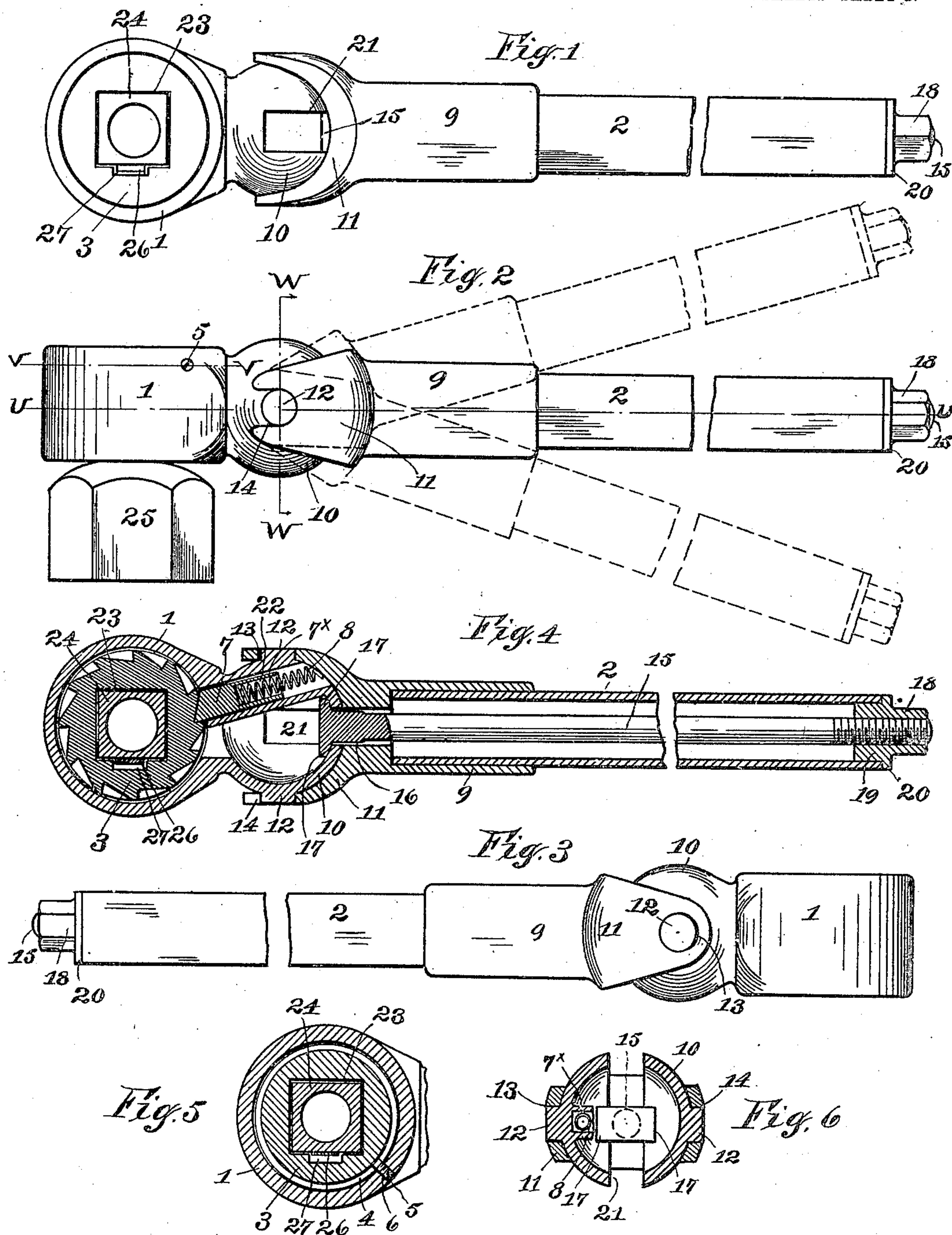


952,436.

C. MILLER.
RATCHET WRENCH.
APPLICATION FILED MAR. 20, 1909.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.



WITNESSES:
Chas. H. Hughes.

Wm. H. Meier, Jr.

