

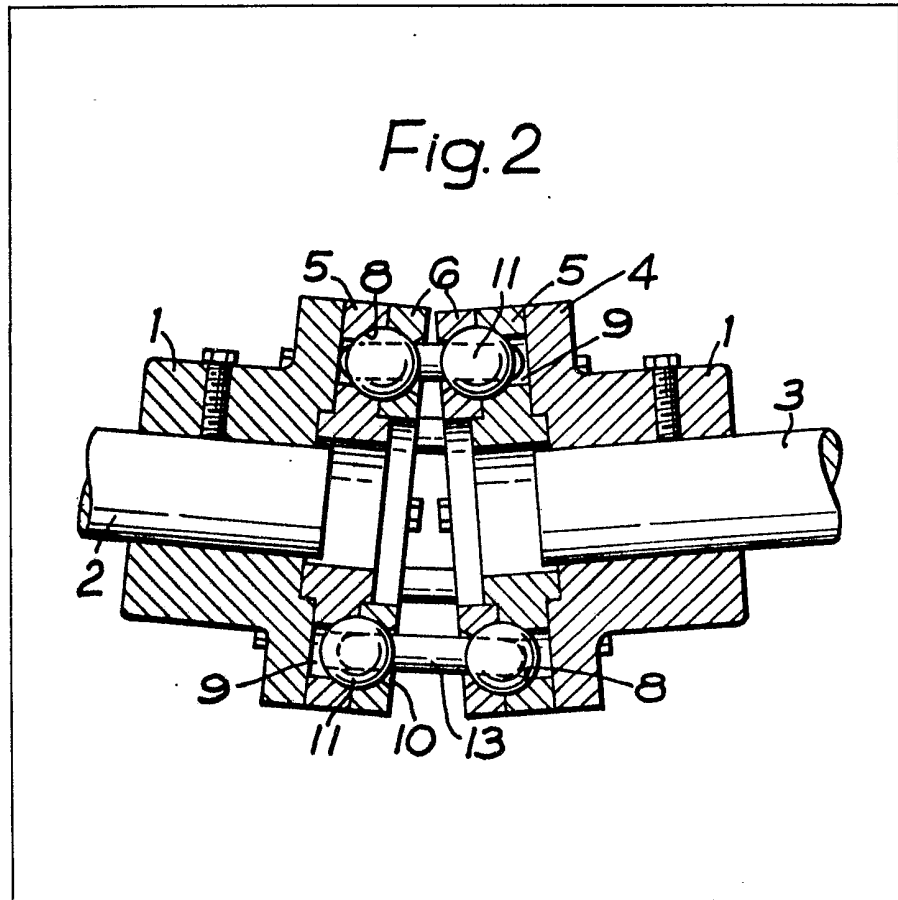
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(71) Applicant  
Alfredo Guillermo  
Arteaga, A.V. Quintana  
127, Buenos Aires,  
Argentina  
(72) Inventor  
Alfredo Guillermo Arteaga  
(74) Agents  
Barlow, Gillett & Percival

(54) Universal joints

(57) Each member to be coupled  
comprises ball and socket joints, the

balls 11 of which have cylindrical  
bores. Pins 13 are slidable in the bores  
to form a coupling allowing a degree  
of flexible movement.



The drawing originally filed  
was informal and the print here  
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later filed formal copy.

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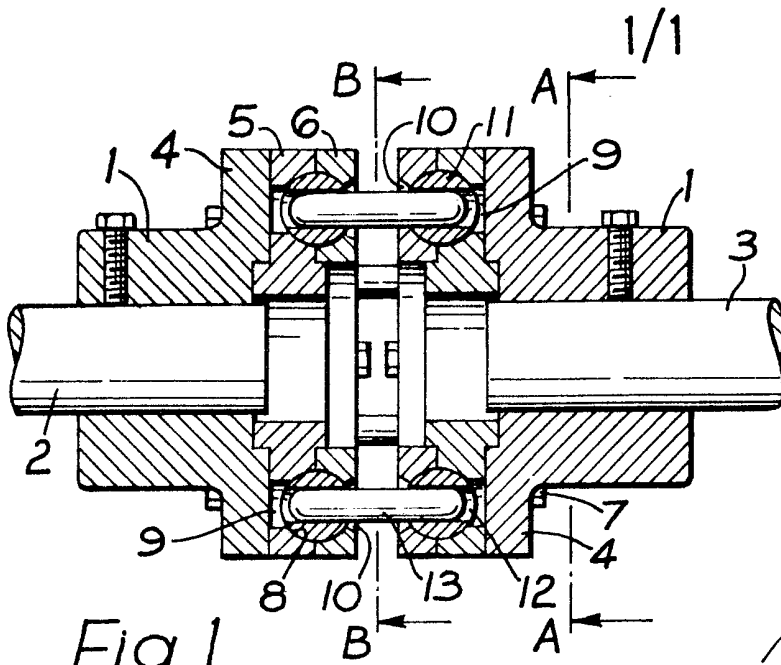


