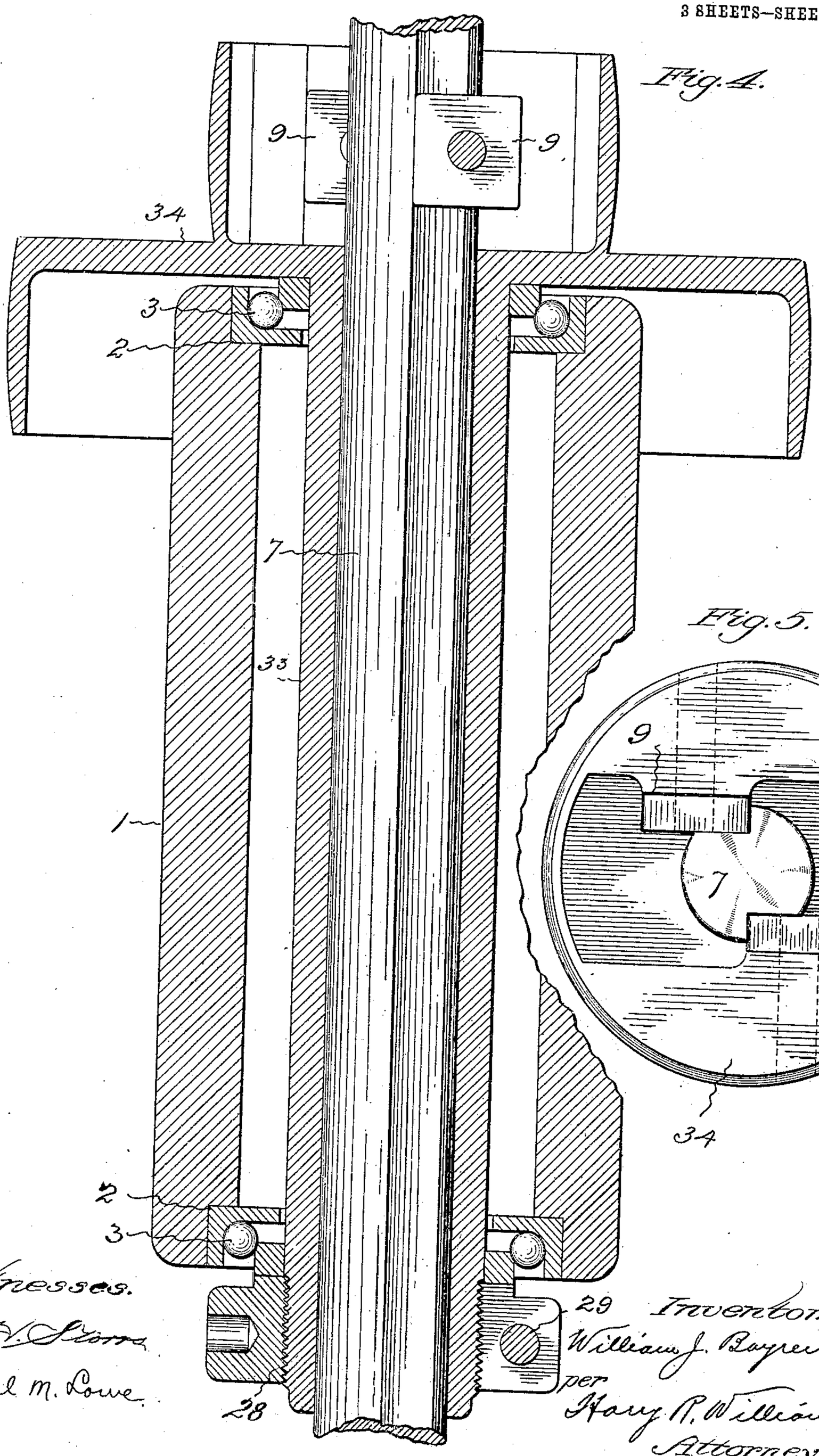

Fig. 5.

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WILLIAM J. BAYRER, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE HENRY & WRIGHT MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

DRILL-PRESS.