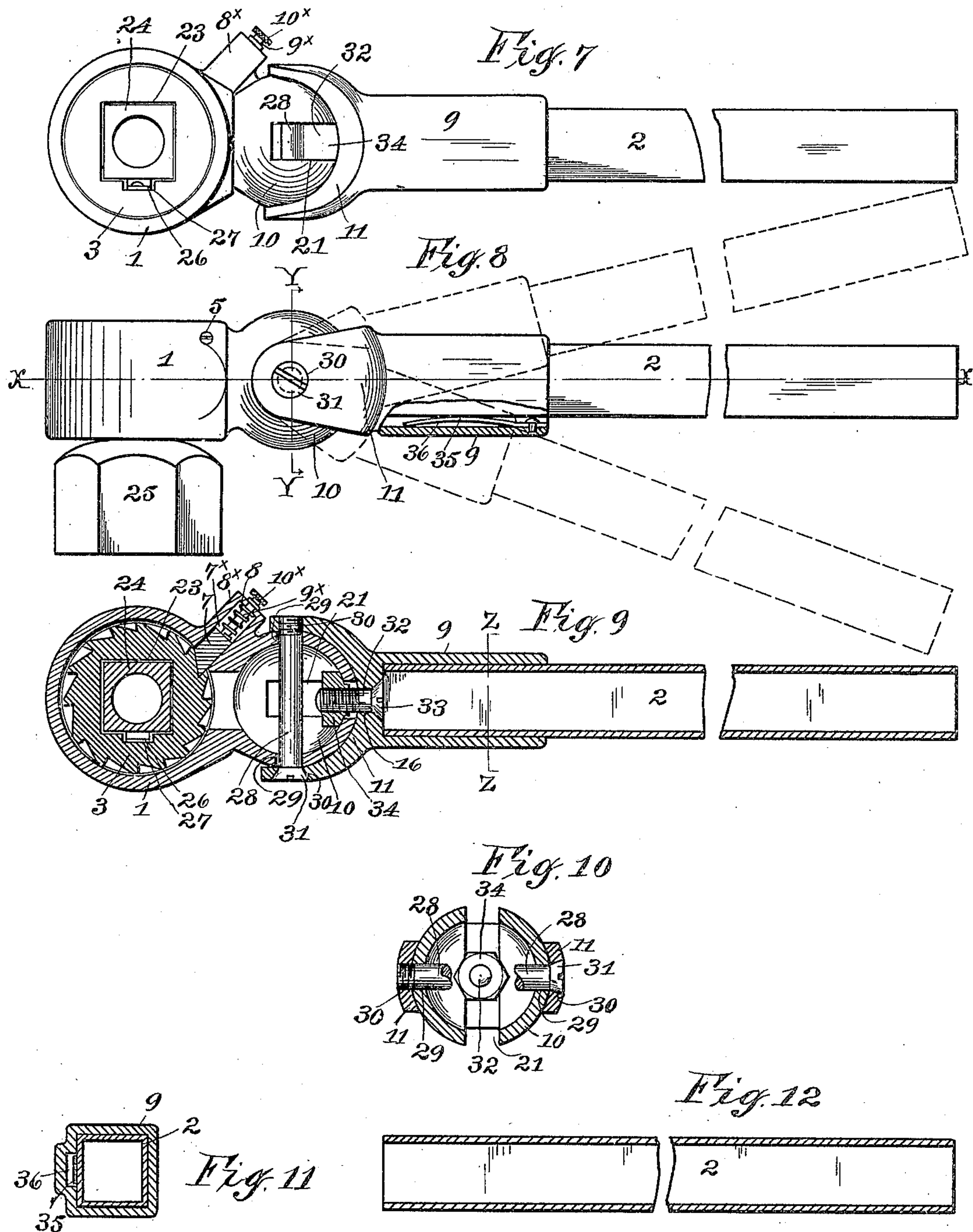
INVENTOR.
Charles Miller
BY E. Laas, Esq.
ATTORNEYS.

952,436.

C. MILLER.
RATCHET WRENCH.
APPLICATION FILED MAR. 20, 1909.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 2.



WITNESSES:
Chas. H. Hughes.
J. H. Meier.

INVENTOR.
Charles Miller
BY E. Laas & Co.
his ATTORNEYS:

UNITED STATES PATENT OFFICE.

