C. H. OSLUND.

MULTIPLE DRILL.

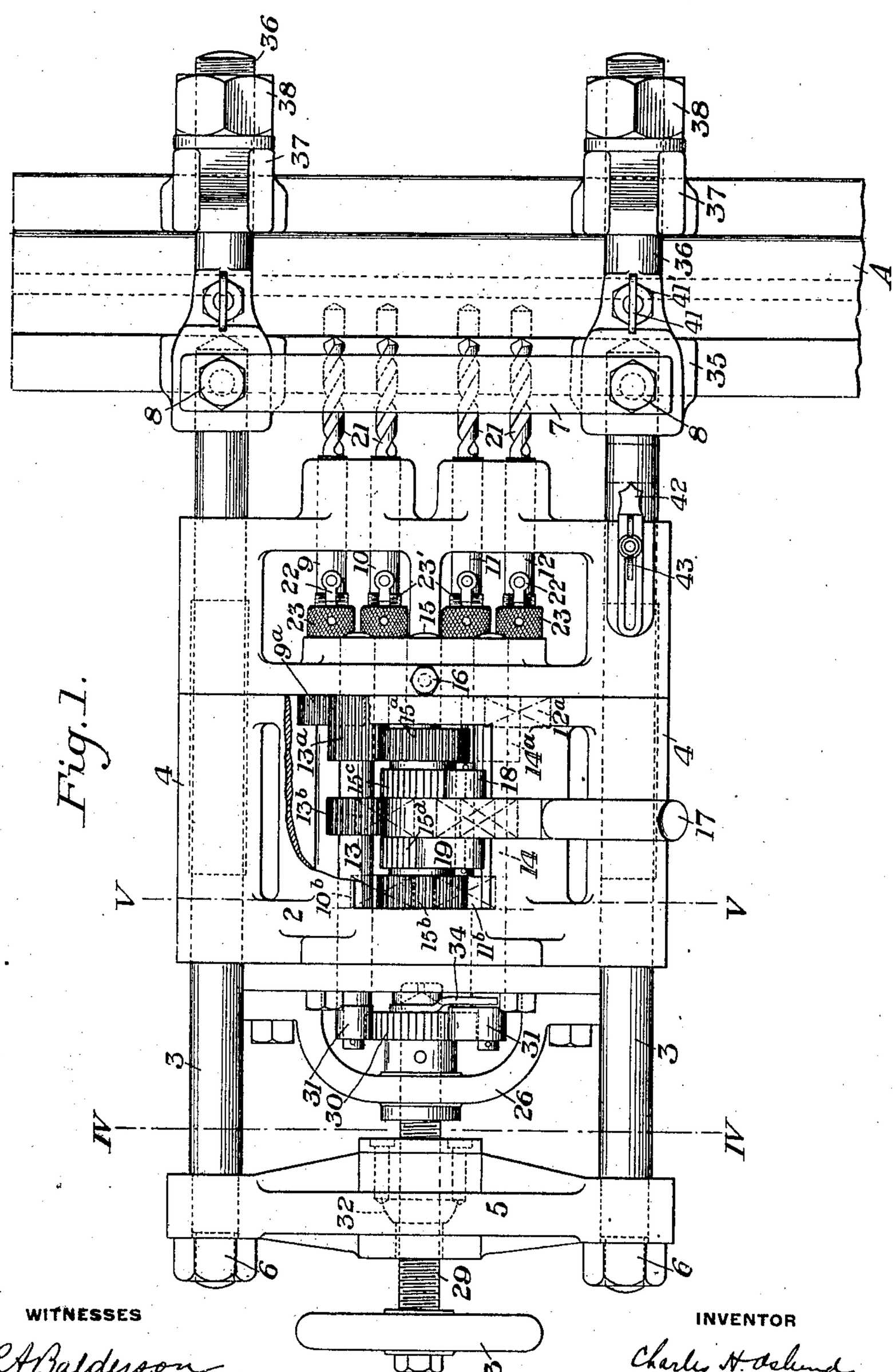
APPLICATION FILED DEC. 26, 1906.

920,080.

Patented Apr. 27, 1909.

5 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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5 SHEETS—SHEET 2.

