

No. 797,924.

PATENTED AUG. 22, 1905.

J. D. SMITH.
TIRE BOLT WRENCH.
APPLICATION FILED AUG. 27, 1904.

2 SHEETS—SHEET 1.

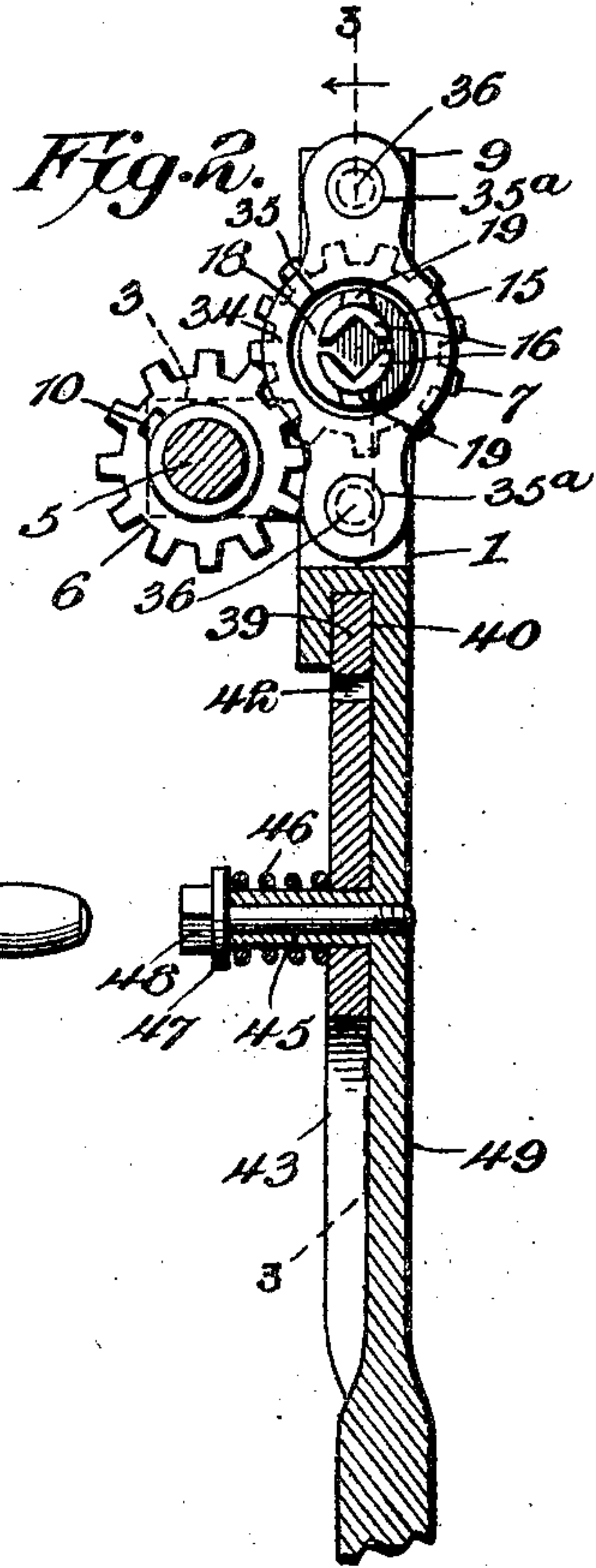
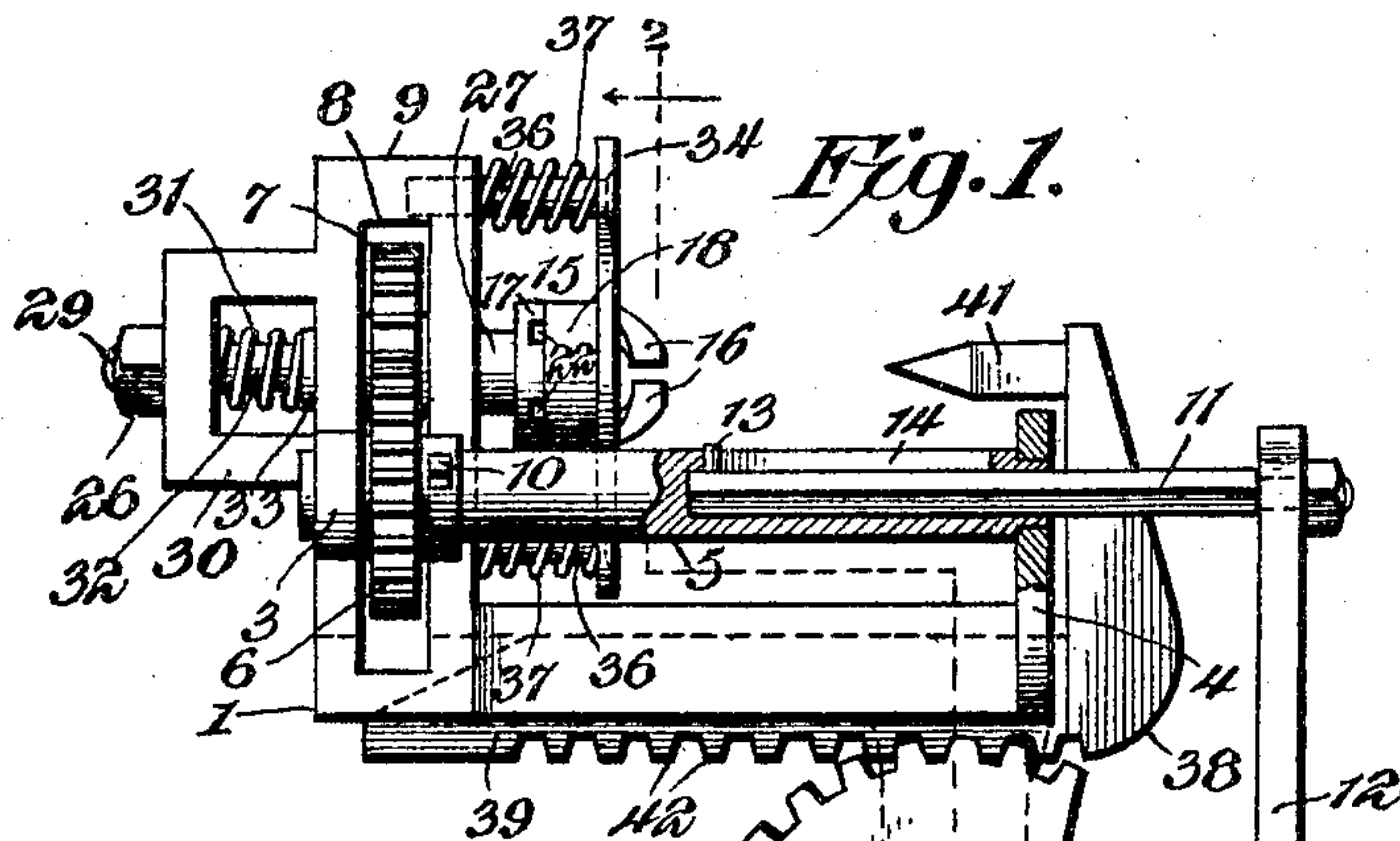


