C. W. SPONSEL.

UNIVERSAL JOINT.

APPLICATION FILED FEB. 20, 1917.

1,249,545.

Patented Dec. 11, 1917.

Fig. 3.

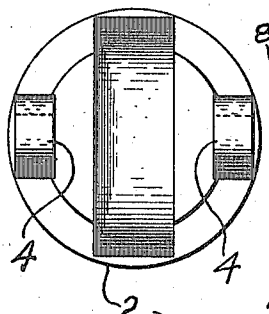


Fig. 1.

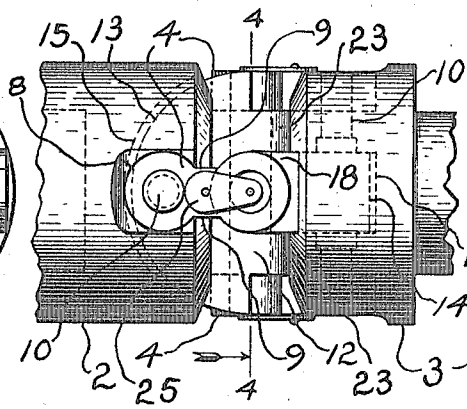


Fig. 4.

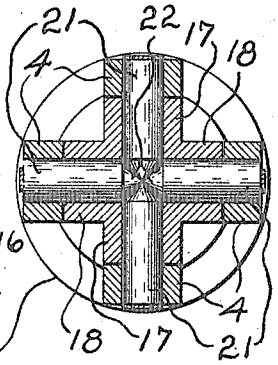


Fig. 2.

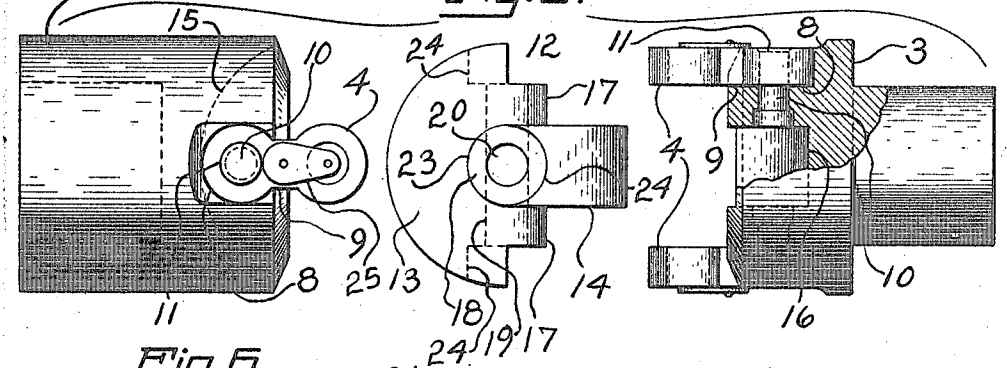


Fig. 6.

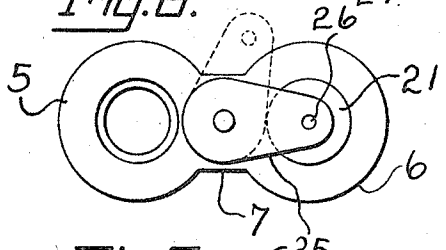


Fig. 5.

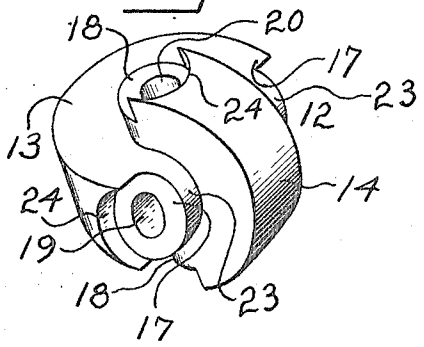
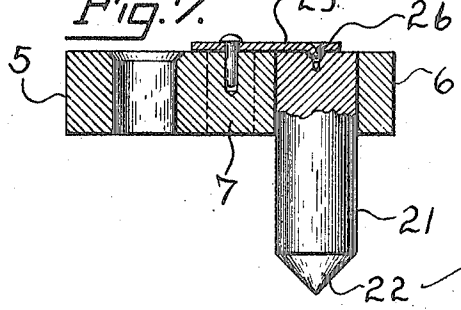


Fig. 7.