No. 863,137. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed April 9, 1906. Serial No. 310,693.

To all whom it may concern:

Be it known that I, WILLIAM J. BAYRER, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Drill-Press, of which the following is a specification.

This invention relates to the construction and arrangement of the supporting parts and driving mechanisms of the vertically movable spindle of a drill press.

The object of the invention is to provide such an organization which is cheap to manufacture, has comparatively few parts and is simple to assemble and easy to adjust at any time, and which is so designed that the spindle will rotate without wabbling or vibrating and with a very small amount of friction, whereby the spindle may be run very slowly with great power, or run at very high speed and while having a wide range will accomplish accurate and efficient work at all times.

This invention may be embodied in a drill press head in which the spindle is arranged to be driven directly at high speed or indirectly through back-gearing at low speed, and in a head in which the spindle is driven directly at various speeds without the intervention of back-gears.

In carrying out this invention the driving mechanisms and the spindle supporting parts are so arranged in the head that there is no rotary friction between the vertically movable spindle and its immediate support, and all of the bearings which are anti-friction are adjusted by the movement of one easily manipulated part which is located in a very accessible position below the head.

Figure 1 of the accompanying drawings shows a side elevation of the spindle head of a drill press provided with back-gearing, that embodies the invention. Fig. 2 shows on larger scale a central vertical section of the spindle supporting and driving parts of the same form of the invention. Fig. 3 shows a plan of the connection between the rotatory driving member and the spindle. Fig. 4 shows a central vertical section of a spindle head with a simple direct drive, that embodies the invention. Fig. 5 shows a plan of the small step of the cone pulley shown in Fig. 4 and the contained spindle drive.

The frame head 1 has a vertical opening and in recesses at the upper and lower ends of the opening are oppositely-facing ball cases 2 containing bearing balls 3.

In the form of the invention first shown extending through the opening in the head and the ball cases is the tubular hub 4 of a gear 5. On this hub are ball cones 6 that engage the balls in the cases in the head. The spindle 7 extends through this gear and its tubular hub and is free to move up and down therein but is keyed so as to rotate with the gear and hub by the rolls 8 which are supported in recesses in the gear and extend into longitudinal grooves in the spindle. This connection between the driving member and the spindle may be made by angular blocks 9 as shown in Fig. 4, if desired. These rolls or blocks permit the spindle to be moved up and down freely but require it to rotate with the gear and its hub.

Mounted on the gear is a cap 10 which incloses the driving rolls. This cap has a hub 11 which extends upwardly through an opening in the arm 12 that is bolted to the top of the drill press frame.

Loosely supported in the opening in the arm is a ball-race 13 containing balls 14 and on the hub of the cap are oppositely facing cones 15 which are adjusted by the nut 16 that turns on the threaded upper end of the cap hub. The front end of the arm is preferably split and provided with a clamp screw 17 for binding the ball-race after it has been adjusted.

Surrounding the hub of the gear above the head is a pinion 18 having a hub 19 on which is secured a pulley 20. At the ends of the pinion hub are oppositely facing ball cases 21 containing balls 22 and on the hub of the gear adjacent to these are cones 23.

The pulley has a clutch pin 24 which may be thrust into or pulled out of a socket in the gear, a spring-catch 25 being provided for holding the pin in the desired position.

The lower end of the tubular hub of the gear is threaded and screwed upon this is a cone pulley 26 which has a split hub and screws 27 that may be tightened for clamping the pulley in position after it has been turned to the desired location. The hub of this pulley bears against the underside of the cone on the gear hub that is beneath the head and the adjustment of all of the anti-friction bearings depends on the location of this pulley.

Instead of having the bearings adjusted by means of the pulley below the head, a nut 28 may be screwed upon the lower end of the hub against the lowest ball cone, which nut may be split and provided with a clamp screw 29, as shown in Fig. 4.

