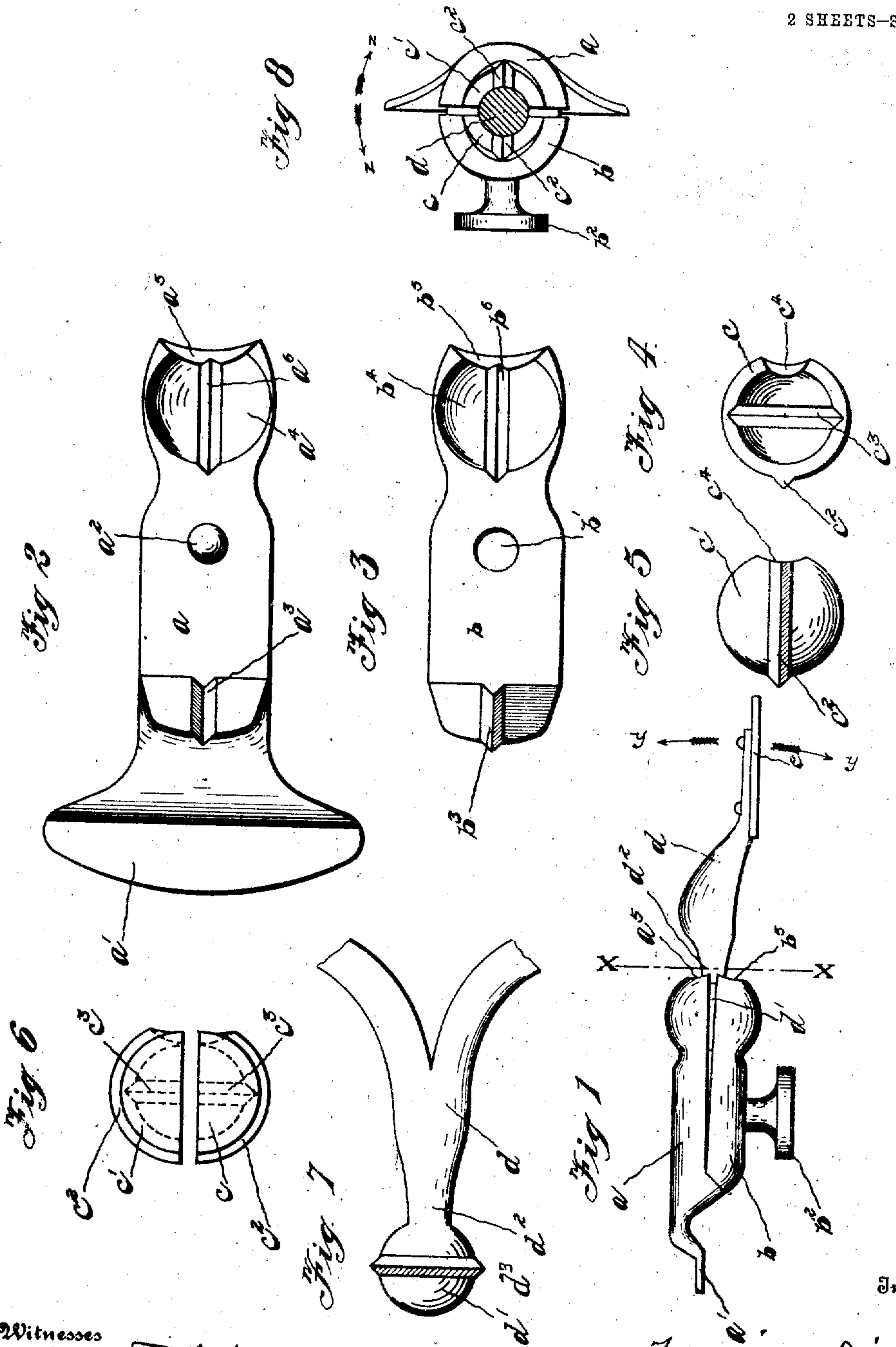


F. A. DILLINGHAM.
BALL AND SOCKET JOINT.
APPLICATION FILED JAN. 4, 1909.

973,635.