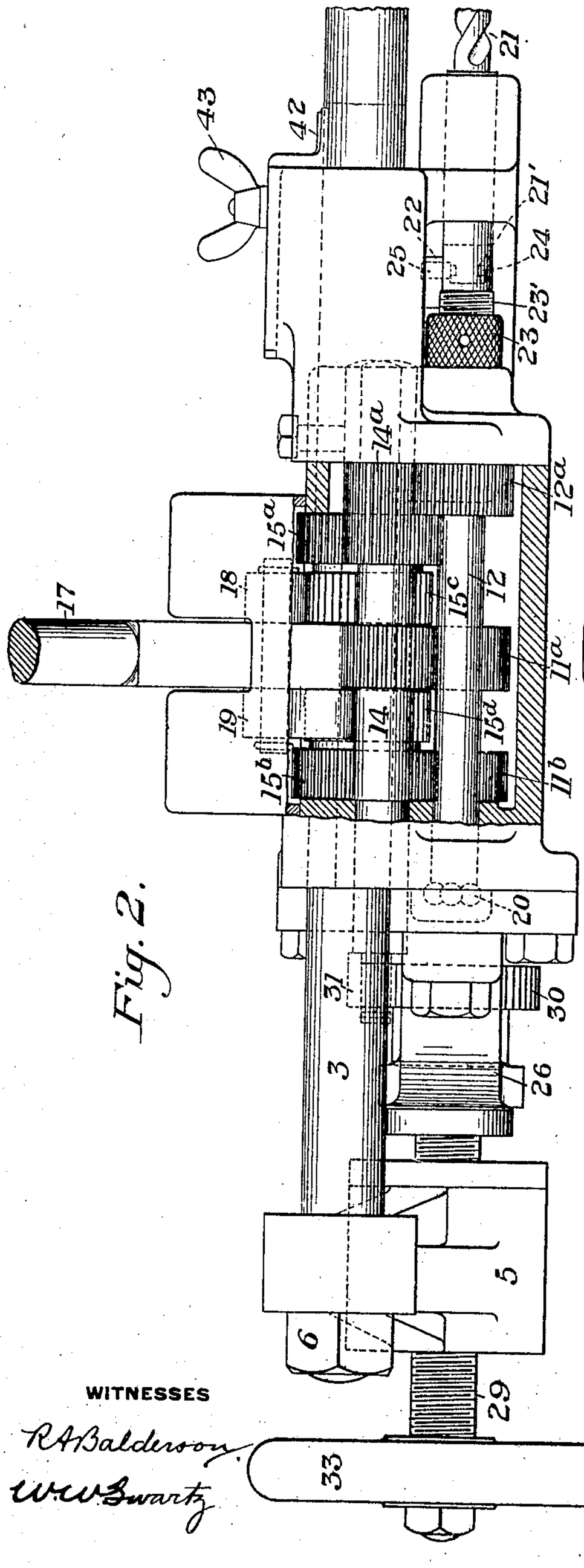

Fig. 2.

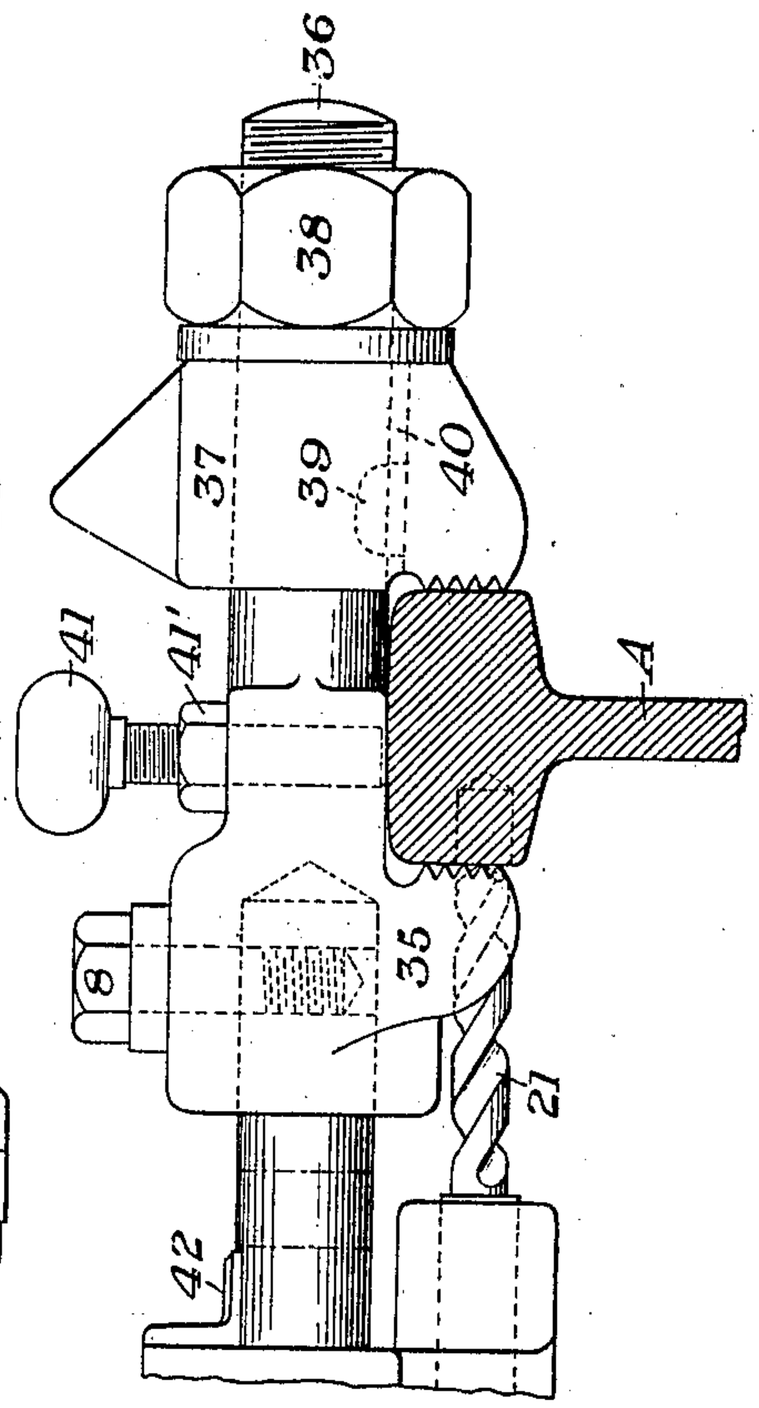

Fig. 3.