Fig. 10.

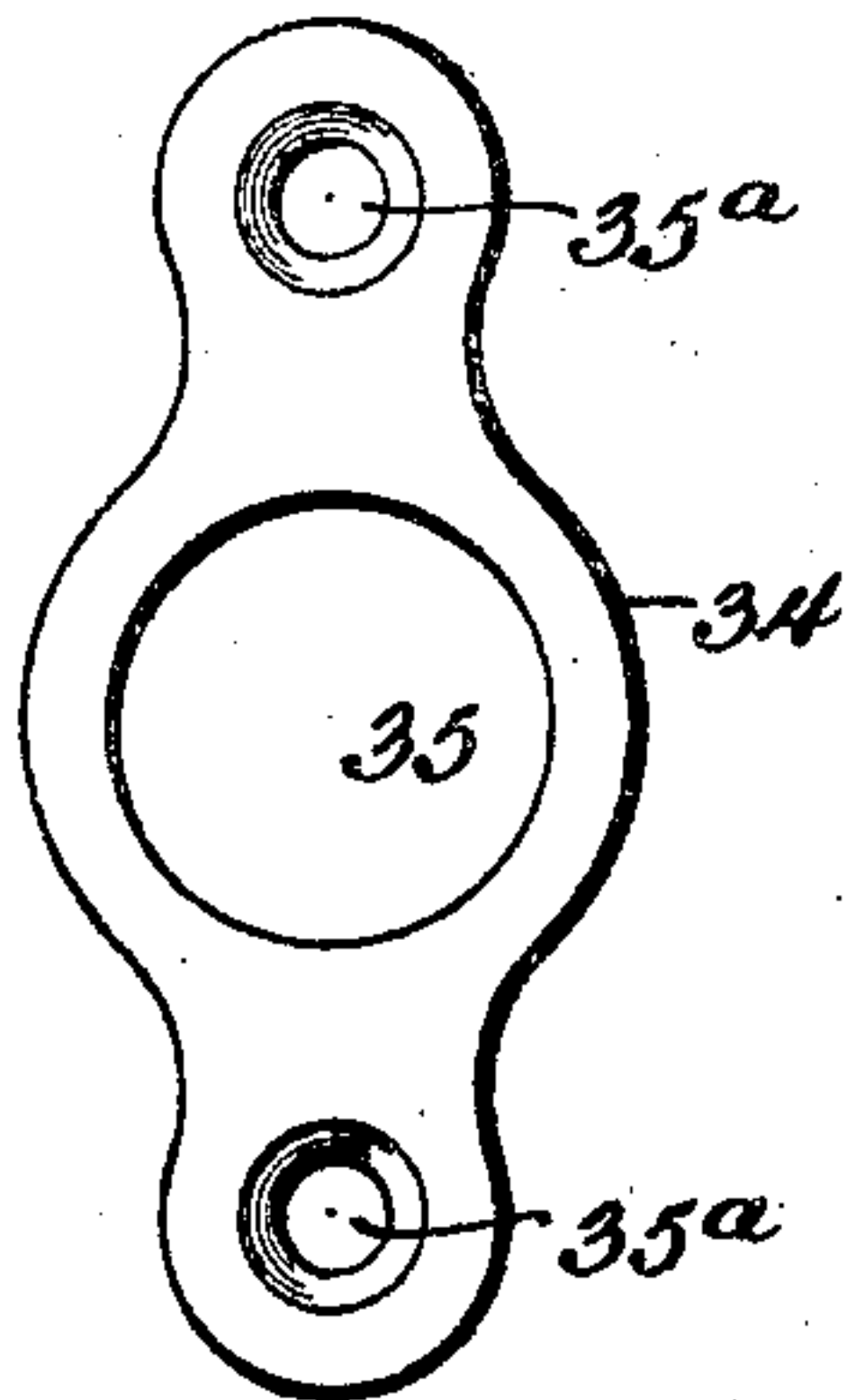


Fig. 5.