Patented Oct. 25, 1910.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 9.

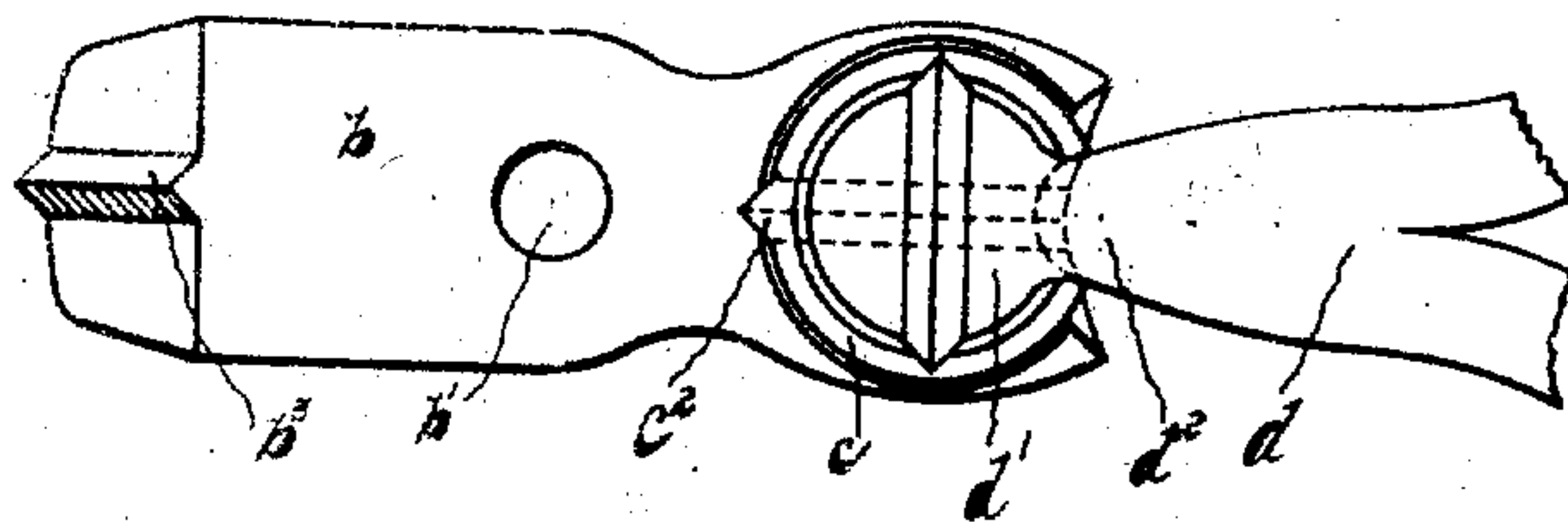


Fig. 10.