CHARLES MILLER, OF SYRACUSE, NEW YORK, ASSIGNOR TO C. M. B. WRENCH COMPANY,
OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

RATCHET-WRENCH.

952,436.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed March 20, 1909. Serial No. 484,612.

To all whom it may concern:

Be it known that I, CHARLES MILLER, a citizen of the United States, and resident of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Ratchet-Wrenches, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of ratchet-wrenches which embody a head in which is carried a spring-pressed pawl for actuating a toothed wheel journaled in said head, and an operating handle connected to the head.

The main object of the present invention is to produce a wrench which will permit the handle to be set at different angles to the axis of the ratchet-wheel, in order to allow the handle to clear obstacles which might otherwise interfere with its movement in various locations in which the wrench may be used.

Another object of the invention is to produce a ratchet-wrench that will be simple, strong and durable in construction, very efficient in its action, and at the same time can be used with great convenience and furthermore shall be inexpensive to manufacture.

Other objects will be apparent from the novel arrangement and combination of the component parts of the wrench as hereinafter fully described and set forth in the claims.

In the accompanying drawings Figure 1 is a plan view of the ratchet-wrench embodying my invention; Fig. 2 is a side view showing by dotted lines the adaptability of the handle to be raised and lowered in relation to the head to set the handle at different angles to the axis of the ratchet-wheel; Fig. 3 shows the side of the wrench viewed reverse to that illustrated in Fig. 2; Fig. 4 is a longitudinal section taken on the line —U—U— in Fig. 2; Fig. 5 is a detail longitudinal section view on the line —V—V— and illustrates the manner of supporting the ratchet-wheel in the head; Fig. 6 is a transverse section taken on the line —W—W— in Fig. 2; Fig. 7 is a plan view of a modified form of the wrench; Fig. 8 is a side view of said modified structure;

Fig. 9 is a longitudinal section on the line —X—X— in Fig. 8; Fig. 10 is a transverse section on the line —Y—Y— in Fig. 8; Fig. 11 is a transverse section on the line —Z—Z—; and Fig. 12 is a detail view of the detachable handle.

Like characters of reference indicate like parts in the several views of the drawings.

My improved wrench comprises essentially a head —1— and a handle —2— which are pivotally connected to allow the latter to be swung to various positions so as to stand at different angles to the axis of the usual ratchet-wheel —3— journaled in the head. The said head is composed of cast-metal and is preferably of cylindrical shape and the ratchet-wheel may be sustained therein in any suitable and convenient manner, however, I prefer to form the wheel with an external peripheral groove —4— which engages the inner end of a screw —5— inserted in a correspondingly threaded transverse aperture —6— provided in the head as clearly illustrated in Fig. 5.

The ratchet-wheel —3— is actuated by means of the usual pawl —7— disposed in a channel —7*— provided in the head —1—, said pawl being held in engagement with the wheel by a spiral-spring —8— bearing against the outer end of the pawl.

The handle —2— is hollow and consists preferably of a steel tube formed square in cross-section and it is provided on its connecting end with a correspondingly shaped cast-metal sleeve —9— which may be fastened thereto by providing the parts with a drive-fit or by the well known shrinking process, or the said parts may be otherwise united. At the same time it will be understood that the parts may be made detachable as hereinafter explained. Said sleeve and aforesaid head being provided with a pivotal coupling adapt the parts to be readily disconnected and permit the handle to be set at different angles in relation to the axis of the wheel —3—. This coupling consists of a ball- and socket-joint, the ball-member —10— being formed integral with the cast-metal head and the socket-member —11— formed on the adjacent end of the cast-metal sleeve. The said ball —10— is hollow and preferably formed on its exterior with trunnions —12—12— having their axes dis-

posed at right angles to the axis of the ratchet-wheel. The socket-member is provided at one side with an aperture —13— which is slightly elongated with relation to the length of the sleeve —9—, and at the opposite side of said socket-member is provided a coinciding slot —14— extending through the end of said member. The said aperture —13— and slot —14— are adapted to receive the respective trunnions —12— —12— as shown in Figs. 2, 3, 4 and 6 of the drawings.