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5 SHEETS—SHEET 3.

Fig. 4.

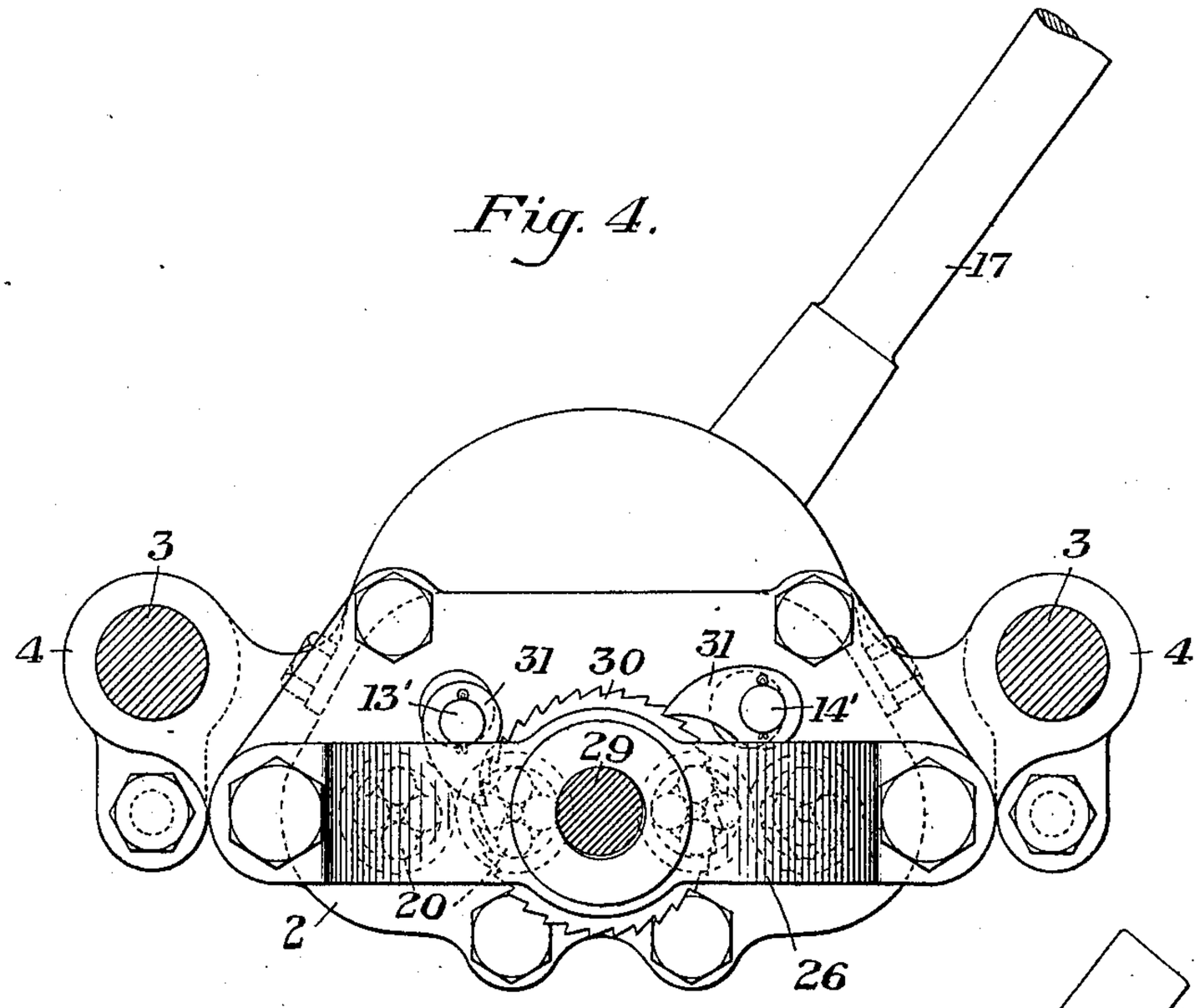
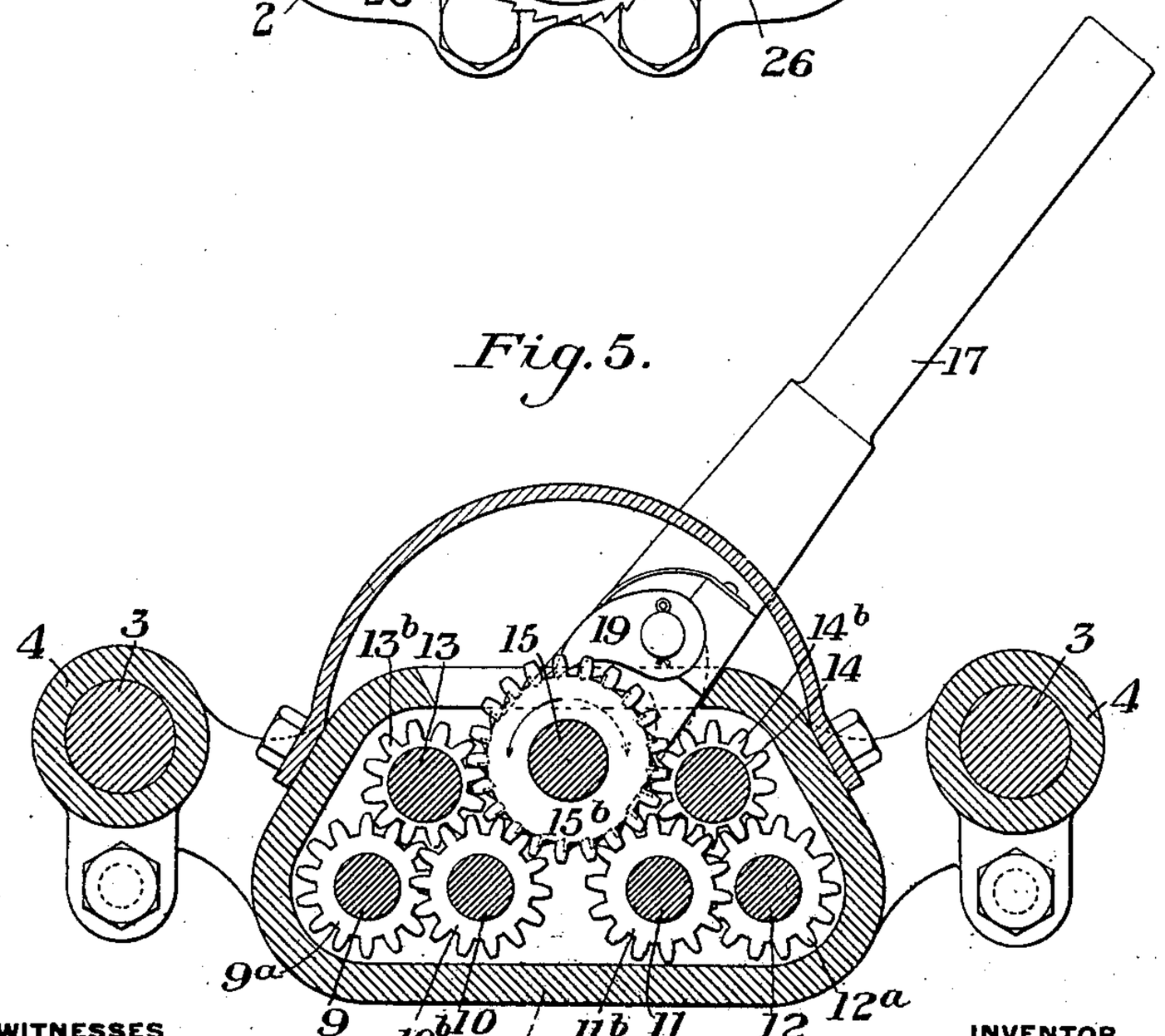