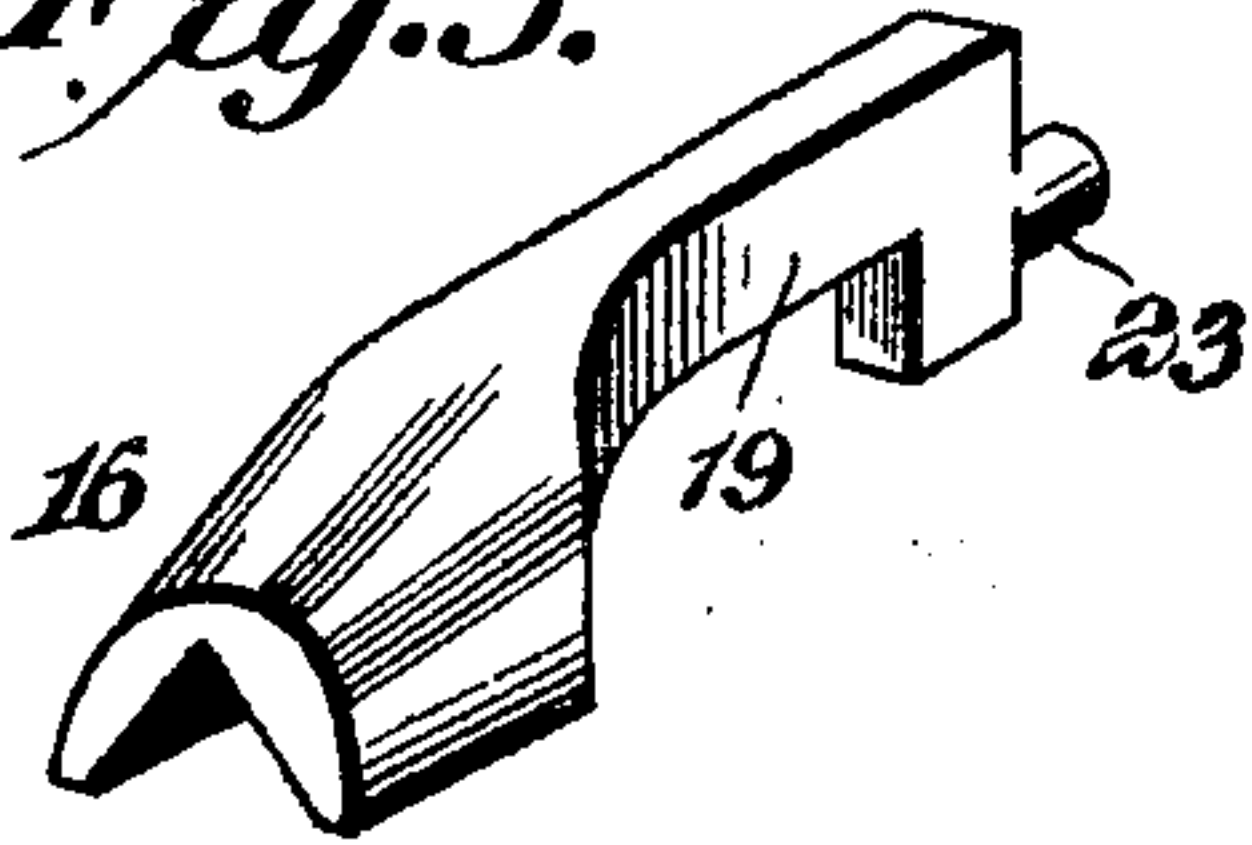
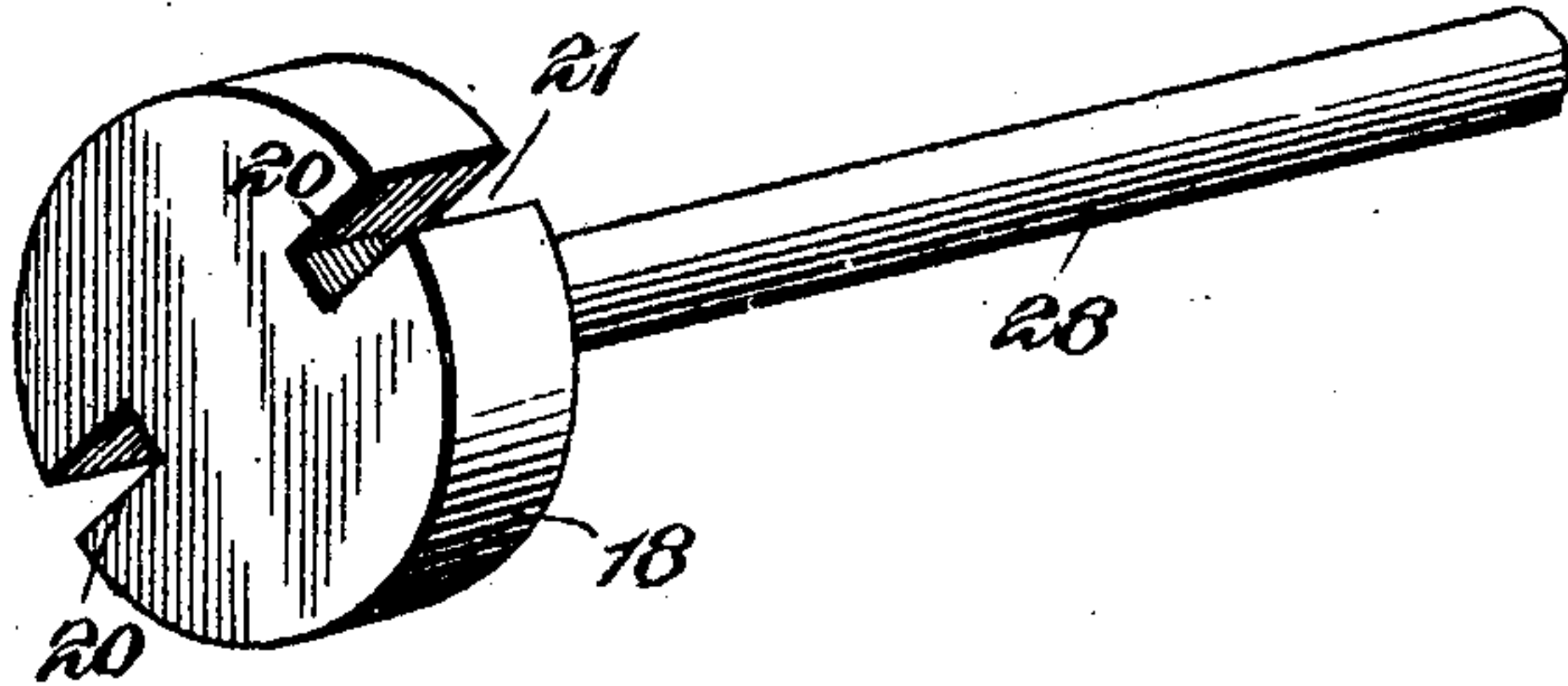


Fig. 9.