In assembling the parts the pulley and the pinion which are secured together are mounted on the hub of the gear and then the hub of the gear is mounted in the head, after which the arm which supports the gear cap is secured in place on the top of the frame. The pulley or a nut, as the case may be, below the head is then screwed upon the hub of the gear. Tightening or loosening this pulley or nut adjusts all of the anti-friction bearings. After the pulley or nut has been ad-

justed to the proper position it is clamped in position and the arm is tightened on the top ball-race. These parts are always accessible for adjusting the bearings so that wear can be taken up at any time. The ball-race that is supported by the arm at the top moves up and down in the opening in the arm as the other parts are adjusted. This bearing merely acts as a support for the upper end of the spindle and prevents it from wabbling when it is raised. The spindle slides freely up and down through the hub of the gear and the hub of the gear cap. These parts do not rotate relatively to each other so that there is no rotatory friction between them. The only rotatory friction that there is is that between the balls and ball-cases and cones which support the hub of the gear.

Meshing with the driving gear is a back pinion 30 which is fastened to a sleeve 31 to which is fastened a back gear 32 that meshes with the driving pinion on the hub of the spindle gear. The back pinion and gear are mounted on an eccentric shaft so that they may be thrown into and out of mesh with the driving gear and pinion, as required.

When it is desired to rotate the spindle at high speed the pulley is fastened to the gear by the clutch pin and the back pinion and gear are disengaged. Under these circumstances the spindle is driven directly at the speed of the pulley. When it is desired to rotate the spindle slowly the back pinion and gear are brought into mesh with the driving gear and pinion and the clutch pin is drawn out so that the pulley is free from the driving gear. Then the rotation of the pulley rotates the driving pulley indirectly through its pinion and the back-gearing.

If the back gears are not required the parts may be arranged as shown in Fig. 4. In this form of the invention the supporting sleeve 33 may be made a part of the hub of the cone pulley 34 and the spindle drive may be arranged inside of the upper step of this pulley. This form of mechanism is very simple and it will be noted that there is no rotary friction between the spindle and its support, all of the rotary friction being taken by the ball bearings at the upper and lower ends of the opening through the head and these bearings are comparatively large in diameter and are quite a distance apart so that the friction is very small and there is no chance for the spindle to wabble or vibrate. These bearings are quickly adjusted by simply turning the nut at the lower end of the head which is accessible at all times.

The invention claimed is:—

1. The combination with a drill press head having a vertical opening therethrough, of a driving member above the head, a tubular hub extending from the driving member and much smaller in diameter than the opening in the head through which it extends, ball bearings at the upper and lower ends of the opening through the head interposed between the head and the hub and holding the hub from vertical also horizontal movement, a driving member attached to the hub below the head and adapted by its location to adjust the ball bearings, a drill spindle extending vertically through the hub, and a spindle drive carried by the first mentioned driving member above the head and connecting the said driving member and the spindle so the latter will be rotated by the former but may be independently reciprocated through the former, substantially as specified.

2. The combination with a drill press of a driving member, a hub fixed to said driving member and extending through the head, bearings carried by the head and supporting the hub, a driving member mounted on the hub of said first mentioned driving member, means detachably connecting the said driving members, a spindle extending through the hub, a spindle drive carried by the first mentioned driving member for causing the spindle to rotate with the driving member but allowing it to be independently reciprocated through the driving member, substantially as specified.

3. The combination with a drill press head of a driving member, a hub fixed to said driving member and extending through the head, bearings carried by the head and supporting the hub, a driving member mounted on the hub of said first mentioned driving member, means detachably connecting the said driving members, a spindle extending through the hub, a spindle drive carried by the first mentioned driving member for causing the spindle to rotate with the driving member but allowing it to be independently reciprocated through the driving member, a cap inclosing the spindle drive and having a hub arranged to support the upper end of the spindle, and bearings mounted in the frame for supporting the hub of the cap, substantially as specified.

4. The combination with a drill press head of a gear having a hub that extends through an opening in the head, bearings at the upper and lower ends of the opening through the head and supporting the hub, a vertically movable spindle extending through the gear and its hub, means carried by the gear for causing the spindle to rotate with it, a pulley and a pinion mounted upon the hub of the gear, means for connecting the pulley, with the gear, and back gearing arranged to connect the driving gear and pinion, substantially as specified.

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