C. W. Sponsel Inventor

By Keith Sutherland

Attorney

UNITED STATES PATENT OFFICE.

CHARLES W. SPONSEL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE SPONSEL COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

UNIVERSAL JOINT.

1,249,545. Specification of Letters Patent. Patented Dec. 11, 1917.

Application filed February 20, 1917. Serial No. 149,785.

To all whom it may concern:

Be it known that I, CHARLES W. SPONSEL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Universal Joints, of which the following is a specification.

This invention relates to universal-joints, and among the primary object of the invention is the provision of an article of this character which is thoroughly practical, efficient and which possesses the maximum strength. While the joint involving the invention is capable of general use, it is of especial applicability when incorporated in an automobile or a machine of metal-working or similar type.

In the drawings accompanying and forming part of the present specification I have shown in detail one convenient form of embodiment of the invention which will be set forth fully in the following description. I am in no sense limited to this particular showing, however, as I may depart therefrom in several particulars within the scope of the invention defined by the claims following said description.

Referring to said drawings:

Figure 1 is a side elevation of said joint.

Fig. 2 is a like view with the parts separated and a portion of one of the main elements in section.

Fig. 3 is a face view of one of the shaft elements being that on the left in Figs. 1 and 2.

Fig. 4 is a transverse section on the line 4—4 of Fig. 1, looking in the direction of the arrow.

Fig. 5 is a perspective view of a coupling-member.

Fig. 6 is an elevation of a bearing and a pivot securing latch in the closed and open positions thereof by full and dotted lines respectively.

Fig. 7 is a detail of said bearing pivot and latch, all in section except the forward portion of the pivot.

Like characters refer to like parts throughout the several views, Figs. 6 and 7 being on a larger scale than the preceding views.

I have already stated concisely some of the objects of the invention. There are other points which I have in view. For example the bearing is of such character that the parts thereof can be machined by the usual simple standard procedures. In view of this condition all working surfaces can be hardened to the requisite extent or sufficiently to properly resist wear and friction. Another point of equal advantage is that the parts can be easily, readily and quickly assembled, and when in correlation can be operated without binding. I desire also to call attention to the fact that the joint possesses the maximum strength and the parts which require it can be readily and easily lubricated. In a general way these are some of the objects I attain and with others will receive further consideration hereinafter.

The joint involves in its organization shaft ends or members of desired construction, those denoted by 2 and 3 answering satisfactorily in this particular. These shaft members in the organization shown are practically of duplicate construction, although this may not always be necessary. Each is provided with a pair of bearings as 4 which may be related with the respective shaft ends 2 and 3 in any desirable manner, although I illustrate and will hereinafter describe an advantageous construction of this character. The bearings 4 of the respective members are transverse to each other, being in fact as shown at right angles or approximately right angles to each other. That is to say the axis of the bearings 4 of the member 2 is as illustrated, exactly at right angles to the axis of the bearings 4 of the member 3. It is highly advantageous that these axes should be in the same plane and the advantage for this will be hereinafter explained. Each bearing comprises a body 5, a bearing portion 6 and a neck 7, the shaft ends 2 having in the construction shown diametrically opposite circular seats 8 into which the respective bodies 5 will be snugly fitted, the base portions of the necks 7 being disposed in the mouths 9 of the circular seats 8. Owing to the fact that the bearings 4 and shaft ends or members 2 and 3 respectively are separate in the organization illustrated, they can be heat-treated independently, which is an element of importance. As previously observed I do not rely upon the driving of the bodies or bases 5 into the seats 8 to hold the bearings 4 in

operative relation with the shaft ends or sections 2 and 3 but prefer to provide some positive means to hold the bearings in proper working relation with the shaft ends, and this may be accomplished by pins as 10 adapted to be driven through registering openings in the shaft sections 2 and 3 and bodies 5 respectively, the pins 10 when in position being riveted as at 11 over the bodies 5 of the respective bearings 4.