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2 SHEETS—SHEET 2.

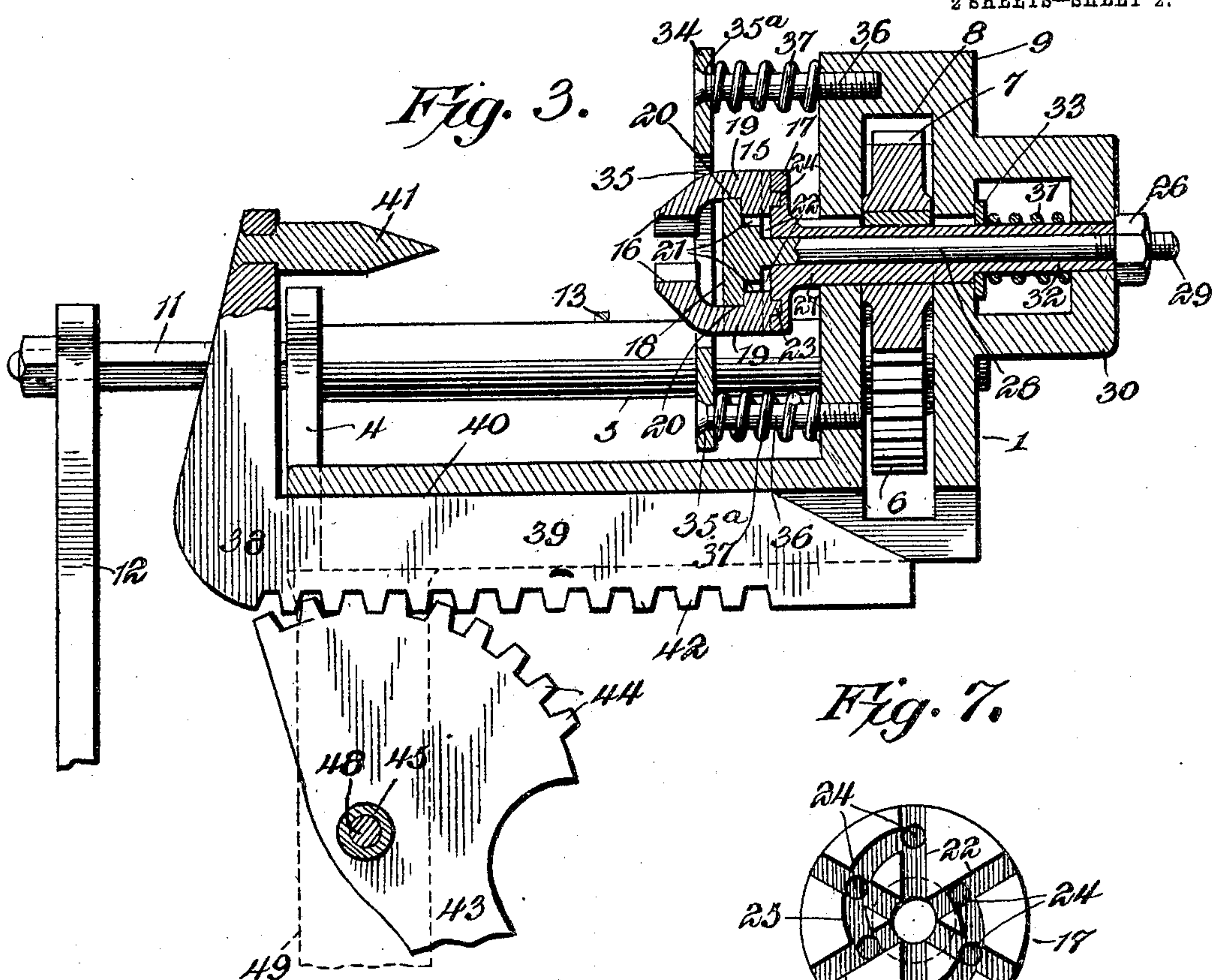


Fig. 7.