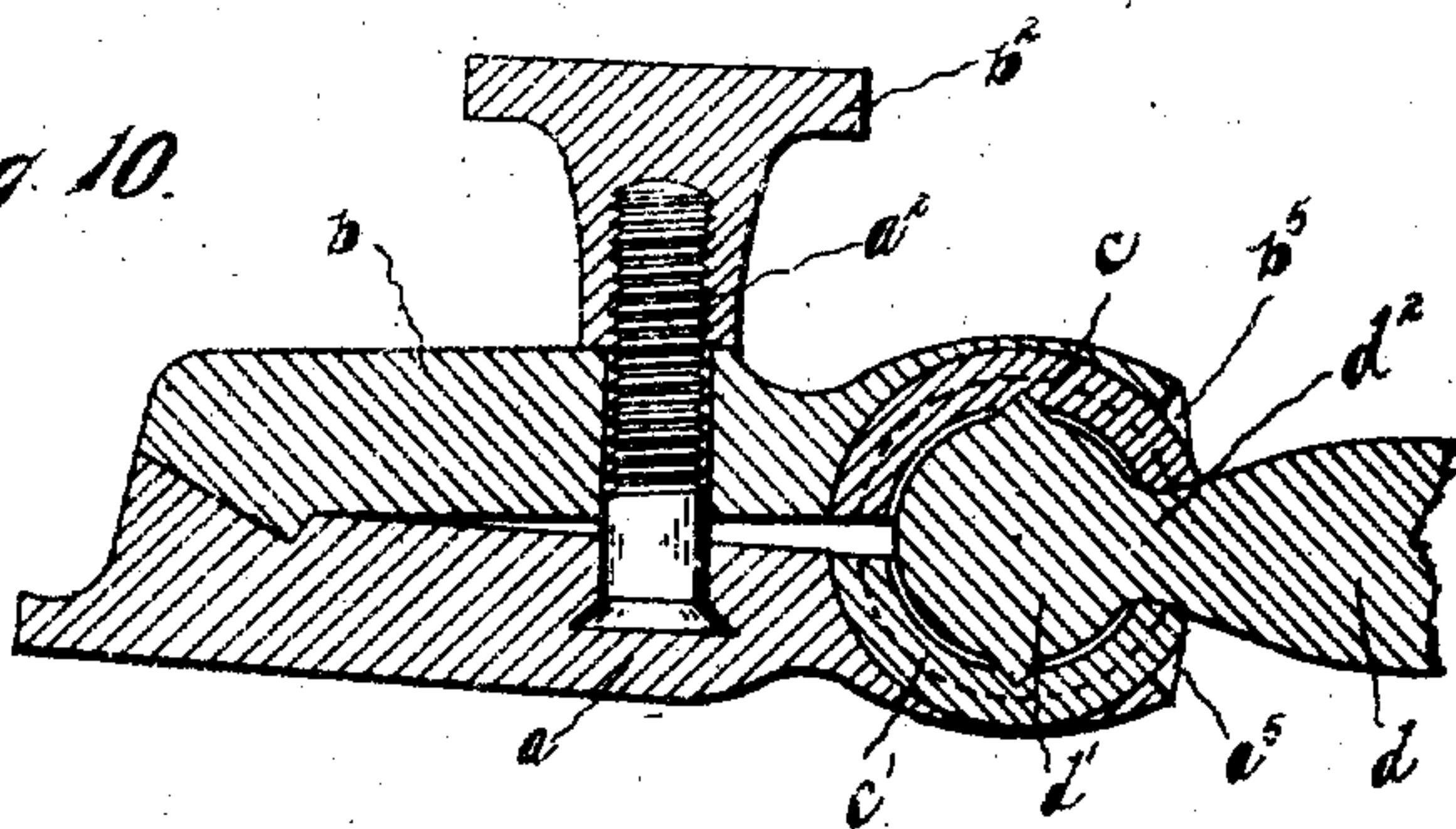
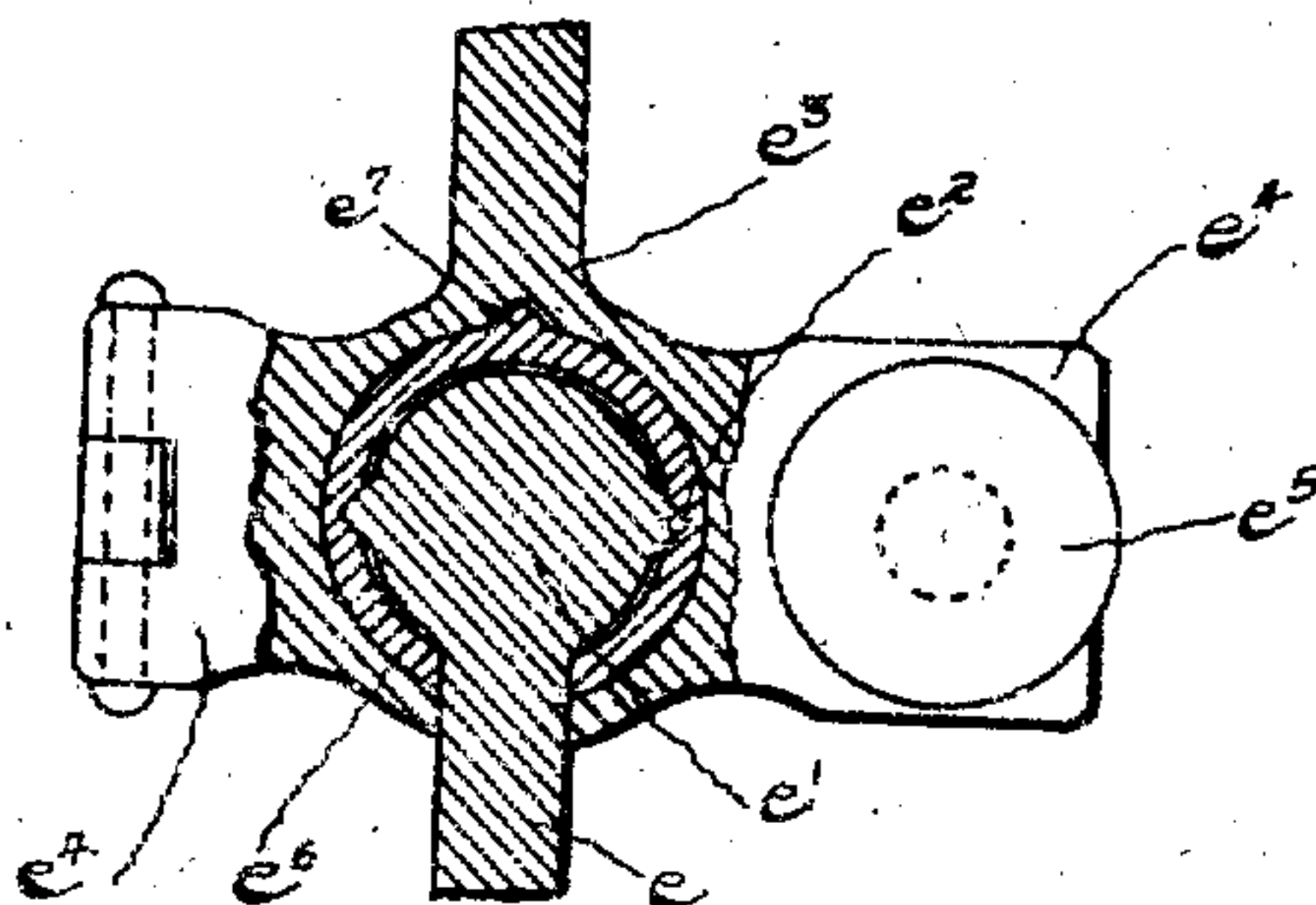


