H. COOPER.

UNIVERSAL JOINT.

APPLICATION FILED JAN. 14, 1914.

1,143,571.

Patented June 15, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

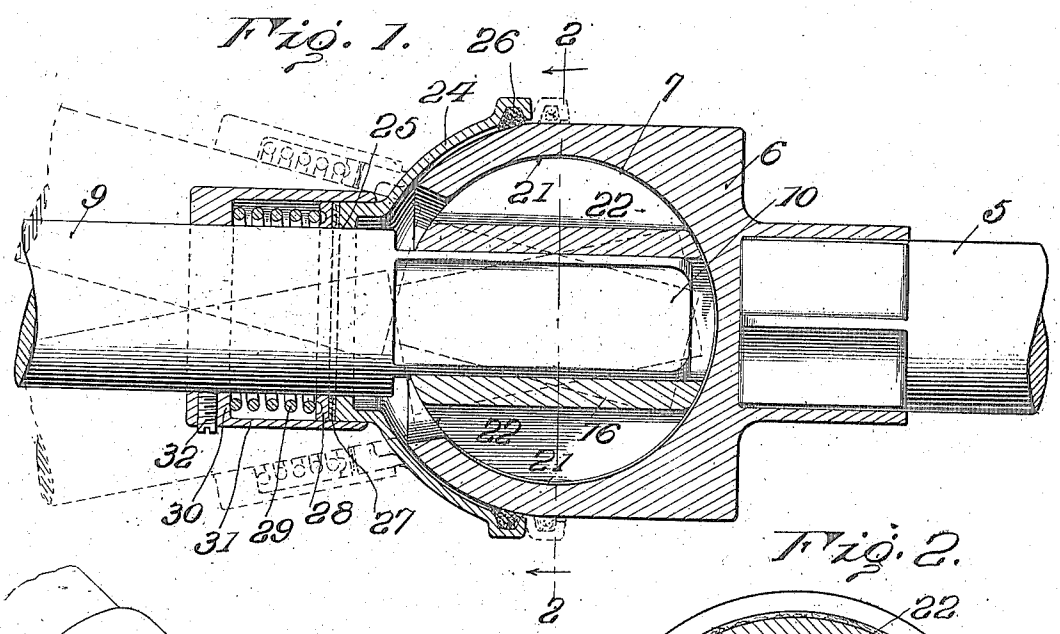

Fig. 2.

