

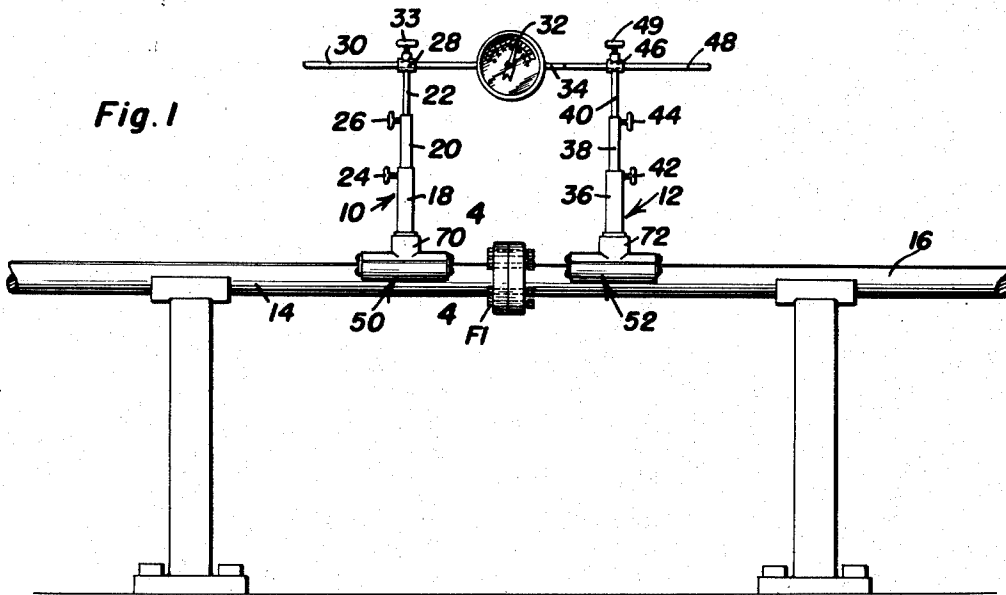
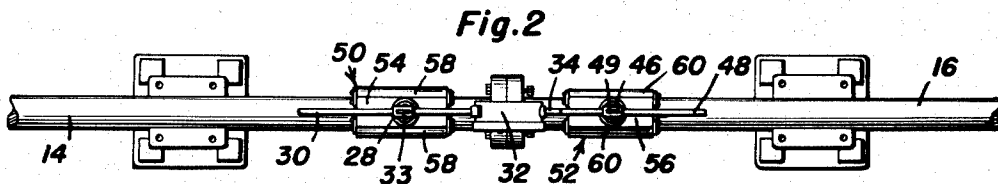
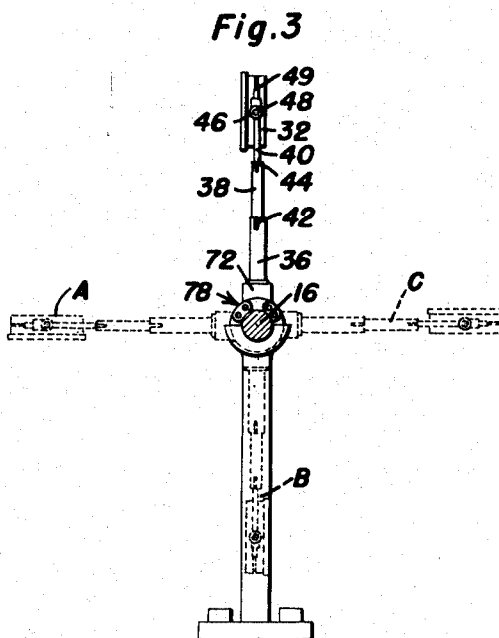
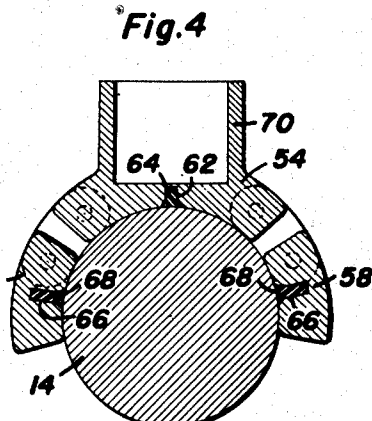
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C. J. HARDING
ALIGNING DEVICE

