P. K. STERN.

UNIVERSAL JOINT.

APPLICATION FILED MAY 5, 1913.

1,143,659. **Patented June 22, 1915.**

Fig. 1

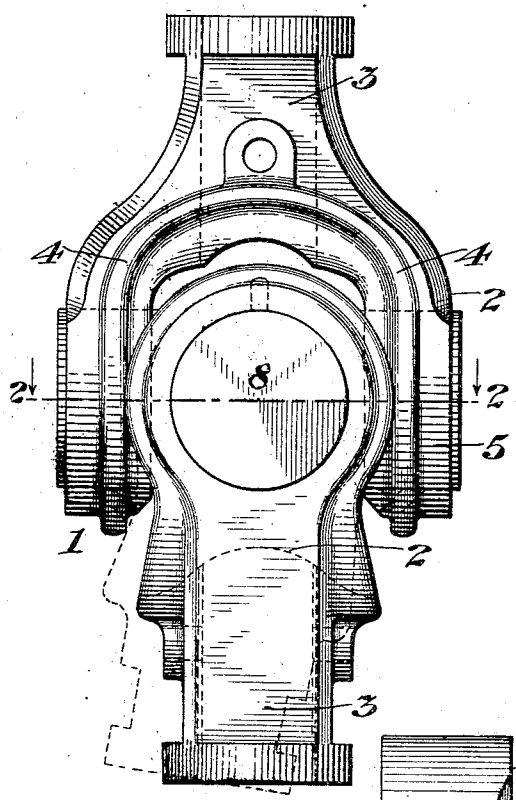


Fig. 4

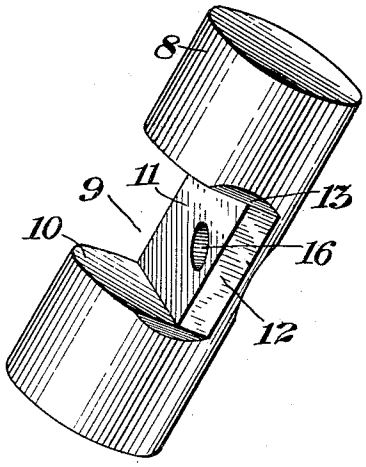


Fig. 3

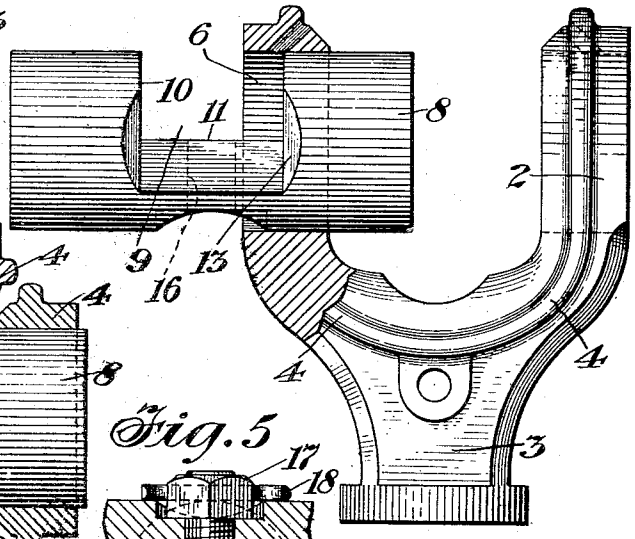


Fig. 2

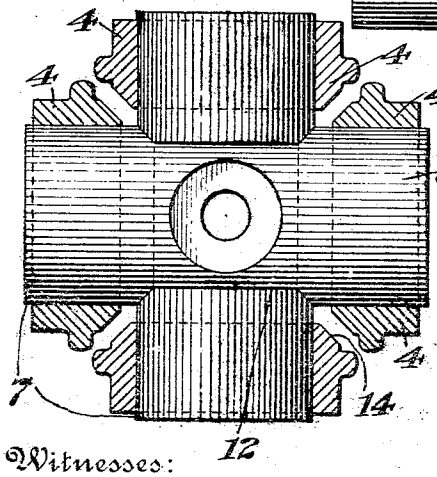
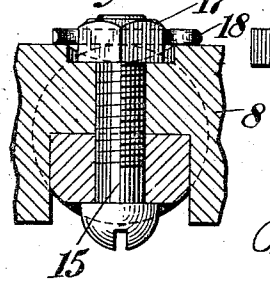


Fig. 5



Witnesses:

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UNITED STATES PATENT OFFICE.

