W. B. & G. C. MAXWELL.

UNIVERSAL JOINT.

APPLICATION FILED AUG. 23, 1915.

1,188,965.

Patented June 27, 1916.

Fig. 1.

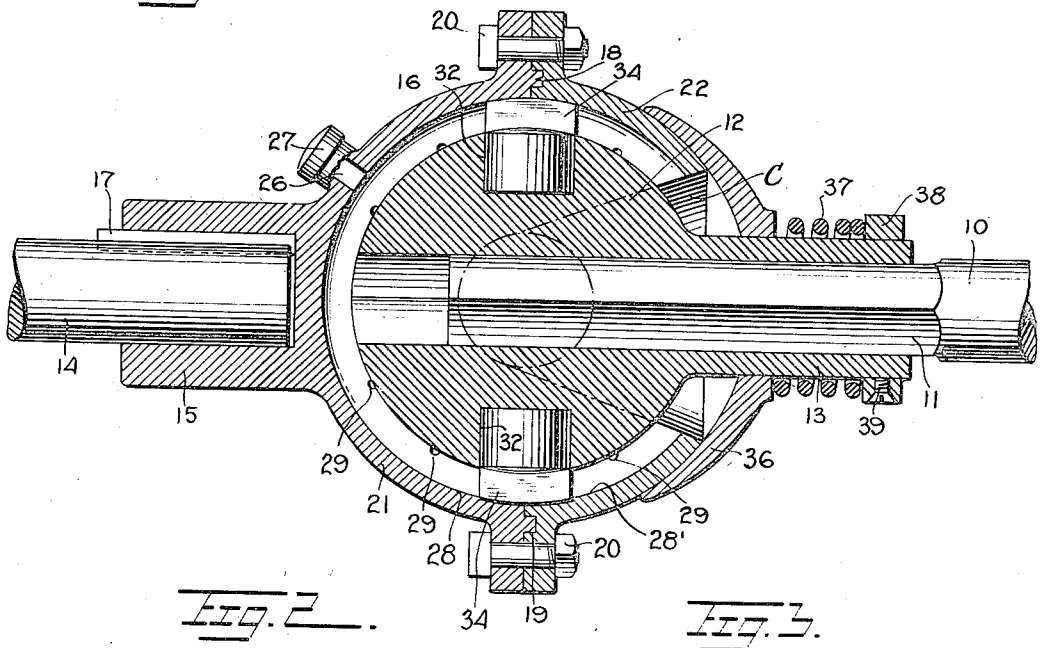


Fig. 2.

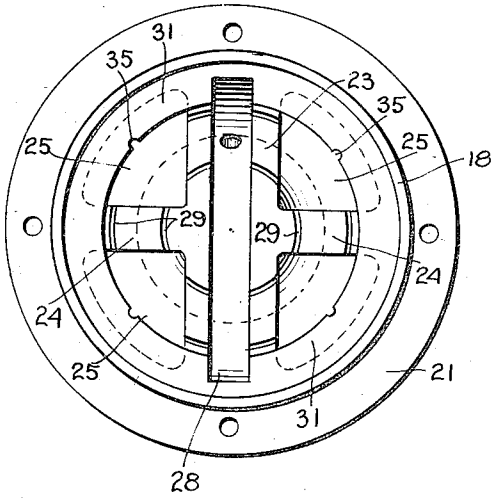


Fig. 3.

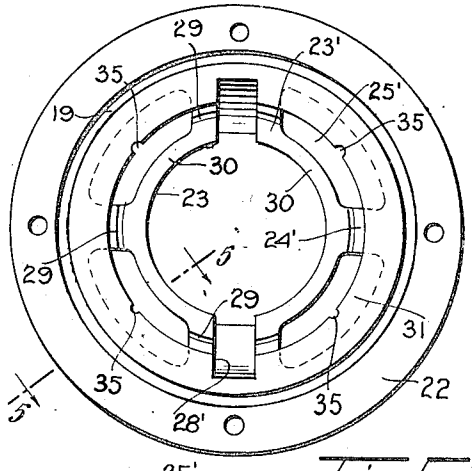


Fig. 5.