The coupling-member may within certain limits, vary as to construction. For instance, while it is integral, it is conceivable that it might be made in parts, although for reason of strength I prefer the former construction. A coupling-member which has met my conditions in a desirable manner is that denoted in a general way by 12. This coupling-member comprises segments as 13 and 14 transverse to each other and as may be inferred the best results are obtained by having the segments formed as arc-shaped keys at right angles to each other, the shaft sections 2 and 3 having suitable seats such as those denoted in a general way by 15 and 16 to receive the respective segments or arcuate keys 13 and 14. Obviously in the construction shown the two seats are at right angles to each other and are located in the ends of the shaft sections 2 and 3 between the bearings 4 thereof. The seats 15 and 16 are shown as of arcuate formation, and are intended to receive the respective segments 13 and 14, the side walls of the arcuate seats 15 and 16 being contiguous to the side walls of the segments 13 and 14. These several side walls are in the present instance flat or imperforate throughout their entire depths and are at the same time parallel. As shown, the segments 13 and 14 do not bottom in the respective seats or grooves 15 and 16. The bottoms of the grooves and the curved surfaces of the segments 13 and 14 are in the present case on arcs struck from the same center. There is no driving connection, however, as will be understood between the bottoms of the grooves and the curved outer surfaces of the segments, the driving being as already observed between the side walls of the segments and the side walls of the seats. The segments 13 and 14 have projections as 17 and 18, which are as shown at right angles to each other, these projections having holes or openings 19 and 20 entirely therethrough adapted to receive suitable pivot means hereinafter described. There are two pivots for the coupling member 12 at right angles to each other and each pivot it might be noted consists of a pair of pins as I will hereinafter point out. It will be seen that the bottom of the seat 15 and the curved surface of the segment 13 are on arcs struck from the axis of the hole or opening 20, and it will further be noted that the bottom of the seat 16 and the curved surface of the segment 14 are on arcs struck from the axis of the hole 19. The projection 18 of the segment 14 is fitted between the bearing portions 6 on the shaft section or end 2 while the projection 18 has a corresponding relation with the bearing portions 6 on the shaft section or end 3, the two holes 19 and 20, as will be perceived being at right angles to each other. There may be cases where it is not necessary to extend the holes entirely through the coupling member, although the former construction is the better one, owing to the ease of disassemblage. When the coupling-member 12 is assembled, pins as 21 will be passed through the openings of the bearing portions 6 and into the holes 19 and 20, the inner ends of these pins being coned as at 22 to engage each other and thus facilitate their removal. It is desirable also to call attention to the fact that the ends of the projections 17 and 18 are rounded as at 23, the rounded portions 23 being on arcs struck from the axes of the pins 21 or holes 19 and 20 respectively. The terminal portions of the segments 13 and 14 also have seats 24 to receive the rounded ends of the bearing portions 6, these engaging surfaces being also formed on arcs struck from the axes of the pins 21 or holes 19 and 20 respectively into which the pins are fitted. I desire to call attention to the fact that the driving is done from one of the shaft ends 2 or 3 to the intermediate coupling member 12 which as described is mounted for free universal movement, the coupling member being held in position by means independent of the driving surfaces. I might note in this connection that experience has demonstrated that whenever the central joint pins are abandoned and such substitutes as concentric slots, grooves or recesses and coacting tongues or wings are used in place thereof, they cause binding and make a hard-working joint which consumes power and entails unusual wear. This is not the case with the present construction, because no such efforts are involved by the coupling member, which has free universal movement. This coupling member, however, is held in operative relation with the shaft sections by transverse pins, and although four of them have been described, this may not be necessary in all cases. The primary function of these pins is to prevent endwise separation of the shaft sections. In the organization shown they do not act as driving factors but subserve merely the function noted. As I have already stated, they are related with the coupling member and the shaft sections in a highly novel manner, so that they can subserve their office of maintaining the shaft sections and coupling member in assembled relation and especially against endwise movement without unnecessary friction or wear.

There may be cases where it is desirable to hold the pins 21 in position without fear of accidental displacement, and the means by which this result is obtained can vary decidedly as to character. The bearings 4 may be provided with latches as 25 pivoted thereto and having at their ends the projections 26 to be snapped into openings in the ends of the respective pins 21.

I desire to call attention to the fact that the joint will operate from any angle from zero up to 45 degrees. In automobiles the angle rarely exceeds 8 degrees. For general machines, however, such as multi-spindle drills, milling machines and other apparatus of this type there exist rare cases in which the angle is greater than 40 degrees which is within the range of the joint.