Fig. 1

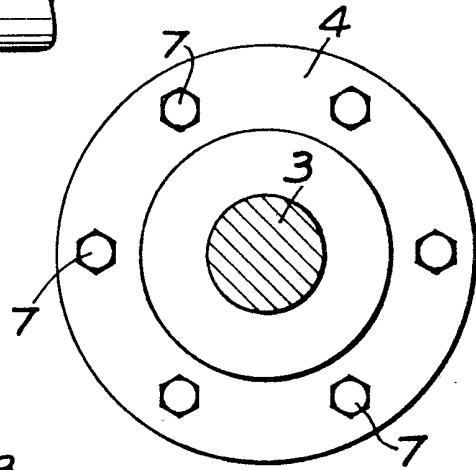


Fig. 4

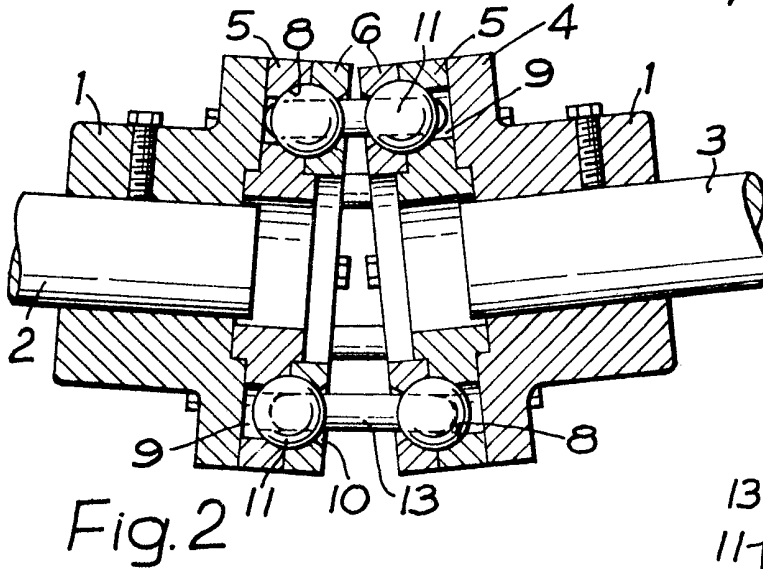


Fig. 2

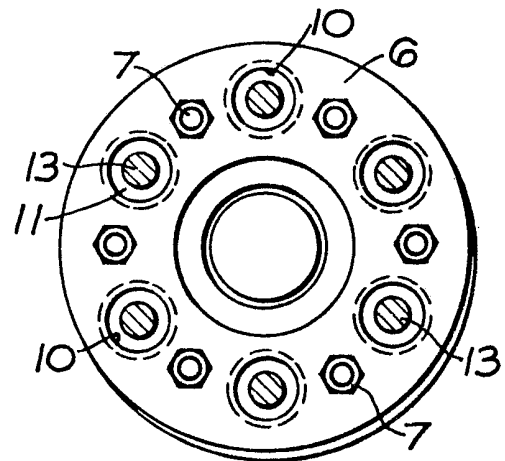


Fig. 5

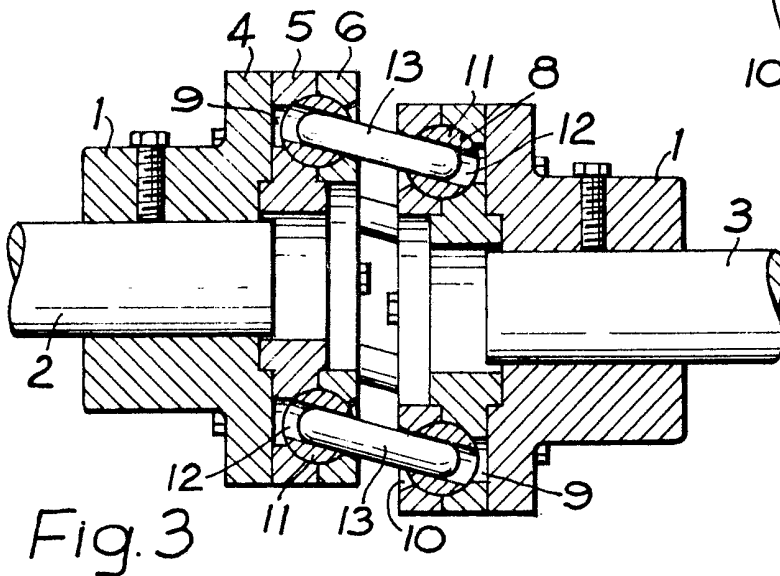


Fig. 3

## SPECIFICATION

## Coupling

The present invention relates to a new kind of flexible coupling for use between the ends of two rotary shafts, one of which may be a driving shaft driven by a driving means and the other a receiving shaft operative to transmit the rotary movement to a machine which, as a result of its characteristics and functioning, is subjected to vibrations and/or displacements which have to be absorbed by the coupling without deterioration of the rotational speed.

At present couplings directed to this same end are known which depend on the employment of relatively delicate component parts. Such couplings are generally satisfactory but suffer from the drawbacks caused by the constant deterioration of the said delicate parts caused by their natural structural weakness and which make it necessary with corresponding economic and production disadvantages to stop plants for their exchange.

