No. 726,259. PATENTED APR. 28, 1903.

W. B. CULVER.

PUMP.

APPLICATION FILED APR. 13, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

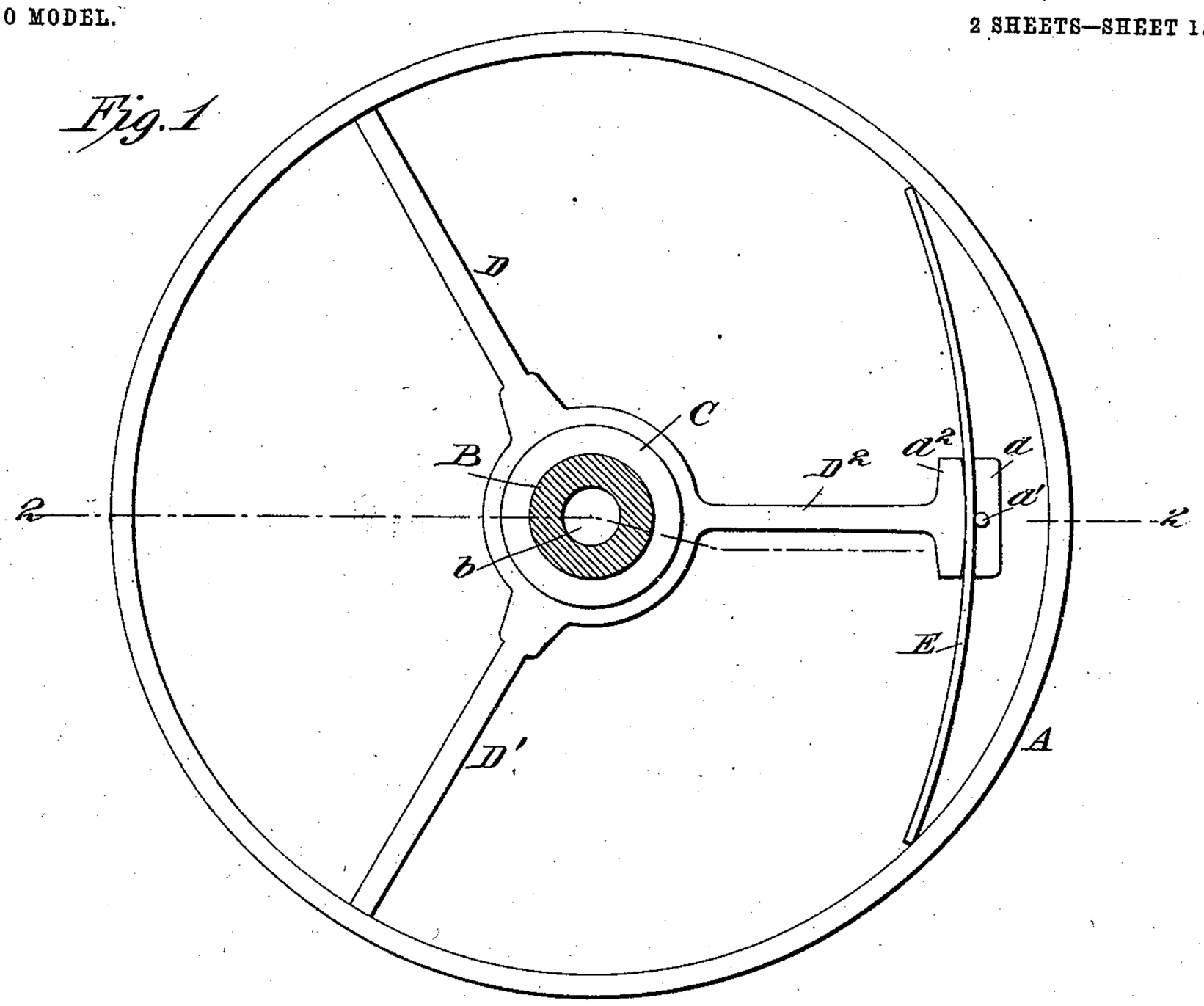
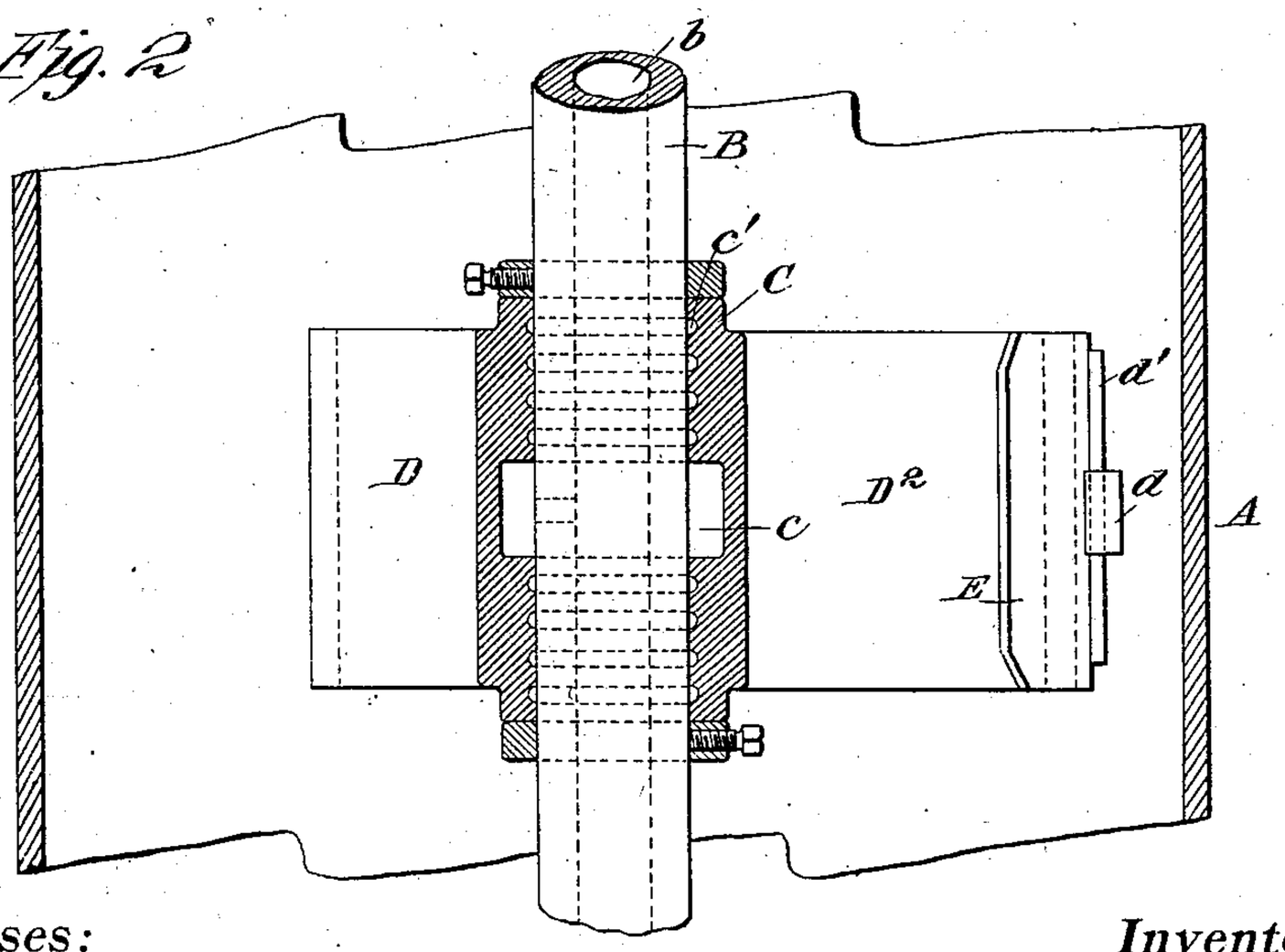