2,656,607

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2 Sheets-Sheet 1



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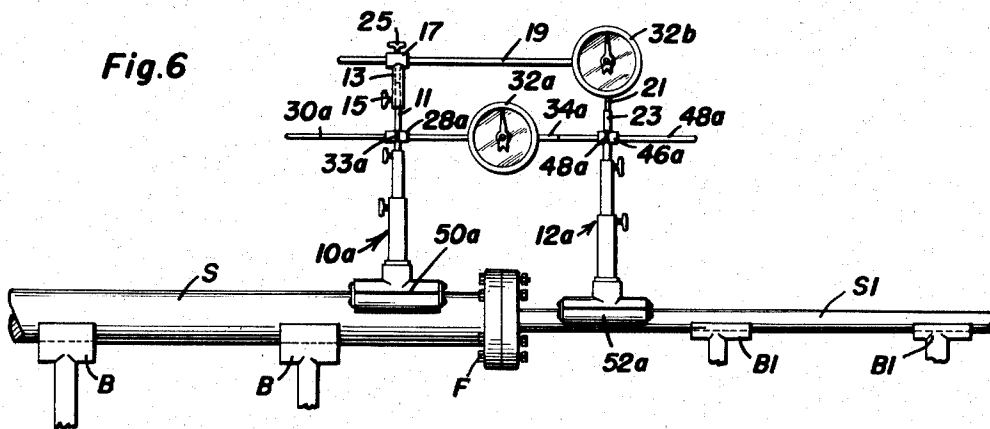
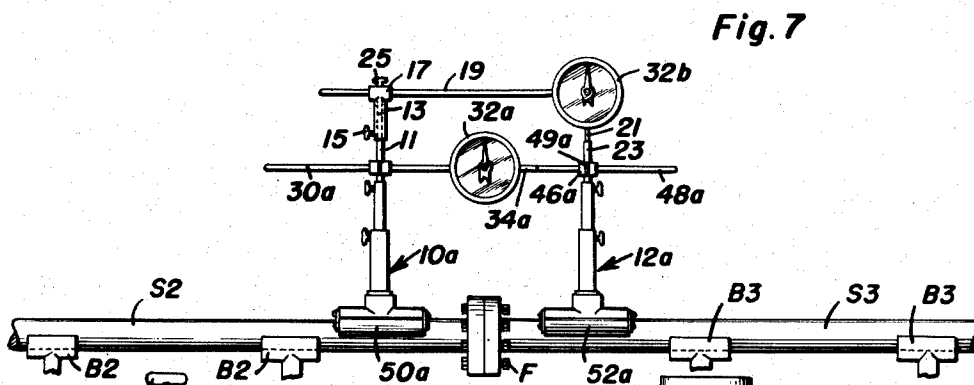
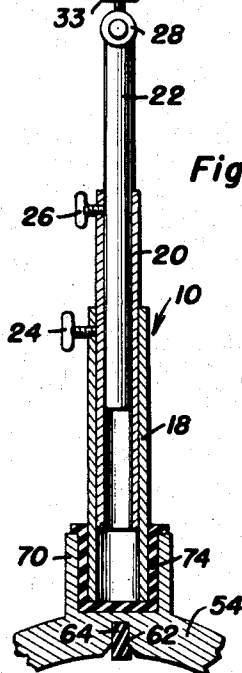
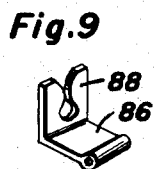
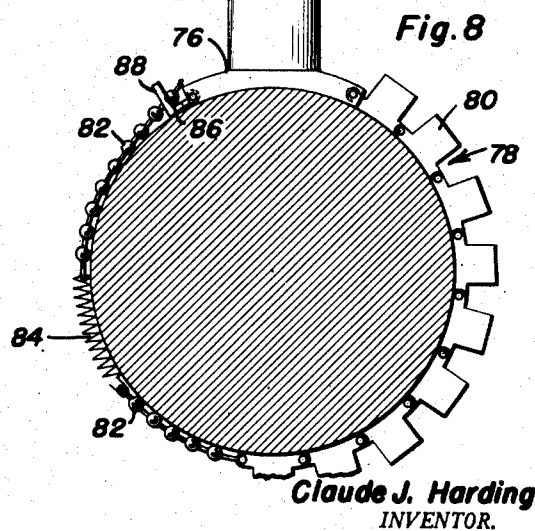
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C. J. HARDING
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ALIGNING DEVICE