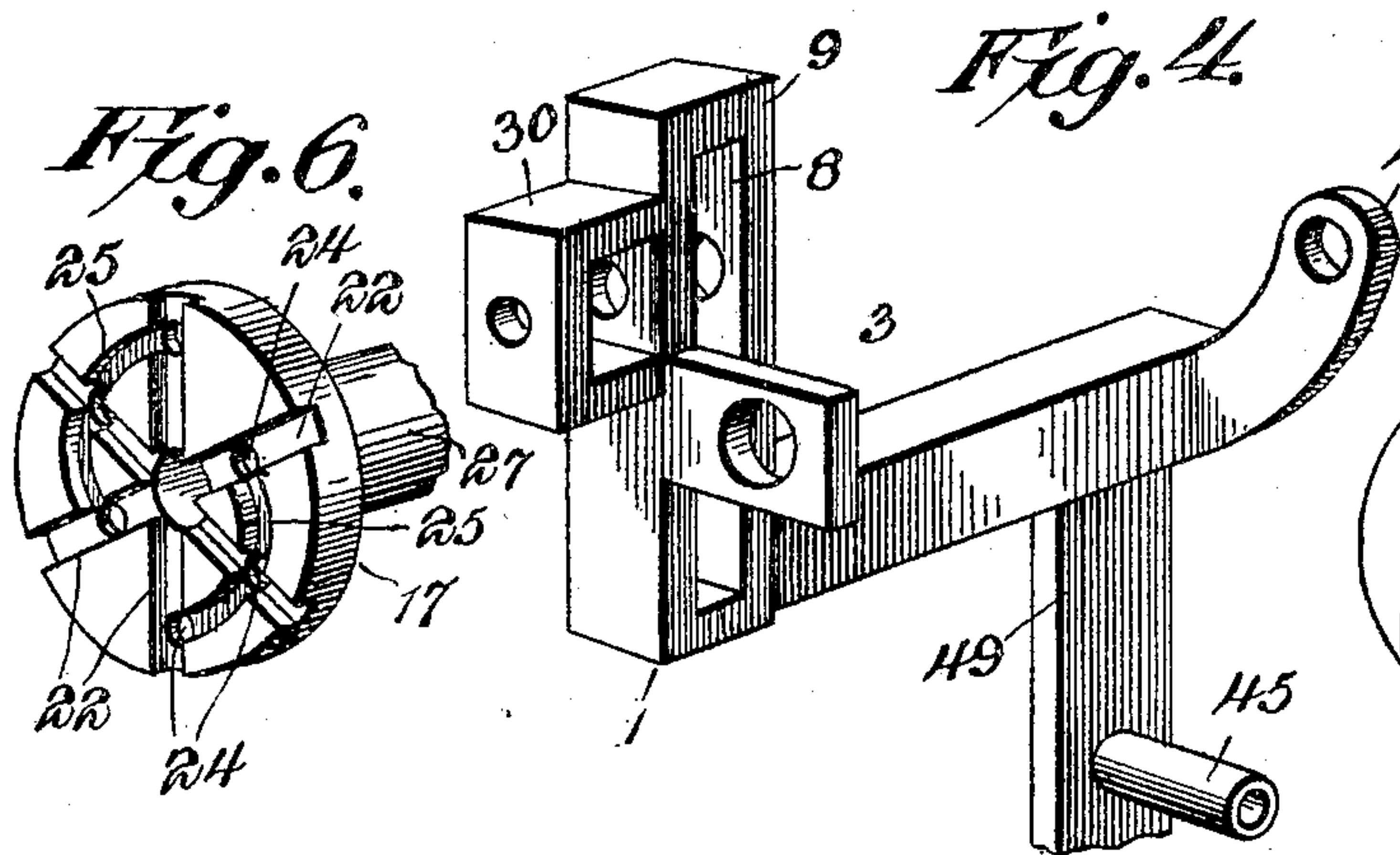
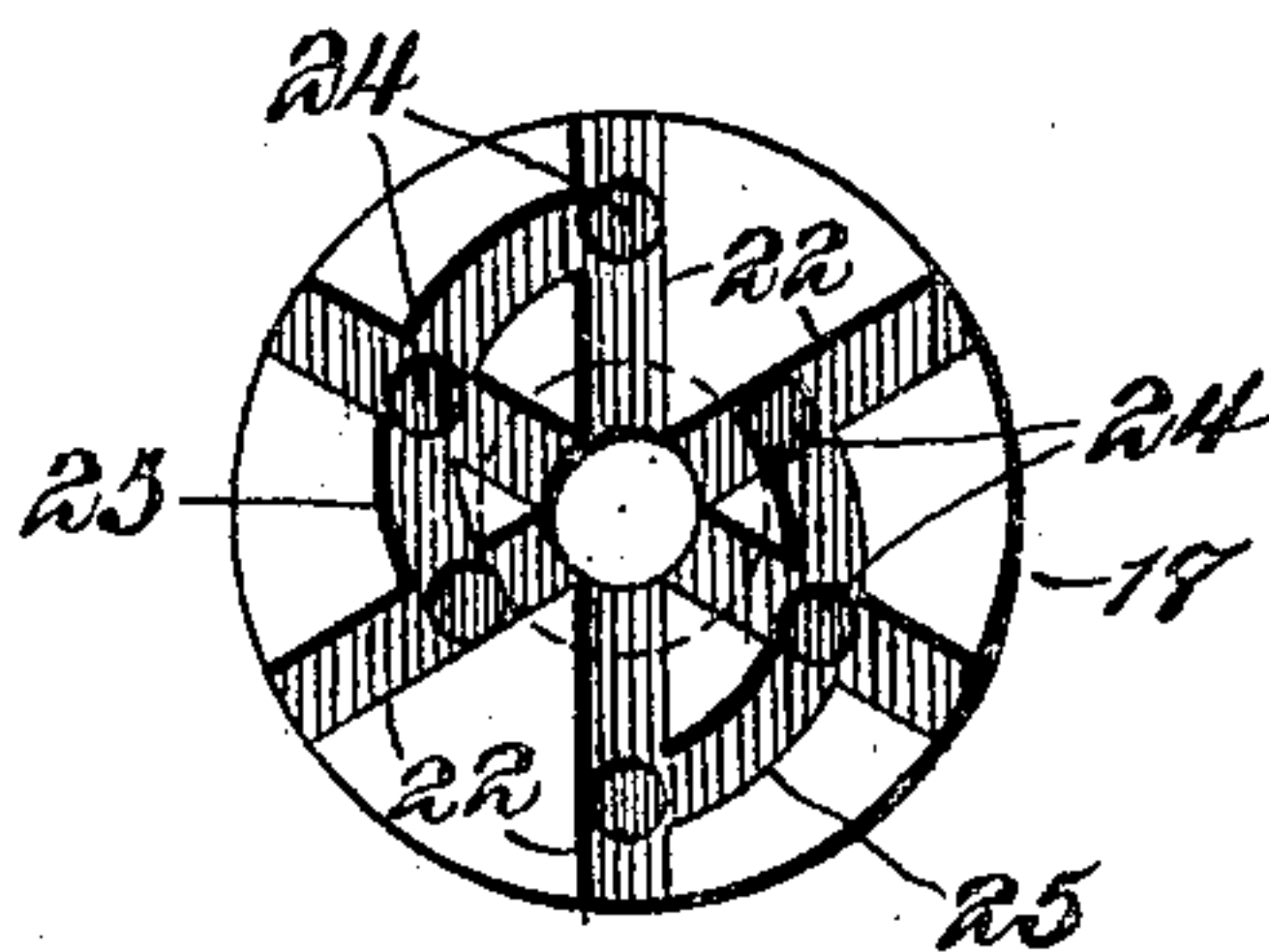