Fig. 5.



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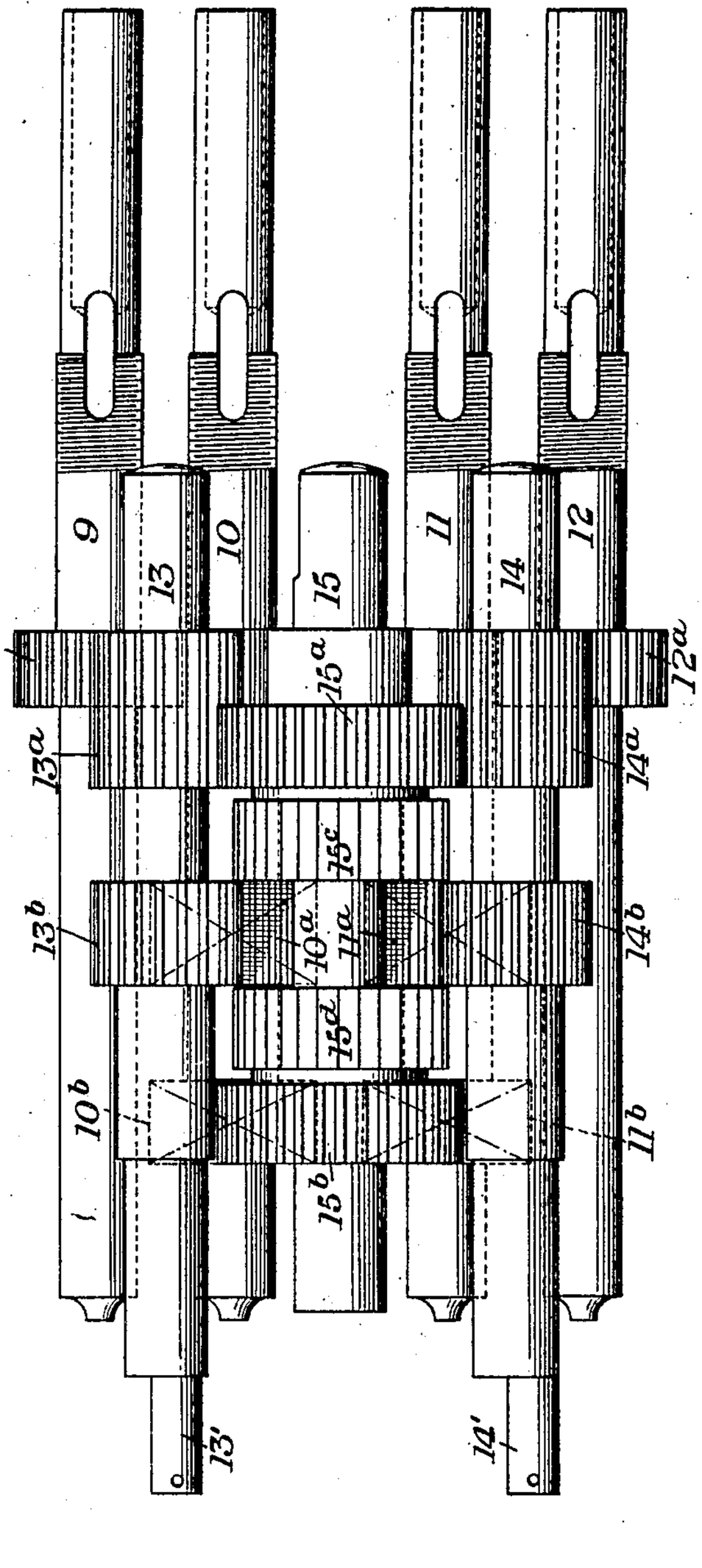
5 SHEETS—SHEET 4.

Fig. 6.



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5 SHEETS—SHEET 5.

Fig. 7.

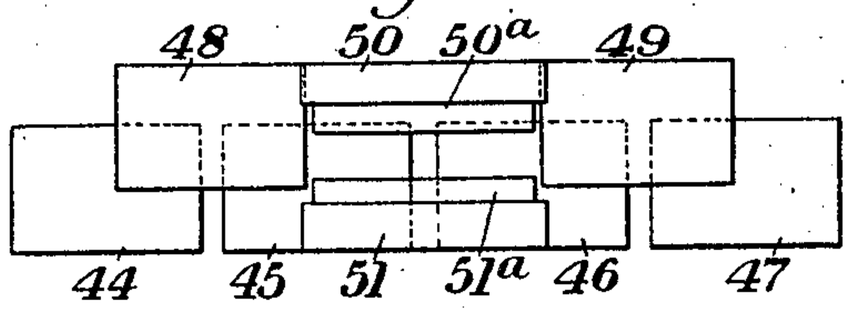


Fig. 8.

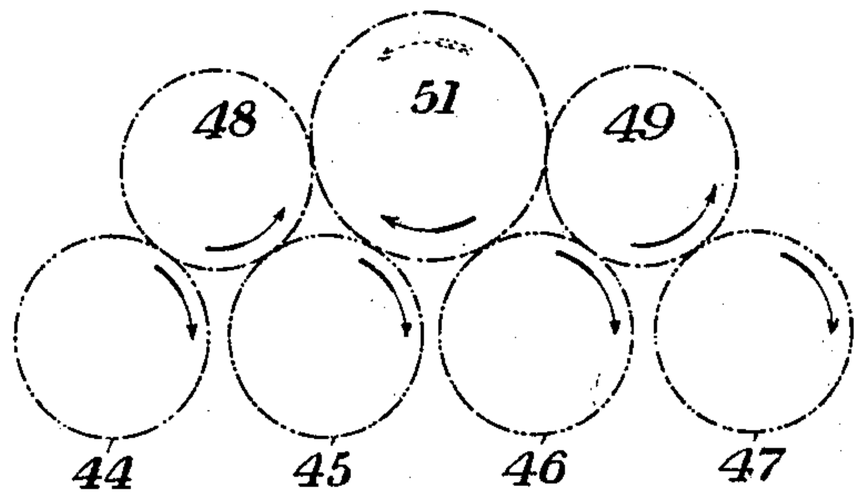


Fig. 9.