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3 Claims. (Cl. 33—84)

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This invention relates to new and useful improvements in aligning and gauging devices and the primary object of the present invention is to provide a device for aligning the inter-connected or coupled shafts of a turbine or the like.

Another important object of the present invention is to provide an apparatus for aligning shafting and which also embodies the necessary elements for assuring equal placement of the shaftings in their supporting bearings.

A further object of the present invention is to provide a shafting aligner composed of telescoped supports having novel and improved means for attaching the supports to the adjacent ends of inter-connected shaftings.

A still further aim of the present invention is to provide an aligning device of the aforementioned character that is extremely small and compact in structure, strong and reliable in use, efficient and durable in operation, inexpensive to manufacture, assemble and install, and otherwise well adapted to the purposes for which the same is intended.

Figure 1 is an elevational view showing the present invention applied to the inter-connected ends of a pair of shafts;

Figure 2 is a plan view of Figure 1;

Figure 3 is an end view of Figure 1;

Figure 4 is an enlarged detailed vertical sectional view taken substantially on the plane of section line 4—4 Figure 1 and with the support removed from the socket portion of the fastening member;

Figure 5 is an enlarged fragmentary vertical sectional view of one of the supports shown in Figure 1;

Figure 6 is an elevational view showing the invention in slightly modified form in use for aligning shafts of various diameters and for properly positioning the shafts in their supporting bearings;

Figure 7 is a side elevational view showing the aligning apparatus of Figure 6 employed in conjunction with two shafts of equal diameter;

Figure 8 is an enlarged transverse vertical sectional view of a shaft and showing the support fastenings in modified form; and,

Figure 9 is a perspective view of the fastening bracket employed with the fastening member of Figure 8.

Referring now to the drawings in detail, wherein for the purpose of illustration, there is disclosed a preferred embodiment of the present invention, the numerals 10 and 12 represent a pair of supports that are adapted for mounting on the

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adjacent inter-connected and coupled ends of a pair of shafts, such as shafts 14 and 16. Support 10 is composed of a plurality of telescoped sections 18, 20 and 22. The section 18 carries a set screw 24 engaging section 20 and section 20 carries a set screw 26 engaging section 22, to permit longitudinal adjustment of the sections forming the support 10.

A transverse sleeve 28 is fixed to the outer end of section 22 and slidably receives the supporting arm or rod of an indicator or gauge 32 of known construction, such as a Brown and Sharp indicator. The arm 30 is held in sleeve 28 by a set screw 33. The indicator 32 includes a needle 15 actuating stem 34 which is pressed upwardly by a delicate spring. The dial of the indicator is provided with graduations preferably in thousandths of an inch.