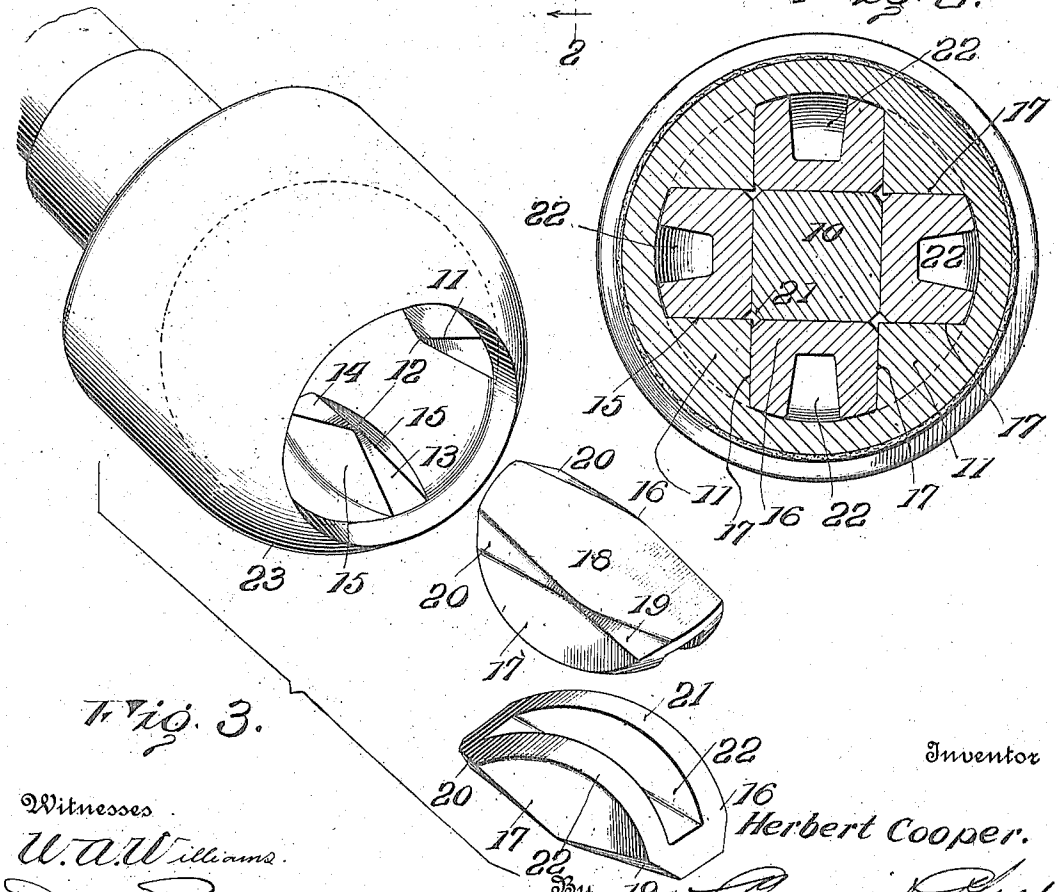

Fig. 3.

Witnesses

W. A. Williams.

Dudley Browne

Inventor

Herbert Cooper.

By Howard & Howard

Attorneys

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2 SHEETS—SHEET 2.

Fig. 4.