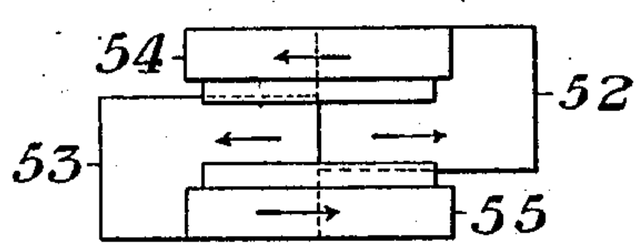
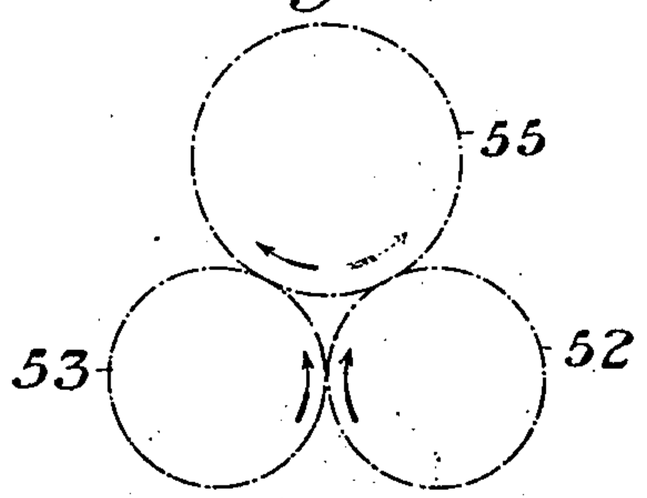


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES H. OSLUND, OF WORCESTER, MASSACHUSETTS.

MULTIPLE DRILL.

No. 920,080. Specification of Letters Patent. Patented April 27, 1909.

Application filed December 26, 1906. Serial No. 349,447.

To all whom it may concern:

Be it known that I, CHARLES H. OSLUND, of Worcester, Worcester county, Massachusetts, have invented a new and useful Multiple Drill, 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 plan view showing a multiple spindle drill constructed in accordance with my invention; Fig. 2 is a side elevation of the same, partly broken away to show the ratchet wheels and gearing; Fig. 3 is a side elevation of a portion of the apparatus showing the rail-clamping device; Fig. 4 is a sectional end view on the line IV—IV of Fig. 1 showing the ratchet feeding mechanism for the spindles and Fig. 5 is a sectional end view on the line V—V of Fig. 1 showing the gearing for rotating the spindles; Fig. 6 is a plan view of the drill spindles and shafts showing the arrangement of the gearing thereon and the relation of the gears with each other; Figs. 7 and 8 are diagrammatic views showing a modification in the arrangement of the gearing for a four spindle machine and Figs. 9 and 10 are similar diagrammatic views showing the arrangement of the gearing for a single spindle machine.

My invention relates to multiple spindle or gang drills and it more particularly relates to hand operated ratchet drills used in drilling holes for terminal stud bonds in the rails of railway track.

The invention further relates to the arrangement of ratchet operated gearing for turning drill spindles on either single or multiple spindle machines.

In the drawings, 2 represents the frame or carriage of the apparatus which is mounted so as to be longitudinally movable on the rods or slides 3, suitable bearings 4 being provided on the frame for this purpose. The outer ends of the rods 3 are secured to the yoke 5 by the nuts 6 and the opposite ends of the rods 3 are connected together by means of the bar or separator 7, this bar being secured to the rods by the bolts 8, these bolts also serving to fasten the rods 3 to the rail clamping device.

Mounted in bearings on the frame 2 are the drill spindles 9, 10, 11 and 12 and also the intermediate driving shafts 13, 14 and the ratchet wheel shaft 15. The drill spindles 9 and 12 have spur gear wheels 9^a, 12^a which are in mesh with and are rotated by the wide faced spur gears 13^a, 14^a located respectively on the intermediate driving shafts 13 and 14. On the spindles 10 and 11 are spur gears 10^a, 11^a which wheels mesh with and are rotated by the spur gears 13^b and 14^b which are also located on the intermediate driving shafts 13 and 14. The spindles 10 and 11 also have spur wheels 10^b and 11^b which are in mesh with and are rotated by the spur gear 15^b formed integral with the ratchet wheel 15^d which turns on the ratchet wheel shaft 15. Also mounted so as to rotate on the shaft 15 is the ratchet wheel 15^c which is formed integral with the spur gear 15^a, the wheel 15^a meshing with and rotating the spur gears 13^a and 14^a on the intermediate shafts 13 and 14. Located on the ratchet shaft 15, which is held in place on the frame 2 and is prevented from turning by the tap bolt 16 is the ratchet lever 17 having the ratchet pawls 18 and 19, which pawls engage with the oppositely facing teeth in the ratchet wheels 15^c, 15^d and cause them to rotate when the hand lever 17 is moved back and forth by the operator.

Each drill spindle is provided on one of its ends with a ball bearing 20 by means of which the friction caused by the end thrust put upon these spindles in the drilling operation is reduced. The outer ends of the spindles have sockets in which sockets the shanks of the drills are inserted. Provision is made for adjusting the drills in their sockets by means of the clamps or keepers 22 which are inserted in the transverse slots extending through the spindles, and which engage with the knurled adjusting nuts 23 on the threaded portion 23′ of each spindle. In order to retain each drill in its spindle and prevent its being withdrawn from the socket by the backward movement of the frame 2 on the slides 3, the drills are provided with grooves or slots 21′ and into these grooves the tongue 24 and set screw 25 on the keeper 22 are inserted after the drill 21 has been placed in its socket in the spindle.