Support 12 is also composed of telescoped sections 36, 38 and 40 that are progressively reduced in cross section in the order named. Section 36 carries a set screw 42 that engages section 38, and section 38 carries a set screw 44 that engages section 40, to permit longitudinal adjustment of the sections relative to each other. A transverse sleeve 46 is fixed to the outer end of section 40 and slidably receives a rod element 48 that is held in sleeve 46 by a set screw 49.

Means is provided for detachably securing or retaining the supports on their respective shafts. This means comprises a fastening or holding members 50 and 52. The members 50 and 52 include elongated concave or convex magnetic base plates 54 and 56 whose side edges are pivotally secured to the side edges of elongated concave-convex side sections or magnetics 58 and 60. The concave surfaces of the base plates 54 and 56 are each provided with a central groove 62 in which rubber strips 64 are frictionally or yieldingly retained. The concave surfaces of the sections 58 and 60 are also each provided with a central longitudinal groove 66 in which rubber strips 68 are frictionally or yieldingly held.

Base plates 54 and 56 are formed with sockets 70 and 72 in which sleeves 74, of insulating material, are disposed. The inner ends of the sections 18 and 36 are positioned in the sleeve 74 of the sockets 70 and 72.

The securing means for these supports may assume the forms shown in Figures 3 and 8. In this embodiment, the fastening members for the base plates 76 of the supports are attached to articulated members 78. The members 78 each include link sections 80 that are pivotally connected together with one end link section of each

member 73 pivoted to its base plate and with the other end link section of each section 73 pivoted to a ball chain 22 having its central portion replaced by a coil spring 84. An angle bracket 84 is pivoted to each base plate and the angle brackets are provided with slotted flanges 32 that will accommodate the free ends of the ball chains 32. In this manner the members 73 will embrace the shafts and be yieldingly retained thereon to hold the supports 10 and 12 relative to their shafts 14 and 16.

In practical use of the present invention, the fastening member 50 of the support 10 is applied to the shaft 14 and the fastening member 52 of the support 12 is applied to the shaft 16. The members 50 and 52 are disposed at the adjacent ends of the shafts 14 and 16 and the rod 43 is adjusted to engage the stem 34 in order to place the needle of the gauge 32 in a predetermined position. Then, the set screw 49 is tightened to retain the needle in its predetermined position. Next, the supports 10 and 12 are rotated forwardly with the shafts 14 and 16 to the position A shown in Figure 3 by dotted lines. A reading of the dial gauge is then made to determine whether or not the shafts 14 and 16 are aligned. The supports are next rotated with the shafts 14 and 16 downwardly to the vertical position shown by dotted lines B in Figure 3 and a second reading of the dial made. The supports 10 and 12 are then rotated rearwardly with the shafts 14 and 16 to the horizontal position shown by dotted lines C in Figure 3 and a third reading of the dial made.

If the needle of the indicator 32 does not change during the various positionings of the supports 10 and 12 as illustrated by dotted lines in Figure 3, then shafts 14 and 16 are properly aligned. However, movement of the needle of the gauge will require raising or lowering of one of the shafts 14 and 16 relative to the other shaft. After the shafts have been properly aligned the fasteners F1 joining their flanged ends are tightened in order to retain the shafts in their aligned, coaxial relationship.

Figures 6 and 7 show the invention in slightly modified form, whereby a pair of shafts may be aligned with the pair of bearings for each shaft also aligned with each other to carry an equal portion of the weight of their supported shafts. In order to accomplish this result, the sleeves 23a and 46a of the supports 10a and 12a are again provided with set screws 33a and 49a that respectively engage the supporting rod 30a of an indicator 32a and a horizontal rod element 48a. The rod element 48a is disposed coaxial with and engages the needle actuating stem 34a of the indicator 32a.