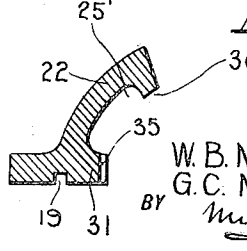
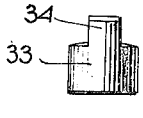


Fig. 4.



WITNESSES

H. J. Walker

Geo. L. Belden

INVENTORS

W. B. Maxwell

G. C. Maxwell

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM B. MAXWELL AND GROVER C. MAXWELL, OF NEW YORK, N. Y., ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO UNIVERSAL BALL JOINT CORPORATION, A CORPORATION OF NEW YORK.

UNIVERSAL JOINT.

1,188,965. Specification of Letters Patent. Patented June 27, 1916.

Application filed August 23, 1915. Serial No. 46,833.

To all whom it may concern:

Be it known that we, WILLIAM B. MAXWELL and GROVER C. MAXWELL, citizens of the United States, and residents, respectively, of the city of New York, Woodside, borough of Queens, in the county of Queens and State of New York, and of the city of New York, Winfield, borough of Queens, in the county of Queens and State of New York, have invented a new and Improved Universal Joint, of which the following is a full, clear, and exact description.

This invention relates to power transmission devices and has particular reference to joints for power shafts or the like.

Among the objects of the invention is to improve that type of universal joints known as ball and socket joints, with reference especially to simplicity of construction, ease of operation and strength, and consequent reliability in use.

With the foregoing and other objects in view, the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a vertical longitudinal section through a joint on a plane coinciding with the axes of the ball pivots; Fig. 2 is an inner face view of a section of the shell shown at the left side of Fig. 1; Fig. 3 is an inner face view of the other portion of the shell; Fig. 4 is a front elevation of one of the pivot members; and Fig. 5 is a transverse section on the line 5—5 of Fig. 3.

Referring more particularly to the drawings, we show a shaft member 10 having a polygonal end 11 fitted non-rotatably within a ball or sphere 12 constituting one main portion of the joint. The ball, if desired, may be provided with a neck 13 providing an extended bearing for the aforesaid end of the shaft 10, it being well understood that in the operation of a universal joint there is more or less tendency for endwise play between the shaft and the ball. 14 indicates the opposite shaft member which may be secured rigidly in a socket 15 of the shell 16 constituting the other main portion of the joint. We show a key 17 making this rigid connection, but any other suitable connecting means may be employed.

The shell 16 is in the nature of a hollow sphere comprising two parts joined practically in a plane perpendicular to the axis of the shaft members when in alinement with each other, such plane passing through the center of the ball. To make a tighter joint, however, between the two shell sections, we provide a rib or tongue 18 extending from the face of one of the sections into a groove 19 formed in the other section. The shell sections furthermore are provided with extending flanges through which connecting bolts 20 or the like extend.

The shell member 21 shown as having the rib 18 is the one which carries the socket member 15 and has a hemispherical concavity for one half of the ball which fits therein snugly. The other shell member 22 is of less extent than a hemisphere, being provided with a conical opening C in that side remote from the other shell member and through which the shaft 10 and neck 13 extend. The form of the opening C is such as to provide for the maximum degree of angular movement of the two shaft members, and the conical wall of the opening is formed as a tangent from a sphere at the center of the ball having a diameter substantially equal to the diameter of the neck indicated by dotted lines in Fig. 1.

The bearing surface between the ball and the shell members is not continuous, but comprises a pair of ribs 23 and 24 in the section 21 and corresponding ribs 23′ and 24′ in the section 22. We have several special advantages in this character of bearing sur-