To hold the described parts in their connection, I usually provide a rod —15— extending centrally and longitudinally through the handle —2— and sleeve —9— and projecting at one end through an opening —16— in the center of the socket-portion of the sleeve, said projecting end of the rod being formed with oppositely extending lugs —17—17— provided with convex surfaces conforming to and adapted to bear against the interior of the socket as clearly shown in Fig. 4. The opposite or rear end of the said rod —15— is screw-threaded for the reception of a nut —18— which is formed with an annular portion —19—, the diameter of which corresponds with internal dimensions of the hollow square handle to permit the nut to turn therein. Said nut is also formed with a collar —20— by which it is shouldered on the end of the handle. By tightening the nut, the ball —10— is securely held in its socket-member —11— and sufficient friction afforded the contacting surfaces to sustain the handle at required angles to the axis of the ratchet-wheel as clearly illustrated in Figs. 2 and 4. To permit the handle to be swung as shown, I provide the ball —10— with a slot —21— to accommodate the rod —15—.

In the preferred construction of the wrench I form the aforesaid channel —7*— for the pawl in the ball —10— and provide the outer end portion of said pawl with a socket —22— in which one end of the spiral-spring —8— is seated, the opposite end of which spring bears against the socket as clearly shown in Fig. 4. The aforesaid ratchet-wheel is provided with the usual central square opening —23— for the reception of a correspondingly shaped stem —24— which is formed with a socket —25— to receive the nut or other object of like cross-sectional shape which may require turning. It will be understood that the said stem —24— is removable from the ratchet-wheel so as to provide sockets for different sized nuts. The said stem may be retained in the ratchet-wheel in any suitable manner. In the present instance I employ a spring-plate —26— secured at one end in a longitudinal channel —27— in the opening —23—, and which is bent sufficiently to afford a frictional hold on the said stem.

While I prefer to pivotally connect the ball —10— to the socket-member —11— in the manner hereinbefore described, still at the same time it will be seen by reference to Figs. 9 and 10 that instead of providing the ball with trunnions, a screw or pin —28— may be employed for this purpose. In that case I provide the ball with two oppositely disposed apertures —29—29— and provide the socket-member —11— with coinciding round apertures —30—30—. I preferably use a screw in this modified structure and therefore thread one of the apertures —30— of the socket-member accordingly, the other aperture —30— being countersunk for the head —31— of the screw.

In the place of using a screw-threaded rod and nut —18— to effect a frictional engagement of the ball —10— with the socket —11—, a bolt —32— may be employed. This bolt passes through the opening —16— in the center of the socket and is provided with a screw-head —33— on one end seated in a counter-sink of the opening, the opposite end of said bolt being provided with a nut —34— which has its inner face shaped to conform to the interior of the ball. The slot —21— in the ball accommodates the screw to allow the socket-member to turn on the ball and thus permit the handle to be set at various angles to the axis of the ratchet-wheel as before explained. If desired the handle may be inserted removably in the sleeve —9— so as to permit a change in the length of the handle if required or for other reasons. In that case I provide the sleeve with any suitable means for securely retaining the parts in their connection.

The handle-retaining means which I prefer to use consists of a spring-plate —35— secured in a longitudinal channel —36— formed in the sleeve to afford a frictional hold on the handle as clearly shown in Figs. 8 and 11.

When I connect the ball and socket-member as shown in Figs. 7, 8, 9 and 10, the channel —7*— for the pawl —7— is formed in a boss —8*— cast on the head —1—. In this instance the pawl is shortened and formed with a stem —9*— which protrudes from the boss and has its protruding end formed with a thumb-piece —10*—. The spiral spring —8— surrounds the said stem and has one end bearing against the pawl and its opposite end bearing against the closed end of the channel. By providing this thumb-piece —10*— the pawl can be easily retracted to allow the ratchet-wheel to be placed in and removed from the head —1—.

It will be understood that I do not claim in this application, broadly, the pivotal connection between a head and handle consisting of a slotted ball and socket and means

for drawing the ball and socket into frictional contact to sustain the handle in adjusted position, inasmuch as this feature is embraced in the claims in my copending application No. 484,613.

What I claim is:—

1. A wrench of the class described comprising a head, a ratchet-wheel journaled therein, a pawl carried in the head for actuating said ratchet-wheel, a hollow ball formed on the head, a hollow handle provided with the socket having a loose pivotal connection with the ball, and means extending through the socket and into the ball for retaining said parts in frictional engagement as and for the purpose set forth.