Secured to the outer end of the frame 2 is a bracket bearing 26 and rotatably mounted in this bearing is one end of the threaded feed screw 29 by which the frame 2 is moved longitudinally on the slides 3. On this feed screw 29 is a ratchet wheel 30 which turns the feed screw when the ratchet is actuated by the ratchet pawls 31, 31 located on the ends 13′, 14′ of the intermediate driving shafts 13 and 14.

The outer end of the feed screw 29 projects through the feed screw nut 32 located on the yoke 5 and on the end of this feed screw is a hand wheel 33 by means of which the frame 2 is retracted and is moved forward on its slides 3 when the pawls 31 are thrown out of engagement with the teeth of the ratchet wheel 30 by the plate 34 provided on the feed screw 29 for this purpose. The plate 34 is slightly larger in diameter than the ratchet wheel 30 and is provided with cut away portions 34^a so as to permit the teeth of the ratchet wheels 30 to be engaged with the pawls 31 to turn these wheels when the ratchet feed is in use. The ends of the intermediate shafts 13 and 14 have reduced portions 13′ and 14′ which are eccentric with the axis of its shaft and the feed screw ratchet pawls 31 are located on these eccentric portions of these shafts.

Clamping jaws are provided by means of which the apparatus is secured to the rail to be drilled, the fixed jaws 35 being secured to the slides 3 by the bolts 8. The movable jaws 37 are movably mounted on the extensions 36 on the fixed jaws 35. The extensions 36 have threaded portions on which the nuts 38 turn, to clamp the jaws on the rail A during the drilling operation. To keep the jaws 37 in position on the extensions 36 and prevent their turning with the nuts 38 on the extensions 36, splines or feather keys 39 are placed on these extensions, which engage with the sides of the keyways 40 in the movable clamping jaws.

On each of the clamping jaw extensions 36, is a thumb-screw 41 for the purpose of adjusting the distance from the top of the rail being drilled to the horizontal center line of the drills and the thumb-screws are held in their adjusted position by the locking nuts 41′ on these thumb screws. The depth to which the holes are drilled in the rails is shown by the relation with a suitably located mark on one of the slides 3 of the point of the adjustable indicator 42 which is held in place on the frame 2 by the thumb-screw 43.

In Figs. 7 and 8 a modification in the arrangement of the gearing for a four spindle drill is shown, in which the gears 44, 45, 46 and 47 are located on the drill spindles, the wheels 44 and 45 meshing with the idler wheels 48 on one of the intermediate shafts and the gears 46 and 47 meshing with a similar idler wheel 49 on the other intermediate shaft. The wheels 48 and 49 both mesh with the wheel 50 which is located on the ratchet shaft and is provided with ratchet teeth 50^a. A similar wheel 51 having ratchet teeth 51^a which face in the opposite direction to the ratchet teeth 50^a on the wheel 50 is also located on the ratchet shaft, this wheel 51 meshing with the wheels 45 and 46 and also driving, through the gears 45 and 46 and the idler wheels 48 and 49, the spindle gears 44 and 47.

Figs. 9 and 10 show the gearing as arranged to drive a ratchet drill having a single drill spindle, in which 52 represents the gear wheel which is secured on and causes the spindle to rotate, and 53 is an idler gear meshing and rotating with the spindle gear 52. Mounted on the ratchet shaft on which the hand lever is placed, are the ratchet gears 54 and 55, these wheels having ratchet teeth 54^a, 55^a formed integral with the wheel 54 and wheel 55, the faces of the ratchet teeth facing in opposite directions when the wheels are assembled in place on the ratchet shaft. The spindle gear 52 is in mesh with and is rotated by the ratchet gear 54, when this wheel is caused to move by the ratchet hand lever (not shown) through its ratchet pawl in engagement with the ratchet teeth 54^a on the gear 54. When the hand lever is moved in the opposite direction, a pawl on the hand lever engages with the ratchet teeth 55^a on the gear 55 and in turning the gear 55 which is in mesh with the gear 53 through the gear 53, causes the spindle gear 52 to rotate.

From the above it will be seen that the spindle gear 52 is caused to rotate always in the same direction, by means of a hand lever, having oppositely facing ratchet pawls through the oppositely rotating ratchet wheels 53 and 54 which are in mesh with the gears 52 and 53.

In the operation of the apparatus, the machine is secured to the rails A by means of the clamping jaws 35 and 37. The drills 21 are then inserted in place in the sockets of the spindles 9, 10, 11 and 12 and after being secured in the spindles by the keepers 22, the drills are adjusted lengthwise in the sockets, by means of the knurled adjusting nuts 23 so as to bring the cutting end of each drill in line with the others. The drills are preferably adjusted in their sockets before the machine is secured to the rail to be drilled.