According to the present invention there is provided a coupling for use between the adjacent ends of two shafts, comprising two coupling members each in use being attached to a respective one of said shaft ends, each coupling member having a plurality of ball and socket joints disposed equiangularly and circumferentially thereof, and a plurality of pins between the coupling members, each pin at its opposite ends extending into and slidable within corresponding apertures in ball members in a corresponding pair of said ball and socket joints so as to permit flexible relative movement between said coupling members.

The type of coupling which is proposed bases its action on the strategic application of a multiplicity of ball joint means of linkage between both shafts, totally integrated by steel parts which guarantee an excellent functional result, for an unlimited period of time, given that practically there are no inclinations to wear out. Moreover, the invention enables the absorption of displacements and torsions of greater range than those achieved by known couplings based on the use of soft elastic materials.

The invention will hereinafter be further described by way of example with reference to the accompanying drawings in which:

Fig. 1 is an axial cross-section through a coupling constructed in accordance with the present invention, between shafts at the moment when they correspond to one and the same axial line;

Fig. 2 is an axial cross-section through the coupling of Fig. 1 when the axes of the coupled shafts are angularly displaced;

Fig. 3 is an axial cross-section through the coupling of Fig. 1 at an instant when the axes of the coupled shafts are displaced parallel to one another.

Fig. 4 is a cross-sectional view along the line

A—A of Fig. 1.

Fig. 5 is a cross-sectional view along the line B—B of Fig. 2.

In order to associate the said drawings with the description which will be given hereinafter, identical parts which can be seen in the various Figures of the drawings have been identified with a common reference numeral.

The type of flexible coupling between shafts to which reference is made is constituted by two equal units, each one of which is applied at the ends of the shafts to be linked. They consist of an adapting and fixing sleeve around the end of the corresponding shaft 2 or 3. The said sleeve 1 has, in its rear part, an annular concentric projection 4 on whose plane front are applied successively annular bodies 5 and 6, of plane surfaces which are fixed together by means of bolts 7 which cross them jointly with the said annular projection 4. These annular bodies 5 and 6 have, as from their surfaces of tangency, various hemi-spherical cavities, radially equidistant and whose axes are normal to one and the same circumferential line coaxial to the said sleeve 1. From the union of these annular bodies 5 and 6, there result from the coincidence of the said hemi-spherical cavities the spherical hollows 8, which communicate at the rear with corresponding cylindrical spaces 9 formed in the annular body 5 and with respective conical mouths 10 formed in the annular body 6. In the interior of these spherical hollows 8 there are housed respective balls 11 which are traversed by the continuous orifices 12 through which there play free the end portions of corresponding pins 13 which constitute the means of mutual linkage between the confronting sleeves of each shaft 2 or 3.

The free ball play of the balls 11 within the spherical hollows 8 and the linear movement which the pins 13 associated with them are able to perform, make it possible to absorb the axial differences which may occur between the shafts 2 or 3, at the times of start and stop as thus also through vibrations, torsions and accelerations, the nexus between the said shafts always being the pins 13, capable of varying their angularity within the limits set on them by the inclined planes of the conical mouths 10 of the respective annular bodies 6, through which they project. Moreover, the minimum diameter of the said mouths 10 is greater than that of the continuous orifices 12 of the balls 11 and therefore of the pins 13, so that the play to which these latter can be taken does not constitute an impediment in their drive. The cylindrical spaces 9 opposed to the mouths 10 have the object of serving as receivers for the ends of the pins 13 in the cases of a very pronounced torsion.

From the description and what is shown in the accompanying drawings there are clearly demonstrated the advantages of a constructional and functional order which characterise the invention in question, it not being considered necessary to expound in greater detail on the matter.

## CLAIMS

1. A coupling for use between the adjacent ends of two shafts, comprising two coupling members each in use being attached to a respective one of said shaft ends, each coupling member having a plurality of ball and socket joints disposed equiangularly and circumferentially thereof, and a plurality of pins between the coupling members, each pin at its opposite ends extending into and slidable within corresponding apertures in ball members in a corresponding pair of said ball and socket joints so as to permit flexible relative movement between said coupling members.
2. A coupling as claimed in claim 1 in which each aperture in each ball of the ball and socket joints extends entirely through the ball and is of a cross-section corresponding to the cross-section of the pin which it receives.
3. A coupling as claimed in claim 1 or 2 in which mouth portions, of each of said coupling members, adjacent said balls of said ball and socket joints are of frusto-conical form with their widest portions in use facing outwardly towards the other coupling member, said mouth portions being operative to determine a maximum angular displacement of the ball and pin combinations.
4. A coupling as claimed in any preceding claim in which each coupling member comprises a sleeve with a coaxial annular projection in which there is provided a plurality of spherical sockets of said ball and socket joints, said socket being radially and equidistantly distributed.
5. A coupling as claimed in any preceding claim wherein said coupling members are adapted for attachment to the ends of respective shafts.
6. A coupling substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.