2. A wrench of the class described comprising a head formed with a hollow ball, a ratchet-wheel journaled in said head, a pawl in the head for actuating said ratchet-wheel, a hollow handle provided with a socket having a loose pivotal connection with the ball, and screw-threaded means carried by the handle for retaining the ball and socket in frictional engagement for the purpose set forth.

3. A wrench of the class described comprising a head formed with a hollow slotted ball, a ratchet-wheel journaled in the head, a spring-pressed pawl in the head for actuating said ratchet-wheel, a hollow operating handle provided at its attaching ends with a socket having a loose pivotal connection with the ball, and a screw-threaded member disposed centrally and longitudinally in the handle and passing through the socket and through the slot of the ball and provided with means engaging the interior of the ball for retaining the latter in frictional contact with the socket for the purpose set forth.

4. A wrench of the class described comprising a head, a ratchet-wheel journaled in the head, and a spring-pressed pawl in the head for actuating said ratchet-wheel, an operating handle provided with a sleeve formed with a socket portion, a hollow slotted ball formed on the head and seated in the socket, means pivotally connecting said ball and socket portion, a screw-threaded member passing through the center of the socket and slot of the ball and provided with means engaging the interior of the ball to hold the ball in frictional contact with the socket as and for the purpose set forth.

5. A wrench of the class described comprising a head formed with a hollow slotted ball and the ball formed with a channel leading to the head, a ratchet-wheel journaled in the head, a spring-pressed pawl disposed in said channel for actuating said ratchet-wheel, a hollow operating-handle provided on one end with a sleeve formed with a socket-member receiving the aforesaid ball and pivotally connected thereto, said socket-member being provided with a

central opening coinciding with the slot of the ball, a rod extending centrally and longitudinally through the hollow handle and sleeve and projecting through the opening in the socket and through the slot of the ball, and having its projecting end formed with oppositely extending lugs engaging the interior of the ball, the opposite end of said rod being screw-threaded and provided with a nut bearing against the corresponding end of the handle as and for the purpose set forth.

6. A wrench of the class described comprising a head formed with a ball, a ratchet-wheel journaled in said head, a spring-pressed pawl retained in the ball and actuating said ratchet-wheel, said ball being formed with trunnions, an operating-handle provided on its attaching end with a socket-member receiving the ball, said socket-member provided at one side with an elongated opening receiving one of the aforesaid trunnions and at the opposite side with a coinciding slot receiving the other trunnion whereby the handle can be swung into different angles in relation to the axis of the ratchet-wheel, and means for holding the ball in frictional contact with the socket-member for the purpose set forth.

7. A wrench of the class described comprising a head formed with a hollow slotted ball, a ratchet-wheel journaled in the head, a spring-pressed pawl in the ball for actuating said ratchet-wheel, an operating handle provided on its attaching end with a separable sleeve formed with a socket receiving the aforesaid ball, said socket being provided with a central opening coinciding with a slot in the ball, and a screw-threaded member passing through the opening and slot and provided with means engaging the interior of the ball to hold the latter in frictional engagement with the socket as and for the purpose set forth.

8. A wrench of the class described comprising a head provided with a ratchet, a spring-pressed pawl in the head for actuating the ratchet, a member projecting from the side of the head, an operating-handle pivoted loosely to opposite sides of said projecting member, and separable means for effecting a frictional engagement between said handle and member for the purpose set forth.

9. A wrench of the class described comprising a head, a ratchet journaled in the head, a spring-pressed pawl carried in the head for actuating said ratchet, a member projecting rigidly from the head, a handle provided with a member having a loose pivotal connection with the aforesaid member, and separable means carried by the handle for retaining the two members in frictional engagement for the purpose set forth.

10. A wrench of the class described com-

prising a head formed on one side with a
projection, a ratchet journaled in the head, a
spring-pressed pawl in the head for actu-
ating the ratchet, a handle provided on its
5 attaching end with a sleeve having a loose
pivotal connection with opposite sides of
the projection, and a detachable member

within the sleeve operative for effecting a
frictional engagement between the sleeve
and projection for the purpose set forth.

CHARLES MILLER.

Witnesses:

JACOB R. BUECHELEY,
M. LAASS.