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UNIVERSAL JOINT.

1,143,659. Specification of Letters Patent. Patented June 22, 1915.

Application filed May 5, 1913. Serial No. 765,584.

To all whom it may concern:

Be it known that I, PHILIP K. STERN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Universal Joints, of which the following is a specification.

My invention in universal joints relates to that type of shaft couplings, provided with a double axial member, whereby, a pair of intersecting journal bearings, disposed in quadrature, and lying in a common plane, constitute the universal axial element, and wherein an element pivotally connected with each of the journal bearings provides one of the terminals of said universal joints.

It has more particular reference to the common axial member of pivotally coupled universal joints, and in this connection, I have directed my attention to the construction of an axial member, comprising two interlocked and crossed bearing pins of substantially cylindrical formation throughout and engaged with each other by being intermediately rabbeted and intersected to fit at right angles to each other.

The object of my invention is to provide a simple, durable and inexpensive construction, combined with a minimum number of parts, and economy in maintenance.

The features characteristic of my invention, whereby I attain the object thereof, are illustrated in the drawings hereto attached, and are described in detail in the following description, and the distinct features of novelty are pointed out in the claims.

In the drawing Figure 1 is a side elevation of a universal joint, constructed in accordance with my invention. Fig. 2 is a top plan view of the axial portion of the device, the terminal members being shown in section on the line 2—2 of Fig. 1. Fig. 3 is a side elevation of a terminal member, with a section of one of the bearings thereof removed, together with a side elevation of one of my improved interlocking coupling pins as it is being placed in position in the terminal-member bearings. Fig. 4 is a perspective detail of one of the interlocking coupling pin members, and Fig. 5 is a fragmentary sectional detail intermediately through the axial member, illustrating the method of securing the interlocking axial members against lateral displacement.

In the several figures, similar characters of reference are employed to designate like parts.

1 designates a universal joint, comprising, in the instance illustrated, a pair of terminal coupling members 2, which each consist of a shank 3 and laterally spaced forks 4 that terminate in ears 5, bored axially to provide bearings 6, the shanks 3 being bored at right angles thereto, in an axis at right angles to that of the bearings 6, and in a manner to intersect the said axis intermediately, said ears 5 being disposed with relation to the terminal members 2 as shaft coupling connections. The bearings 6 of the fork ears 5 of each of the respective forks 4 swing upon axes at right angles to each other and upon my improved interlocking coupling pin axial member 7. This is composed of a pair of identically formed cylindrical journals 8 let into each other intermediately and at right angles to each other by rabbeting them from one side, in order to form a recess 9, whereby parallel lateral walls 10, and a floor 11 are formed, and by slabbing the remaining sides at right angles to said floor, to form a neck 12, and further, by mitering the shoulders adjacent the neck 12 to form bearing seats 13. After the cylindrical journals 8 have been thus fitted together, they will form substantially a cross, as illustrated in Fig. 2, and provide horizontal and vertical axes, upon which the forks 4 of each of the coupling members swing on the bearings 6 of the ears 5.

It is important that the bearing seats 13, at the necks 12 of the mutually engaging journals 8 shall fit each other snugly, in order that back-lash or play of any kind shall be obviated when the universal joint is in action.

The fork ears 5 of the respective forks 4 have opposing beveled ends 14 and are respectively spaced apart from each other, to

provide a limited amount of end play, to permit of variations in axial alinement between two sections of shaft coupling.

The cylindrical journals 8 when interlocked with each other in the manner referred to, are secured against pulling apart by a through bolt 15, which passes through perforations 16 in each of the journals 8, and may be retained by means of a nut 17 and cotter pin 18. The bolt 15 is introduced through the bore of either of the shanks 3 and screwed into the nut, which may be previously positioned through the opposite shank, and after being set up tight to aline for the cotter pin hole, the latter may be introduced and secured in said hole.