Fig. 11.



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UNITED STATES PATENT OFFICE.

FREDERICK A. DILLINGHAM, OF TROY, OHIO, ASSIGNOR TO THE TROY CARRIAGE SUN SHADE COMPANY, OF TROY, OHIO, A CORPORATION OF OHIO.

BALL-AND-SOCKET JOINT.

973,635.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed January 4, 1909. Serial No. 470,690.

To all whom it may concern:

Be it known that I, FREDERICK A. DILLINGHAM, a citizen of the United States, residing at Troy, in the county of Miami and State of Ohio, have invented certain new and useful Improvements in Ball-and-Socket Joints, of which the following is a specification.

This invention relates to improvements in ball and socket joints.

The object of the invention is to provide a joint which will be simple in construction, easily and quickly manipulated and effective in operation.

The invention consists in the constructions and combinations of parts hereinafter described and set forth in the claims.

In the accompanying drawings, Figure 1 is a top plan view of one embodiment of my device. Fig. 2 is a detail of one half of the stationary part of the device, looking at the inner side thereof. Fig. 3 is a detail of the other stationary half of the device, also looking at the inner side. Fig. 4 is a detail of one half of the intermediate socket, looking into the interior thereof. Fig. 5 is a detail of the other half of the intermediate socket, showing the exterior thereof. Fig. 6 is a detail of both parts of the intermediate socket placed together. Fig. 7 is a detail of the movable part of the bracket. Fig. 8 is a section on the line $x-x$ of Fig. 1. Fig. 9 is a top plan view of the device with one-half of the stationary part and also one-half of the intermediate socket removed. Fig. 10 is a longitudinal sectional view. Fig. 11 is a side elevation of the device showing a modification, some of the parts being removed.