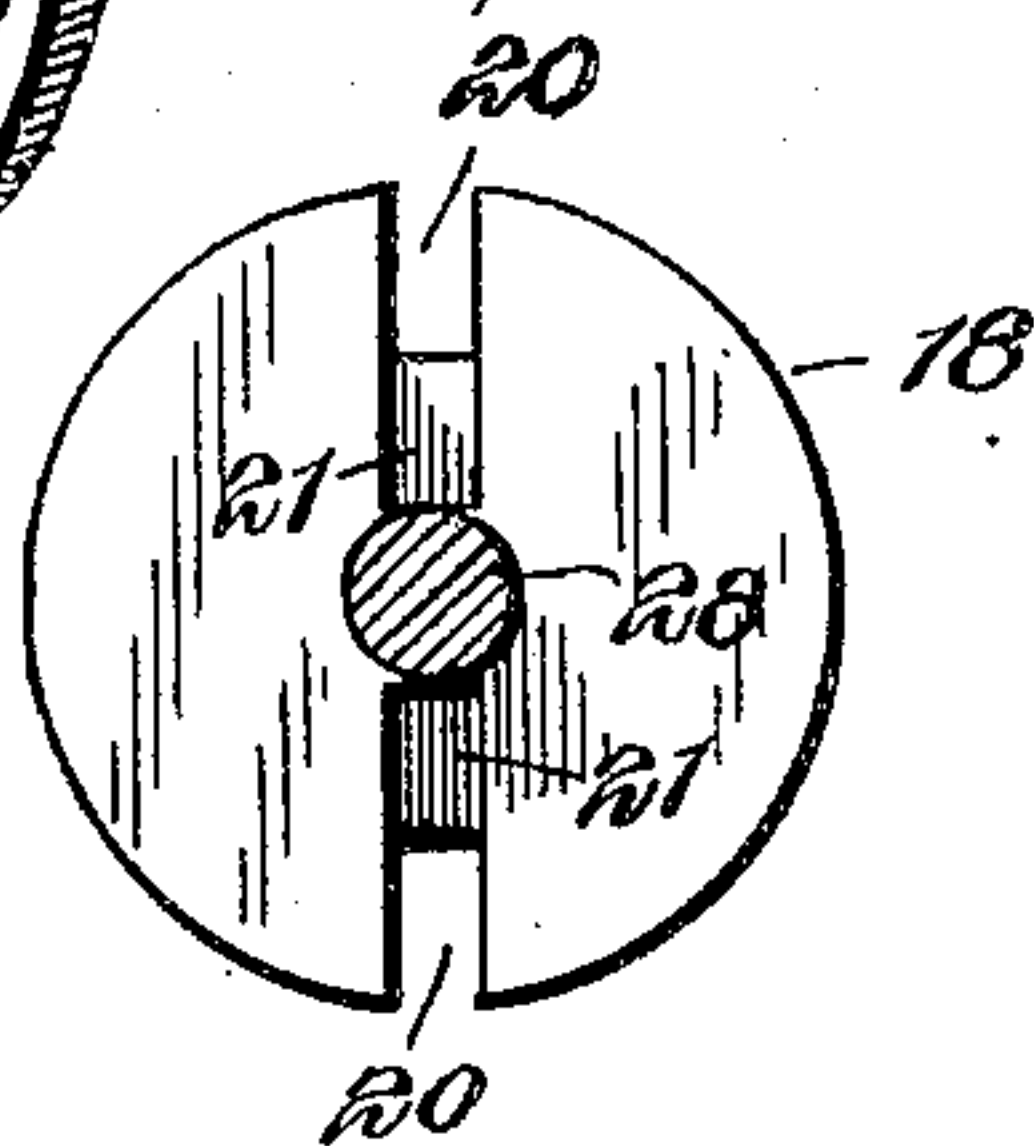