face, among which may be noted, first, that it is much cheaper and easier to make because it is only the bearing surface which needs to be machined, and, secondly, the pockets 25 formed in the right angles between the respective ribs constitute holders for grease or other lubricant whereby the same may be kept thoroughly lubricated for a long period of time. The walls of these pockets being out of contact with the ball need not be finished or machined. The grease may be introduced by means of a grease gun or otherwise into the shell through a port 26 closed ordinarily by a cap 27, said port being shown herein as communicating with a circumferential groove 28 formed in the shell member 21 longitudinally of the rib 23 and along the middle portion of it. The ends of the groove 28 extend to the plane of connection between the two shell members. Transverse communication is had from the groove 28 to the pockets 25, or from one pocket to another, by means of grooves 29 formed across the ribs 23 and 24. The bottom of the groove 28 may be of any suitable form, but is shown herein as cylindrical. The other shell member 22 is provided with a groove 28′ corresponding to the groove 28 and having its outer ends registering with the ends of the groove 28 when the parts are assembled, as shown in Fig. 1. The groove 28′, however, is broken at its middle where it merges into the conical opening 23. When the shell is filled with grease, the space within the opening 23 likewise becomes filled. This part of the shell also is provided with transverse grooves 29, as above explained in connection with the member 21. Also there are provided pockets 25′ corresponding to the pockets 25 bounded adjacent the opening 23 by flanges 30 constituting the rim bounding the inner end of the opening 23. All of the pockets 25 and 25′ adjacent the plane of connection between the two shell parts are bounded by flanges or rims 31.

The ball is provided at its poles with a pair of polar sockets 32, the axes of which are in alinement passing through the center of the ball at right angles to the axis of the shaft 10 fitted therein. These sockets are cylindrical in form, and rotatably mounted therein for movement around the axis of the sockets are pivot members 33, each of which has a cylindrical body fitted snugly but rotatably in its socket and provided with a tongue 34 having flat parallel sides and an end surface of cylindrical form fitted in the groove or grooves 28, 28′. The shoulders at the outer end of each main body portion of the pivot member adjacent the inner end of the tongue are preferably of spherical form corresponding to the surface of the ball whereby the maximum strength is obtained. As viewed in Fig. 1, with the two tongues 34 projecting into the grooves of the shell, the ball and shaft 10 fitted therein are free to oscillate around the center of the ball in the plane of the paper within the limits determined by the distance from the neck 13 to the conical wall of the opening 23 a degree of angularity as large as is practical in joints of this nature. While the pivot members and their tongues are thus free to glide along the grooves 28, 28′, as just described, the tongues coöperating with the shell members are held from rotation with respect to such members. Since the bodies of the pivot members are cylindrical and coaxial with each other, the ball and shaft 10 are free to rotate around such axis irrespective of the location of the pivot members along the grooves 28, 28′, the latter rotation of the ball being limited as before only by the conical wall of the opening 23. These several movements of the ball and shaft 10 are practically independent of each other and hence the shaft members are free to be moved at any angle to each other or in any direction within the limits specified. Since the tongues 34 are fitted snugly but slidably in the grooves 28, 28′, they constitute obstructions for the lubricant from one half of the shell to the other; hence we form a suitable number of registering grooves 35 crossing the rims 31.

The numeral 36 indicates a cap constituting a spherical segment fitted to the outer surface of the shell member 22 and of a size sufficient to close the opening 23 in all positions of the shaft 10, thus retaining the lubricant within the shell. The cap is held snugly against the shell by means of a spring 37 surrounding the neck 13 and having its opposite ends abutting against the cap on the one side and a collar 38 on the other side held to the outer end of the neck by means of a set screw 39 or its equivalent.

We claim:—

1. In a universal joint, the combination of a ball having pivot members journaled therein, said pivot members extending beyond the surface of the ball, a shell fitted around said ball and having a circumferential groove into which said pivot ends extend, said shell being provided with a plurality of pockets for lubricant, and means to introduce lubricant into all of said pockets from the outside of the shell.

2. In a universal joint, the combination of a ball having a pair of polar sockets formed therein coaxially of each other, a pair of pivot members journaled in said sockets and rotatable around the axis of the same, each of the pivot members having a tongue projecting beyond the surface of the ball, a shell surrounding the ball and formed with a plurality of ribs arranged at an angle to one another, said ribs constituting the contacting surfaces between the shell

and the ball, one set of said ribs being formed with a circumferential groove into which the tongues of the pivot members project, said shell being provided with a plurality of pockets formed in the angles between adjacent ribs aforesaid, and transverse grooves formed across said ribs bringing all of said pockets into communication with one another.

WILLIAM B. MAXWELL.
GROVER C. MAXWELL.

Witnesses:
WM. RAEQUIN, JR.,
PHILIP WILLEMANN.