It is a simple and easy matter to assemble the parts; for instance, the segment 13 will be introduced in its seat 15 in the member 2, and the pins 21 will be passed through the openings 20 of the coupling member 12 and afterward latched in place by the latches 25. The member 3 will be brought at right angles to the member 2 and the segment 14 will then be seated in the seat or groove 16 and the part 14 subsequently pinned in place by the appropriate pins 21 which go through openings 20 at right angles to the openings in which the other pins have been inserted in the coupling member 12. The pins last applied will then be latched in place by the appropriate latches 25.

What I claim is:

1. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective segmental portions, and means for connecting the coupling member to the main members permitting movement thereof about transverse axes and at the same time preventing separation of the main members said axes being in the same plane transversely of the joint.

2. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive said transverse portions, and means for pivoting the coupling member to the main members for movement about transverse axes and at the same time to prevent separation of the main members said axes being in the same plane transversely of the joint.

3. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective segmental portions, the segmental portions being in contact with the sides of the seats and out of contact with the bottoms thereof, and means for connecting the coupling member with the main members for movement about transverse axes and at the same time for preventing separation of the main members said axes being in the same plane transversely of the joint.

4. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having transverse seats, the sides of the segmental portions being in contact with the sides of the seats and the bottoms of the segmental portions being spaced from the bottoms of the seats, and means for pivoting the coupling member to the main members for movement about transverse axes said axes being in the same plane transversely of the joint.

5. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions, the sides of which are parallel throughout their depth, the main members having corresponding transverse circular seats to receive the respective segmental portions, the sides of the segmental portions being parallel throughout their depth and in contact with the sides of the seats, the bottoms of the segmental portions being spaced from the bottoms of the seats, and means for pivoting the coupling member to the main members for movement about transverse axes and in the same plane between the bottoms of the seats.

6. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective segmental portions, and means for pivoting the coupling member to the main members for movement about transverse axes, the curved parts of the transverse segmental portions being formed on arcs struck respectively from said axes said axes being in the same plane transversely of the joint.

7. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive said transverse portions and the main members also having bearings, and four pivots supported by the respective bearings and extending into the coupling member at approximately right angles to each other the axes of said pivots being in the same plane transversely of the joint.

8. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members hav-

ing corresponding transverse seats to receive said transverse portions and the main members also having bearings, and four pivots supported by the bearings and extending into the coupling member at approximately right angles to each other, the curved faces of the segmental portions being on arcs struck from the axes of the respective pivots the axes of said pivots being in the same plane transversely of the joint.

9. A coupling member for universal joints, comprising two opposite segments at right angles to each other, said segments having a common central plane, each segment overlapping the plane approximately one-half the thickness thereof and having bearing holes in the overlapped portions at right angles to each other, the curved faces of the segments being on arcs struck from the axes of the respective holes.

10. A coupling member for universal joints comprising two opposite segments at right angles to each other, the segments overlapping approximately one-half the thickness thereof, said overlapping portions being provided with bearings, the bearings having holes at right angles to each other, and the curved faces of the segments being struck from the axes of the respective holes, the holes being on a common plane.

11. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the transverse portions, and two pairs of pivots for connecting the coupling member for universal movement with the respective main members, the pairs of pivots being at right angles to each other and their inner ends being coned and in engagement.

12. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective transverse segmental portions, bearings carried by the respective main members at right angles to each other, and four pins carried by the bearings, the coupling member having holes to receive the respective pins the axes of said pins being in the same plane transversely of the joint.

13. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective transverse segmental portions, bearings carried by the respective main members at right angles to each other, and four pins carried by the bearings, the coupling member having corresponding transversely alined holes to receive the respective pins, and latches carried by the respective bearings and engaging the pins to prevent their accidental displacement the axes of the pins being in the same plane transversely of the joint.

14. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main members having corresponding transverse seats to receive the respective segmental portions, bearings carried by the main members and at right angles in pairs to each other, pins carried by the bearings and also in transverse pairs to each other, the bearings having pivoted latches, and pins extending into the bearings and coupling member, the latches being resilient and being adapted to be sprung into the ends of the pins.

15. A universal joint comprising two main members, an intermediate coupling member, the coupling member having transverse segmental portions and the main member having corresponding transverse seats to receive the respective segmental portions, bearings carried by the respective main members, pins extending through the bearings for pivotally connecting the coupling member thereto for movement about transverse axes, the bearings being rounded and the ends of the segmental portions having seats to receive the ends of the bearings.

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

CHARLES W. SPONSEL.

Witnesses:

L. L. MARKEL,

HEATH SUTHERLAND.