Fig. 4.

Fig. 8.



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UNITED STATES PATENT OFFICE.

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TIRE-BOLT WRENCH.

No. 797,924.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed August 27, 1904. Serial No. 222,468.

To all whom it may concern:

Be it known that I, JAMES D. SMITH, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented a new and useful Tire-Bolt Wrench, of which the following is a specification.

The invention relates to improvements in tire-bolt wrenches.

The object of the present invention is to improve the construction of tire-bolt wrenches and to provide a simple and comparatively inexpensive wrench of great strength and durability adapted to be quickly applied to a wheel and capable of readily engaging the nut of a tire-bolt whether the same be embedded in the felly or projecting therefrom.

A further object of the invention is to provide a tire-bolt wrench which can be conveniently held and operated and which will be capable of ready adjustment for enabling it to engage nuts of different sizes.

With these and other objects in view the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size, and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a plan view, partly in section, of a tire-bolt wrench constructed in accordance with this invention. Fig. 2 is a longitudinal sectional view taken substantially on the line 2 2 of Fig. 1. Fig. 3 is a sectional view taken substantially on the line 3 3 of Fig. 2. Fig. 4 is a detail perspective view illustrating the construction of the frame of the machine. Fig. 5 is a detail view of one of the adjustable jaws of the wrench-head. Figs. 6 and 7 are detail views illustrating the construction of the inner clamping member of the wrench-head. Figs. 8 and 9 are detail views of the outer clamping member of the wrench-head. Fig. 10 is a detail view of the felly-engaging plate or member.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 designates a frame approximately L-

shaped in plan view to enable it to be placed in position at the rim of a wheel and constructed of suitable metal. The frame is provided at its ends with projecting bearings 3 and 4 for the reception of a crank or operating shaft 5, which carries a spur-gear 6, and the latter meshes with a spur-gear 7, which operates in an opening 8 of the projecting portion 9 of the frame. The gear 8 operates a rotary wrench-shaft, as hereinafter explained, and the two gears may be of any desired size to secure the requisite speed and power. The gear or pinion 6, which is arranged contiguous to the bearing 3, is provided with a projecting hub portion having a set-screw 10 for engaging the crank or operating shaft; but it may be fixed to the same in any other desired manner, as will be readily understood. The operating or crank shaft is preferably provided with a longitudinal bore, square in cross-section, to receive a slidable section or member 11, to the outer end of which is secured a crank-handle 12, by means of which the shaft 5 is rotated; but any other suitable operating device may be employed. Also the bore or opening of the shaft 5 and the section or member 11 may be of any other desired configuration. The outward movement of the section or member 11 is limited by a pin 13, operating in the longitudinal slot 14 of the crank 5; but any other suitable means may be employed for this purpose.

The portion 9 of the frame is adapted to extend between the spokes of a wheel for enabling the rotary wrench-head 15 to engage a tire-bolt nut at the inner face of the rim. The wrench-head comprises a pair of adjustable nut-engaging jaws 16 and inner and outer clamping sections or members 17 and 18, which are adapted to hold the nut-engaging jaws in their adjustment. The nut-engaging jaw, which is substantially V-shaped at its engaging end to receive the corner of a nut, is provided with a substantially L-shaped shank 19, extending through a slot 20 of the outer clamping section or member and engaging a groove or recess 21 at the inner face thereof and a groove 22 of the inner clamping section or member. The outer clamping section or member is provided at diametrically opposite points with the slots 20 and the grooves 21, which extend inward toward the center of the clamping section or member, as clearly shown in Fig. 8 of the drawings. The grooves

22 of the inner section or member are disposed radially, as clearly shown in Figs. 6 and 7, and are arranged at regular intervals. The shank is provided at a point between the ends of its arm with a projecting lug 23, adapted to engage a socket 24 of the inner clamping section or member. The sockets 24 are arranged in a series at opposite sides of the clamping section or member, the sockets being located at different distances from the center for holding the jaws at different adjustments. The inner section or member is provided with opposite cam-grooves 25, disposed eccentrically and adapted to guide the studs of the shanks from one socket to another. In adjusting the jaws of the wrench-head the sections are slightly separated to enable the arms of the shanks to disengage the radial grooves of the inner clamping member. The inner clamping member is then partially rotated to bring the desired sockets in alinement with the studs of the shanks, and the cam-grooves move the shanks inward or outward. When the jaws have been properly adjusted, the clamping members are fitted together and are secured by a nut 26. The inner clamping member is fixed to a tubular shaft or sleeve 27, on which the gear 8 is mounted, and the outer clamping section or member is provided with a stem 28, which extends through the sleeve and which is threaded at its outer end 29 to receive the nut 26. The nut 26 fits against the adjacent end of the sleeve and is adapted to hold the clamping sections or members firmly in engagement with the shanks of the jaws. By this construction the parts of the wrench-head are rigidly connected and are adapted to operate on the nut of a tire-bolt. The frame is provided at the arm 9 with a projecting loop 30, in the opening of which is arranged a coiled spring 31, mounted on a reduced portion 32 of the sleeve and engaging a washer 33, which fits against the shoulder formed by such reduction. The coiled spring is interposed between the washer and the outer end of the loop 30 and is adapted to hold the wrench-head and the wrench shaft or sleeve in an extended position beyond a yieldably-mounted felly-engaging plate or member 34. The yieldably-mounted tubular wrench shaft or sleeve is slidably connected with the gear 8, preferably by means of a feather or key; but any other means may be employed, as will be readily understood.

The felly-engaging plate or member 34 is provided with a central opening 35 for the passage of the wrench-head, and it is provided at its ends at opposite sides of the wrench-head with apertures 35^a for the reception of guides 36, consisting of screws mounted in threaded sockets or openings of the projecting portion 9 of the frame. The screws or bolts guide and support the felly-engaging plate or member and have coiled springs 37 disposed on them for holding the felly-engag-

ing plate or member yieldably in engagement with a felly.

The device is provided with a slidable bolt-holder 38, cooperating with the felly-engaging means of the frame to form a clamp and consisting of a substantially L-shaped bar or member having its arm 39 arranged in a groove or way 40 of the frame. The other arm is arranged at the outer end of the frame and is provided with a bolt-engaging tool 41, suitably secured to the L-shaped bar or member and disposed opposite the rotary wrench-head. The bolt-engaging tool is oppositely beveled to provide a chiseled edge to enable it to engage a bolt having either a grooved or smooth head. The arm 39, which slides in the way, is provided at intervals with teeth 42, forming a rack and arranged at the outer edge of the said arm 39 in position to be engaged by a lever 43, which is provided with a curved series of teeth 44, as clearly shown in Figs. 1 and 3 of the drawings. The rack is of greater length than the curved series of teeth 44, and the slidable member 38 is adjustable by disengaging the lever from it. The lever is fulcrumed on a hollow or tubular stud 45 and is engaged by a coiled spring 46, which holds the lever normally in position for actuating the slidable member 38. The outer end of the spring fits against a washer 47, arranged on a bolt or screw 48, which passes through the tubular stud 45 and engages threads of a handle 49. The handle 49 extends from the frame and carries the stud 45. The lever and the handle are adapted to be gripped simultaneously for holding the device and for causing the slidable member to engage the head of a bolt. When a wheel is arranged horizontally, the device will be introduced between the spokes from the top with the handle and the lever in an upright position. The crank will lie beyond the wheel. The handle and the lever extend outward from the frame substantially at right angles to the operating-shaft, and by this arrangement the device may be conveniently held in the left hand and operated with the right hand.