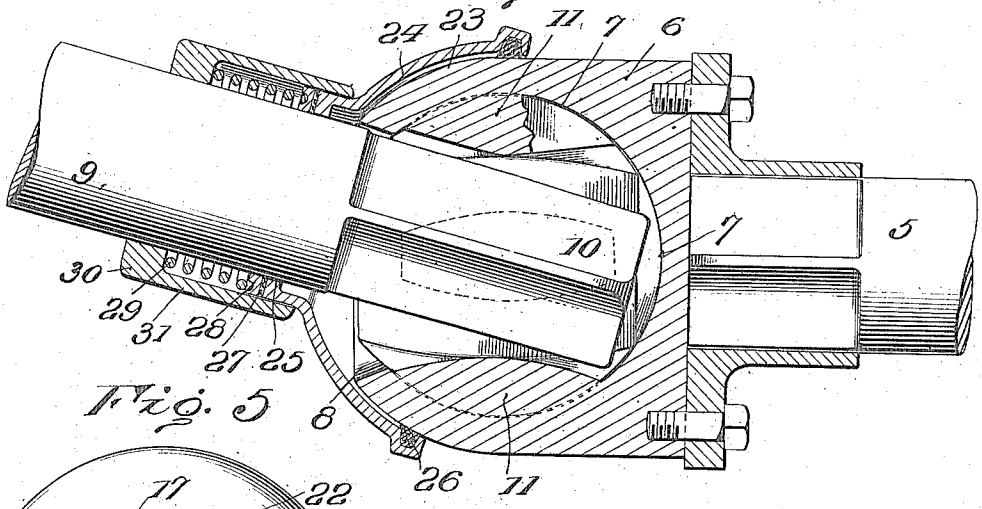


Fig. 5

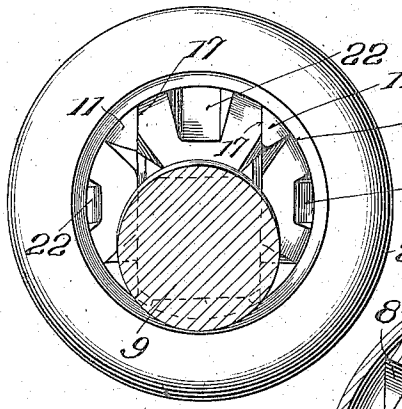
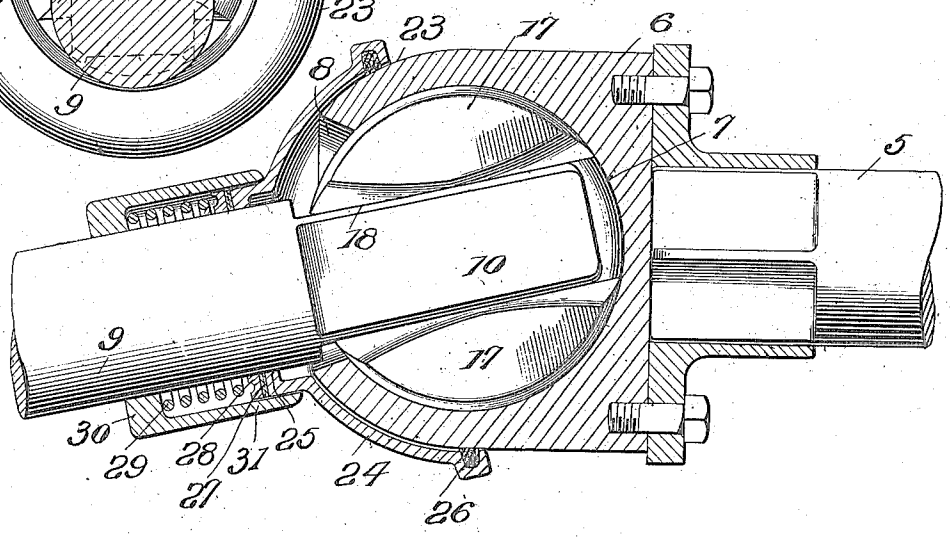


Fig. 6.



Witnesses

W. A. Williams.

Dudley Browne

Inventor

Herbert Cooper.

By Howard Phelps

Attorneys

UNITED STATES PATENT OFFICE.

HERBERT COOPER, OF BROOKLYN, NEW YORK.

UNIVERSAL JOINT.

1,143,571. Specification of Letters Patent. Patented June 15, 1915.

Application filed January 14, 1914. Serial No. 811,984.

To all whom it may concern:

Be it known that I, HERBERT COOPER, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Universal Joints, of which the following is a specification.

My invention relates to an improved universal joint, particularly adapted for use in flexible shafting, though it is to be understood that the invention may be used in any other relation where the same may be found desirable.

The principal object of my invention is to provide a universal joint, in which lost motion or back-lash is eliminated when the angle between the driving and driven sections of the shaft is varied.

A further object of my invention is to produce a joint which is simple and comparatively cheap to manufacture.

With the foregoing and other objects in view my invention consists in certain constructions, combinations and arrangements of parts, the preferred form of which will be first specifically described in connection with the accompanying drawings and then the invention particularly pointed out in the appended claims.

Referring to the drawings wherein the same part is designated by the same reference numeral wherever it occurs, Figure 1 is a central longitudinal section of the preferred embodiment of my invention, showing the parts in one position in full line, and two other positions in dotted lines; Fig. 2 is a cross section taken on line 2, 2, of Fig. 1, and Fig. 3 is a perspective view looking into one end of the casing, showing two of the movable bearing blocks removed therefrom. Fig. 4 is a central longitudinal section through my invention showing the parts at an angle above the horizontal; Fig. 5 is an end view of the device with the shaft shown in section and, Fig. 6 is a central longitudinal section through my invention showing the parts at an angle below the horizontal.

5 designates a shaft section to the end of which is secured a casing 6, the interior of said casing being formed with a spherical socket 7, cut away at one end to provide an opening 8. 9 designates the other shaft section which has its end 10 polygonal in cross section, the form of polygon shown in the drawing being a square, this end being adapted to enter into the spherical socket 7, through the opening 8.