Like parts are represented by similar characters of reference in the several views.

In Fig. 1, I have illustrated my improved joint applied to a bracket for supporting a reflecting glass for use on automobiles, although it is evident that it may be used in connection with a wide range of devices, one of which I have illustrated in Fig. 10 and will describe more fully hereinafter.

In the said drawing, a and b represent two halves of the stationary part of the bracket. The part, a^1 , is provided with means for attachment to any suitable part, such as, in the present case, the storm front or windshield of an automobile in convenient reach

of the operator. The part, b , is removably secured to the part a , preferably by having a stud, a^2 , on the part, a , extending through a perforation, b^1 , in the part, b , and screw-threaded to receive a thumb-screw, b^2 . The respective halves may also be provided with interengaging parts, such as a tongue, b^3 , and groove, a^3 , to more firmly secure them together.

Each of the stationary parts of the bracket has at one end a recess, a^4 and b^4 , cut away, as at a^5 and b^5 , so as to form, when the parts are assembled together, an open-ended socket, which I will call the main socket. Each recess is also provided with a groove, a^6 and b^6 , preferably V-shaped in cross-section, extending longitudinally of the parts, so that said main socket will have a continuous interior groove except at the point where the cut-away portions occur.

Located in the socket of the stationary parts is what I term an intermediate socket, formed in two parts, c and c^1 , each of which has an external V-shaped tongue or rib, c^2 c^2 , adapted to fit the grooves, a^6 and b^6 . Each part of the intermediate socket is also provided with internal grooves c^3 c^3 , preferably V-shaped in cross-section. The grooves, c^3 , extend in a direction at right-angles to the external ribs, c^2 , or the grooves, when the parts are assembled, may be said to form a circle through whose center the longitudinal axis of the device extends. Each of the parts, c and c^1 , is provided with a cut-away portion c^4 so as to provide an opening leading into the interior of the socket formed therein.

Located in the intermediate socket is the ball, d^1 , of the movable part, d , of the bracket; this ball being provided with a V-shaped tongue or rib d^3 which fits in the groove of the intermediate socket. The opening into the intermediate socket will be of such size that the neck, d^2 , of the part, d , will fit snugly therein so as to prevent any lost motion between the part, d , and the intermediate socket, and cause them to move together in one direction or plane of movement. The planes of the respective ribs, d^3 and c^2 , are at right-angles or perpendicular to each other.

The movable part of the bracket carries the object to be supported, such as, in the

present instance, a reflecting glass represented by *e*. It will be seen from the construction described that upon loosening the clamping screw the movable part of the bracket is free to move in two directions but will be positively held from movement in any other direction. For instance, the part, *d*, may be swung in either direction as indicated by the line *y y* of Fig. 1, but will be held from any movement either up or down, due to the grooves, *a^o b^o* and ribs, *c² c³*, of the outer and intermediate sockets; the intermediate socket and the ball, *d¹*, moving together by reason of the engagement of the rib and groove on the respective parts and the movement being only limited by the contact of the neck of the part, *d*, with the sides of the opening formed by the cut-away portions *a⁵ b⁵* of the main socket. The part, *d*, and the object carried thereby may also be swung about its longitudinal axis in either direction, as indicated by the line *z z* of Fig. 8, the movement being permitted by reason of the rib and groove connection between the ball and intermediate socket.