The device is adapted for both screwing nuts on tire-bolts and removing them therefrom, and the rotary wrench-head is adapted to be adjusted to fit nuts of different sizes in order that the wrench may operate on various kinds of vehicles.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a wrench of the class described, the combination of a frame having yieldable felly-engaging means and provided with a handle, bolt-engaging means having an operating-handle located adjacent to the said handle, said bolt-engaging means cooperating with the felly-engaging means of the frame to form a clamp, and rotary nut-engaging means carried by the frame.

2. In a wrench of the class described, the combination of a frame, a rotary wrench-head, means for operating the wrench-head, a slidable bolt-engaging member having a rack, and an operating-lever having a curved series of teeth, said series being of a length less than the rack, and the lever being movable laterally of the rack to engage it with and disengage it from the same.

3. In a wrench of the class described, the combination of a frame, a rotary wrench-head, means for operating the wrench-head, a slidable bolt-engaging member having a rack, an operating-lever having a curved series of teeth, said series being of a length less than the rack, and the lever being movable independently of the rack to engage and release the same, and a spring engaging the lever and yieldably holding the same against movement independently of the bolt-engaging member.

4. In a wrench of the class described, the combination of a frame, provided with a groove or way, a rotary wrench-head, a bolt-engaging member having an arm slidable in the groove or way and provided with a rack, an operating-lever having a curved series of teeth meshing with the rack, a handle fixed to the frame and having a hollow stud forming a pivot for the lever and permitting the latter to slide in and out of engagement with the rack, a spring disposed on the stud and holding the lever normally in engagement with the rack, and means for securing the spring on the stud.

5. In a wrench of the class described, the combination of a frame provided at its ends with rigid parallel arms of unequal length, an operating-shaft mounted on the arms, a wrench-shaft carried by the long arm of the frame, gearing connecting the shafts, and a clamping member slidable on the frame longitudinally thereof and provided with an arm located at and extending beyond the short arm of the frame and provided with means for engaging the head of a bolt.

6. In a wrench of the class described, the combination of a frame, a yieldably-mounted felly-engaging member, a yieldably-mounted wrench-shaft having a wrench-head normally projecting beyond the felly-engaging member, means for operating the shaft, and a bolt-holder.

7. In a wrench of the class described, the combination of a frame provided with opposite guides, a felly-engaging member mounted on the said guides, a yieldably-mounted rotary wrench-head normally projecting beyond the felly-engaging member, and means for operating the wrench-head.

8. In a wrench of the class described, the combination of a frame, a yieldably-mounted felly-engaging member slidable on the frame and having an opening, a rotary wrench-head yieldably mounted and normally projecting through the opening of the felly-engaging

member, and means for operating the wrench-head.

9. In a wrench of the class described, the combination of a frame provided with projecting guide-screws having heads at their outer ends, a felly-engaging member provided with apertures to receive the screws and having an intermediate opening, springs disposed on the screws and engaging the said member, a yieldably-mounted rotary wrench-head normally extending through the opening of the felly-engaging member, and means for operating the wrench-head.

10. In a wrench of the class described, the combination of a frame, an operating-shaft, a tubular wrench-shaft having an inner clamping member, gearing connecting the shafts, a stem extending through the tubular shaft and having an outer clamping member, and adjustable jaws engaged by the said clamping members.

11. In a wrench of the class described, the combination with a bolt-holder, of a rotary wrench-head comprising nut-engaging jaws provided with shanks, and inner and outer clamping members movable toward and from each other and engaging the shanks of the jaws and securing the latter in their adjustment, and means for rotating the wrench-head.

12. In a wrench of the class described, the combination with bolt-holding means, of a rotary wrench-head comprising an inner clamping member provided with a tubular shaft or sleeve, an outer clamping member having a stem extending through the tubular shaft or sleeve and provided with means for engaging the same, and nut-engaging jaws held between the said members, and means for rotating the wrench-head.

13. In a wrench of the class described, the combination with bolt-holding means, of a rotary wrench-head comprising inner and outer clamping members having grooves, one of the members being also provided with sockets located at different points, nut-engaging jaws having shanks fitted in the said grooves and provided with means for engaging the said sockets, means for securing the clamping members in engagement with the shanks of the jaws, and means for rotating the wrench-head.

14. In a wrench of the class described, the combination with bolt-holding means, of a wrench-head comprising opposite clamping members having radial grooves, one of the members being also provided with sockets arranged at different points, jaws having shanks fitted in the grooves and provided with projecting lugs arranged to engage the sockets, and means for securing the clamping members in engagement with the shanks of the jaws, and means for rotating the wrench-head.

15. In a wrench of the class described, the

combination with bolt-holding means, of a rotary wrench-head comprising opposite clamping members having radial slots, one of the members being also provided at different points with sockets and having cam-grooves extending between the sockets, and jaws having shanks fitted in the grooves and provided with lugs for engaging the sockets, said lugs being also arranged to operate in the cam-

grooves, and means for rotating the wrench-head.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES D. SMITH.

Witnesses:

E. M. CORBETT,
S. P. MARSH.