After the drills are adjusted and the apparatus secured in place on the rail, the operator then moves the frame 2 forwardly on the slides 3 by means of the hand wheel 33 on the feed screw 29 until the drills 21 are in contact with the rail A. The hand lever 17 is then moved back and forth on the ratchet shaft 15, and the pawls 18 and 19 on this lever by engagement with the ratchet wheels 15^c and 15^d turn the drills through the connecting gearing. When the hand lever 17 is moved so as to rotate the ratchet wheel 15^c by the pawl 18, the gear 15^a rotates the intermediate shafts 13 and 14 through the gears 13^a, 14^a, located on these shafts. These shafts in turn cause the spindles 9 and 12 to rotate through the spindle gears 9^a and 12^a which are in mesh with the gears 13^a and 14^a. The same movement of the shafts 13 and 14, through the gears 13^b and 14^b, rotates the

spindles 10 and 11 through the spindle gears 10^a and 11^a. When the lever 17 is moved in the opposite direction the pawl 19 engages with the teeth in the ratchet wheel 15^d and through it rotates the gear 15^b. The wheel 15^b meshes with and rotates the gears 10^b and 11^b on the spindles 10 and 11.

When the spindle gears 10^b and 11^b are moved by the wheel 15^b, the spindles 10 and 11 by means of the gears 10^a and 11^a which are in mesh with the gears 13^b, 14^b cause the shafts 13 and 14 to rotate, these shafts through the gears 13^a and 14^a in turn rotating the spindle gears 9^a and 12^a and through them the spindles 9 and 10.

As the intermediate shafts 13 and 14 are turned in the drilling operation, the ends 13′ and 14′ of these shafts which are reduced eccentrically to the axis of the shaft, cause the pawls 31, 31′ to reciprocate, and these pawls by engagement with the teeth in the ratchet wheel 30 automatically turn the feed screw 29 in the feed screw nut on the yoke 5 so as to positively feed the frame 2 forward on the slides 3. When it is desired to throw the pawls 31, 31 into their inoperative position, the plate 34 is moved on the screw 29 so as to shift the position of the cut-away portions 34^a and bring the edge of this plate into engagement with and lift the pawls and hold them in their inoperative position. When this is the case, the frame 2 must be moved on the slides 3 by means of the hand wheel 33 by the operator.

The advantages of my invention will be apparent to those skilled in the art. By means of my invention, a ratchet drill having one or more spindles is provided, in which the drill is actuated by each forward and each backward stroke of the hand lever. By the use of the gearing as shown the spindles of a multiple drill can be located so as to permit holes being drilled very closely together at one operation. The mechanism is simple and is easily kept in repair.

Variations in the construction and arrangement of the parts may be made within the scope of my invention. The number of spindles employed may be changed, as the apparatus is adapted for use on one or more spindles and other changes may be made without departing from my invention.

I claim:—

1. A multiple spindle drill comprising a plurality of drill spindles, a driving shaft having gear connections with part of said spindles, a ratchet shaft, a ratchet wheel on the ratchet shaft having gear connections with the driving shaft, a second ratchet wheel on said ratchet shaft having gear connection with the remainder of said drill spindles and an oscillating lever on the ratchet shaft having pawls for actuating the ratchet wheels in opposite directions to rotate the spindles; substantially as described.

2. A multiple spindle drill comprising a plurality of drill spindles, a driving shaft having gear connections with part of said spindles, a ratchet shaft, a ratchet wheel on the ratchet shaft having gear connections with the driving shaft, a second ratchet wheel on said ratchet shaft having gear connection with the remainder of said drill spindles and an oscillating lever on the ratchet shaft having pawls for actuating the ratchet wheels in opposite directions to rotate the spindles, a feed screw for longitudinally moving the spindles and means operated by the driving shaft for turning said feed screw; substantially as described.

3. A multiple spindle drill having a plurality of drill spindles, a driving shaft having gear connection with one of said spindles, a ratchet shaft, a ratchet wheel rotating on the ratchet shaft having gear connection with the driving shaft, a second ratchet wheel rotating on said ratchet shaft having gear connection with another of said spindles, an oscillating lever on the ratchet shaft having pawls for actuating the ratchet wheels in opposite directions to rotate the spindles, a feed-screw for moving the spindles longitudinally, a ratchet wheel on said feed-screw, pawls operated by the driving shaft for rotating said feed screw, and a hand wheel by which said feed-screw may be rotated to advance and retract said spindle independently of the ratchet wheel on said feed-screw; substantially as described.

4. A multiple spindle drill comprising a plurality of drill spindles, a driving shaft having gear connections with the spindles, a ratchet shaft, a ratchet wheel on the ratchet shaft having gear connections with the driving shaft, a second ratchet wheel having gear connections with the spindles and means on the ratchet shaft for actuating said ratchet wheels and driving said spindles; substantially as described.

In testimony whereof, I have hereunto set my hand.

CHARLES H. OSLUND.

Witnesses:

CHAS. R. STURDEVANT,

WM. A. BACON.