A small post element 11 is fixed to and rises from the sleeve 33a and a tube 13 is telescoped over the upper end of the post element 11 and is held thereon by a set screw 15. A horizontal sleeve 17 formed at the upper end of the tube 13 slottably receives the holding arm or rod 19 of an indicator 32b having its needle actuating stem 21 extending downwardly into contact with a vertical rod element 23 fixed to and extending upwardly from the sleeve 46a. A set screw 25 carried by the sleeve 17 engages and prevents sliding movement of the rod 19 in sleeve 17 after the stem 21 has been aligned with the rod element 23.

The supports 10a and 12a include holding members 50a and 52a whereby the same may be applied and held on the adjacent ends of a pair

of different diameter shafts S and S1. The shaft S is supported in a pair of bearings B and the shaft S1 is supported in a pair of bearings B1. The adjacent flanged ends of the shafts are coupled together by circumferentially spaced fasteners F that are loosened to permit slight lateral adjustment of the shafts until they are aligned with each other.

The gauge or indicator 32a will permit the shafts S and S1 to be aligned by observing the needle of the indicator 32a as the supports and shafts S and S1 are rotated 90 degrees, 180 degrees, 270 degrees and 360 degrees and moving the shafts relative to each other until the needle of the indicator fails to change during rotation of the supports to the desired stopping points.

Since the gauge 32a is responsive to angular displacement of the shafts S and S1, the gauge 32a may show the shafts S and S1 in alignment even though the shafts S and S1 are not coaxial. The gauge 32b is responsive to offset instead of angular displacement. Consequently, if bearings B and B1 are not coaxial, the shafts S and S1 will rotate about different axes so that the gauge 32b will indicate the axial offset of the shafts in their bearings and the bearings may be moved back and forth until no movement of the needle for the indicator 32b occurs as the supports 10a and 12a are rotated with the shafts 90 degrees, 180 degrees, 270 degrees and 360 degrees. Then, the fasteners F are tightened in order to hold the shafts coaxial with each other.

The above procedure may also be followed for two shafts S2 and S3 of equal diameter and are supported in pairs of bearings B2 and B3 respectively, as shown in Figure 7 so that the shafts will be aligned with each other with each bearing carrying its share of the weight of its shaft.

Obviously, the fastening members 50a and 52a include in conjunction with the supports 10a and 12a of Figures 6 and 7 may be replaced by the mechanical fastening members or articulated members 73 illustrated in Figure 8 of the drawings so that the supports may be rotated to a desired position and retained in such position by the action of the spring 84 rather than the magnets forming the fastening members.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A shaft aligner comprising a pair of supports, means carried by each of the supports for attaching the same to adjacent ends of a pair of shafts, an indicator mounted on one support and having a needle actuating stem extending toward the other support, and a rod element carried by said other support engaging the stem, said means comprising a curved magnetic base plate, a pair of curved magnetic base plate sections hinged to the base plate, and a rubber strip carried by each section and said base plate.

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2. A shafting aligning apparatus comprising a pair of supports each composed of telescoped sections, a pair of concavo-convex magnetic base plates having sockets formed thereon, said supports having inner sections held in said, 5 sockets, a pair of concavo-convex magnetic base sections pivotally secured to each base plate, a rubber strip carried by each base plate, additional rubber strips carried by each base section, an indicator supported on one of said supports and having a needle actuating stem disposed perpen- 10 dicular to both supports, and a rod held on the other of the supports disposed coaxial with and engaging the stem.

3. A shafting aligning apparatus comprising a 15 pair of supports each composed of telescoped sections, a pair of concavo-convex magnetic base plates having sockets formed thereon, said supports having inner sections held in said sock- 20 ets, a pair of concavo-convex magnetic base sections pivotally secured to each base plate, a rubber strip carried by each base plate, additional rubber strips carried by each base section, an

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indicator supported on one of said supports and having a needle actuating stem disposed perpen- dicular to both supports, and a rod held on the other of the supports disposed coaxial with and engaging the stem, and an insulating sleeve in each socket embracing the inner sections of said supports to prevent the magnetic base plates and sections from interfering with the reading of the indicator.

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