Formed on the sides of the socket 10 are a plurality of ribs 11, the number of ribs corresponding to the number of surfaces on the end 10 of the shaft. These ribs are located equidistant from each other and project inwardly from the walls of the socket. The inner surfaces of each of these ribs is beveled from a central point 12 to form front and rear bearing surfaces 13 and 14. The side walls 15, 15 of the ribs being also beveled so that they form with the bearing surfaces 13 and 14 a sharp corner at 12, the angle of the side walls 15 and 15 being such that the adjacent walls of adjacent ribs are parallel and form with the inner wall of the socket 7 a pocket to receive a movable bearing block 16. Each bearing block comprises parallel walls 17, 17, which correspond to and snugly fit between the parallel side walls 15 of the ribs, and the blocks are of a height substantially equal to the height of the ribs. The inner surface 18 of each block is flat, and forms with the side walls 15 of adjacent ribs a substantially continuous surface when the blocks are in normal position. The corners of each block are beveled at 19, 19, and 20, 20, to correspond with the inner beveled surfaces 13 and 14 of the ribs, and to form with the latter a space to receive the beveled corners 21 of the section 10 of the shaft 9, and also to permit the tilting of the blocks in the movement of the shaft. The outer surface of each of the blocks is curved, both longitudinally and transversely, as shown at 21, 21, to fit the curvature of the interior of the casing, and each block is preferably also provided with a longitudinal groove 22 therein, to reduce the weight and form two bearing surfaces for each block. It is to be noted that the rear wall of the socket 7 is complete, and that the lip 8 formed at the front end of the socket provides a retaining portion for the blocks when the parts are assembled.

In assembling the construction, after the blocks 16 are placed in position between the ribs, the end 10 of the shaft 19 is slipped into the opening between the blocks and in order to prevent the entrance of dust into the socket and the escape of the lubricant therefrom I preferably form the outside of the casing spherical, as shown at 23, and provide a cup 24 which has a central opening 25, through which the shaft 9 passes, the

cup being of a size to snugly fit the outer spherical surface 23, and it is preferably provided at its outer edge with a packing ring 26.

27 is a washer of felt or similar material placed over the shaft, against the end of the cup, which engages a washer 28, pressed against by a spiral spring 29 confined between a shoulder 30 of a collar or sleeve 31, and the washer 28. The collar or sleeve 31 may be held on the shaft by a set screw 32.

From the foregoing description and construction it will be seen that the section 10 of the shaft, when the two shafts are rocked in relation to each other, will slide on the bearing surfaces 18 of the blocks, transversely thereto, and that the blocks will move longitudinally of the socket between the ribs, and furthermore that the center of oscillation of the portion 10 of the shaft is substantially in line with the corners 12 on the ribs. By reason of these facts changes in the angle between the two shaft sections will not produce any lost motion or backlash between the shaft sections.

I am aware that considerable variation is possible in the details of construction herein shown and described, without departing from the spirit of my invention, and I do not intend to limit myself thereto, except as pointed out in the following claims, in which it is my intention to claim all the novelty inherent in the structure shown and described as broadly as the state of the art will permit.

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

1. In a universal joint the combination with a casing having a substantially spherical interior, of a plurality of spaced ribs extending inwardly from the interior of the casing, a plurality of driving blocks mounted between the ribs and movable therein, said blocks having a curved outer surface for contact with the interior of the casing, and a plane inner surface, and a shaft having a polygonal end adapted to extend between the blocks and contact with the plane surfaces thereof.

2. In a universal joint the combination with a casing having a substantially spherical interior, of a plurality of spaced ribs extending inwardly from the interior of the same, the side walls of said ribs being beveled whereby the adjacent walls of adjacent ribs are substantially parallel to each other, a plurality of driving blocks mounted between the ribs and movable therein, each bearing block having parallel side walls, a curved outer surface in contact with the interior of the casing, and a plane inner surface, a shaft having a polygonal end adapted to extend between the blocks and contact with the plane surfaces thereof.

3. In a universal joint the combination with a casing having a substantially spherical interior, of a plurality of spaced ribs extending inwardly from the interior of the casing, each of said ribs being beveled from a substantially central point to form front and rear bearing surfaces, the side walls of said ribs being also beveled, the angle of the side walls being such that adjacent walls of adjacent ribs are substantially parallel to each other, a plurality of driving blocks mounted between the ribs and movable therein, said blocks having substantially parallel side walls, a curved outer surface in contact with the interior of the casing, and a plane inner surface, and a shaft having a polygonal end adapted to extend between the blocks and contact with the plane surfaces thereof.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT COOPER.

Witnesses:
PAUL DIETZ,
JAMES BLAKE.