In Fig. 11 is shown a modification of the device to adapt it for use in a canopy top support for vehicles. *e* represents the stationary part of the support, which may be in the nature of the usual standard attached to the back of the seat of the vehicle. *e¹* is a ball on the upper end of the stationary support, having a rib or tongue, *e²*. The main socket is located in the movable part, *e³*, which carries the canopy top and its supports in the usual way. This movable part is formed in two pieces, one of which, *e⁴*, is hinged to the main parts, and the parts are clamped together by the thumb-screw, *e⁵*. The main socket is located in this movable part and contains the intermediate socket, *e⁶*, which has an exterior rib, *e⁷*, extending into an interior groove of the main socket. The ball is fitted into the intermediate socket which has a groove to receive the rib on the ball. The opening into the main socket is preferably cut away upon one side (not shown) so that it will permit the movable part to swing in one direction but will form a stop for the same in its vertical position so that the parts may be readily aligned. When it is desired to tilt the canopy top, the movable part, together with the intermediate socket, will be turned about the ball until the groove of the main socket and rib of the intermediate socket come to the proper position and then the movable part will be swung about the intermediate socket to the proper angle.

By the construction described, a very quick and accurate adjustment may be made, the two adjustments described permitting the supported object to be moved to any desired position.

Having thus described my invention, I claim:

1. In a device of the character described, two members, one of said members having a ball and the other a socket to receive the ball, and an intermediate member between said ball and socket having an engagement therewith which will permit one of said members to make a complete revolution in one plane of direction and also permit said movable member to have another movement in another plane of direction, substantially as specified.
2. In a device of the character described, two members, said members having a ball and socket joint and an intermediate socket arranged therein, the respective parts of the joint and said intermediate socket having interengaging parts which will permit one of said members to have a complete revolution in one plane of direction and also to have a movement in another plane of direction, substantially as specified.
3. In a device of the character described, two members, one of said members having a main socket and the other a ball, an intermediate member having a socket and fitted in said main socket and receiving said ball, said socketed members having interengaging parts permitting a movement of one of said socketed members with respect to the other in one plane of direction, and said intermediate socketed member and said ball also having interengaging parts permitting a complete revolution of one of said members in another single plane of direction, substantially as specified.
4. In a device of the character described, two members, one of said members having a ball and the other member having a main socket, an intermediate member located in said main socket and having a socket to receive said ball, said intermediate member having a groove in its socket to receive a tongue on said ball, and said main socket member having an interior groove in its socket to receive a tongue on said intermediate member, substantially as specified.
5. In a device of the character described, two members, one of said members being formed in sections and having means for clamping the sections together, said sectional member having a main socket and the other member having a ball, an intermediate member also formed in sections located in said main socket and having a socket to receive the ball, said main socket member and intermediate member having interengaging parts permanently secured thereto, and said intermediate member and ball also having interengaging parts permanently secured thereto, substantially as and for the purpose specified.
6. In a device of the character described, two members, one of said members being

formed of two pieces with means for clamping the pieces together, said two-piece member having a main socket and the other member having a ball, an intermediate member 5 located in said main socket and having a socket to receive said ball, said intermediate member being formed in two parts, said main socket member and intermediate member having interengaging parts, and 10 said intermediate member and ball also having interengaging parts, substantially as specified.

7. In a device of the character described, two members, one of said members having a 15 main socket and the other member having a ball, an intermediate member located in said main socket and having a socket to receive said ball, said intermediate member having a groove and a tongue, one on the 20 interior and one on the exterior thereof and extending in different directions with reference to each other, and said main socket member and ball also having, respectively, a tongue and groove corresponding to the 25 tongue and groove of said intermediate member, substantially as specified.

8. In a device of the character described, two members, one of said members having a main socket and the other a ball and reduced

neck, an intermediate member located in said 30 main socket and having a socket to receive said ball, said intermediate member having an opening leading to its socket through which said reduced neck extends, said ball 35 and said intermediate member having interengaging parts which permit one of said members to make a complete revolution with respect to each other but prevent said members from moving with respect to each other 40 in other directions, said main socket member having an enlarged opening leading to its socket through which said reduced neck also extends, said intermediate member and said 45 main socket member having interengaging parts permitting the movement of one of said members with respect to the other in one direction and preventing movements of said members with respect to each other in 50 other directions, said movement being limited by the contact of said reduced neck with said main socket member, substantially as specified.

In testimony whereof, I have hereunto set my hand this 24th day of December, 1908.

FREDERICK A. DILLINGHAM.

Witnesses:

CHEAS. L. WELCH,

MARJORIE S. MORROW.