To assemble my improved universal joint, one of the cylindrical journals 8 is passed through the bearings 6 of a pair of fork ears 5, until the recess 9 lies in a position opposite to the shank 3 and intermediate of the ears 5. This operation is repeated and a similar assembly is made of another cylindrical journal 8 and fork ears 5, whereupon the two coupling members 2 thus assembled, with their respective journals 8 are placed in a position opposing each other and at right angles respectively, and the recesses 9 of each of the said journals are brought into engagement with the necks 12, after which, the opposing coupling members 2 are forced in a direction toward each other until the axial member 7 shall have become a unit, whereupon the through bolt 15 is introduced to the perforations 16, and secured by the nut 17 and cotter pin 18.

In practice, I prefer to form the cylindrical journals 8 of standard bar stock, such for example as cold drawn or rolled steel and execute the recessing and slabbing by a milling operation, as well as the formation of mitered shoulder bearing seats 13. Thus it will be understood that a simple and inexpensive axial coupling member is provided for universal joints, which not only possesses a degree of initial strength, but moreover provides facilities for the renewal of worn bearing journals with the greatest facility and economy.

I claim:

1. The combination with terminal members of a universal joint comprising a pair of members substantially cylindrical throughout their length and each intermediately recessed to form a lateral neck with parallel slabbed sides, the opposed walls of the recess in each member being at right angles to its base, forming shoulders, to receive the neck portion of the other member in crossed relation, with the neck surfaces of said members juxtaposed, the shoulders of one member engaging the slabbed sides of the other member, thereby forming a snugly interfitting bi-axial joint, and means uniting said members to prevent relative lateral displacement thereof.

2. The combination with terminal members of a universal joint comprising a pair of members substantially cylindrical throughout their length and each intermediately recessed to form a lateral neck with parallel slabbed sides, the opposed walls of the recess in each member being at right angles to its base, forming shoulders, to receive the neck portion of the other member in crossed relation, with the neck surfaces of said members juxtaposed, the shoulders of one member engaging the slabbed sides of the other member, thereby forming a snugly interfitting bi-axial joint, and a uniting bolt intersecting the axes of said cylindrical members through their neck portions.

3. A universal joint comprising a pair of cylindrical members each intermediately recessed to form a lateral neck with parallel slabbed sides, the opposed walls of each recess being at right angles to its base, forming shoulders, and the edges of said shoulders, perpendicular to said neck, being mitered, whereby said cylindrical members may fit together in intersecting relation, with their neck surfaces juxtaposed, the shoulders of one member engaging the slabbed sides of the other member, and the mitered edges of said members being in opposed contact, thereby comprising a snugly fitting bi-axial joint, and means uniting said members to prevent relative lateral displacement thereof.

4. A universal joint comprising a pair of cylindrical members each intermediately recessed to form a lateral neck with parallel slabbed sides, the opposed walls of each recess being at right angles to its base, forming shoulders, and the edges of said shoulders, perpendicular to said neck, being mitered, whereby said cylindrical members may fit together in intersecting relation with their neck surfaces juxtaposed, the shoulders of one member engaging the slabbed sides of the other member, and the mitered edges of said members being in opposed contact, thereby comprising a snugly fitting biaxial joint, together with a uniting bolt intersecting the axes of said cylindrical members through their neck portions.

5. A universal joint comprising a pair of cylindrical members each intermediately recessed to form a lateral neck with parallel slabbed sides, the opposed walls of each recess being at right angles to its base, forming shoulders, and the edges of said shoulders, perpendicular to said neck, being mitered, whereby said cylindrical members may fit together in intersecting relation with their neck surfaces juxtaposed, the shoulders of one member engaging the slabbed sides of the other member, and the mitered edges of said

members being in opposed contact, thereby comprising a snugly fitting biaxial joint, together with a uniting bolt intersecting the axes of said cylindrical members through their neck portions, and a pair of terminal members having bearing portions respectively engaging opposite ends of each cylindrical member.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

PHILIP K. STERN.

Witnesses:
E. L. STERN,
R. H. TUBBS.