Fig. 2



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

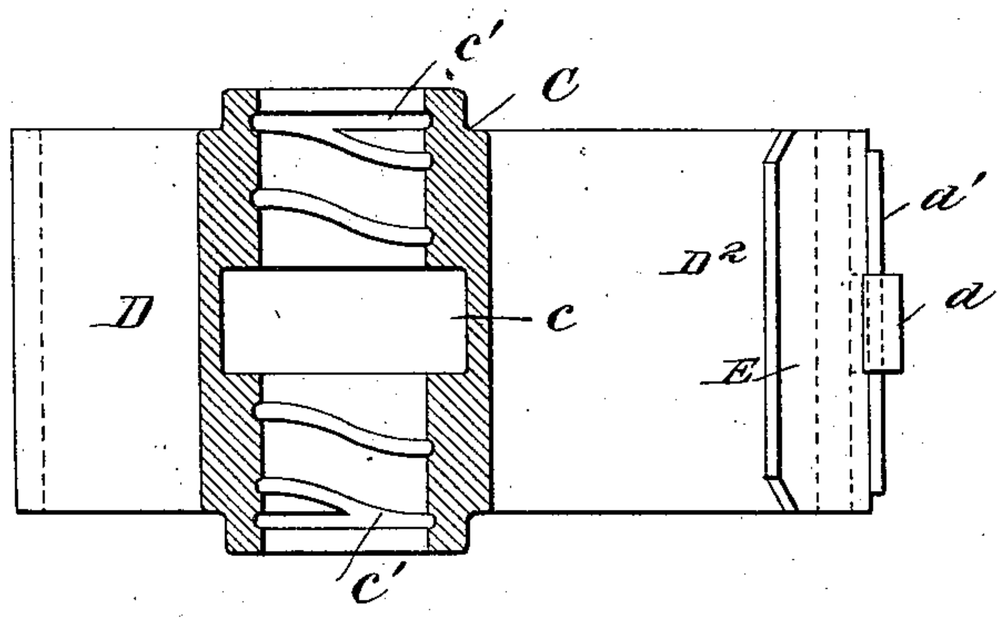
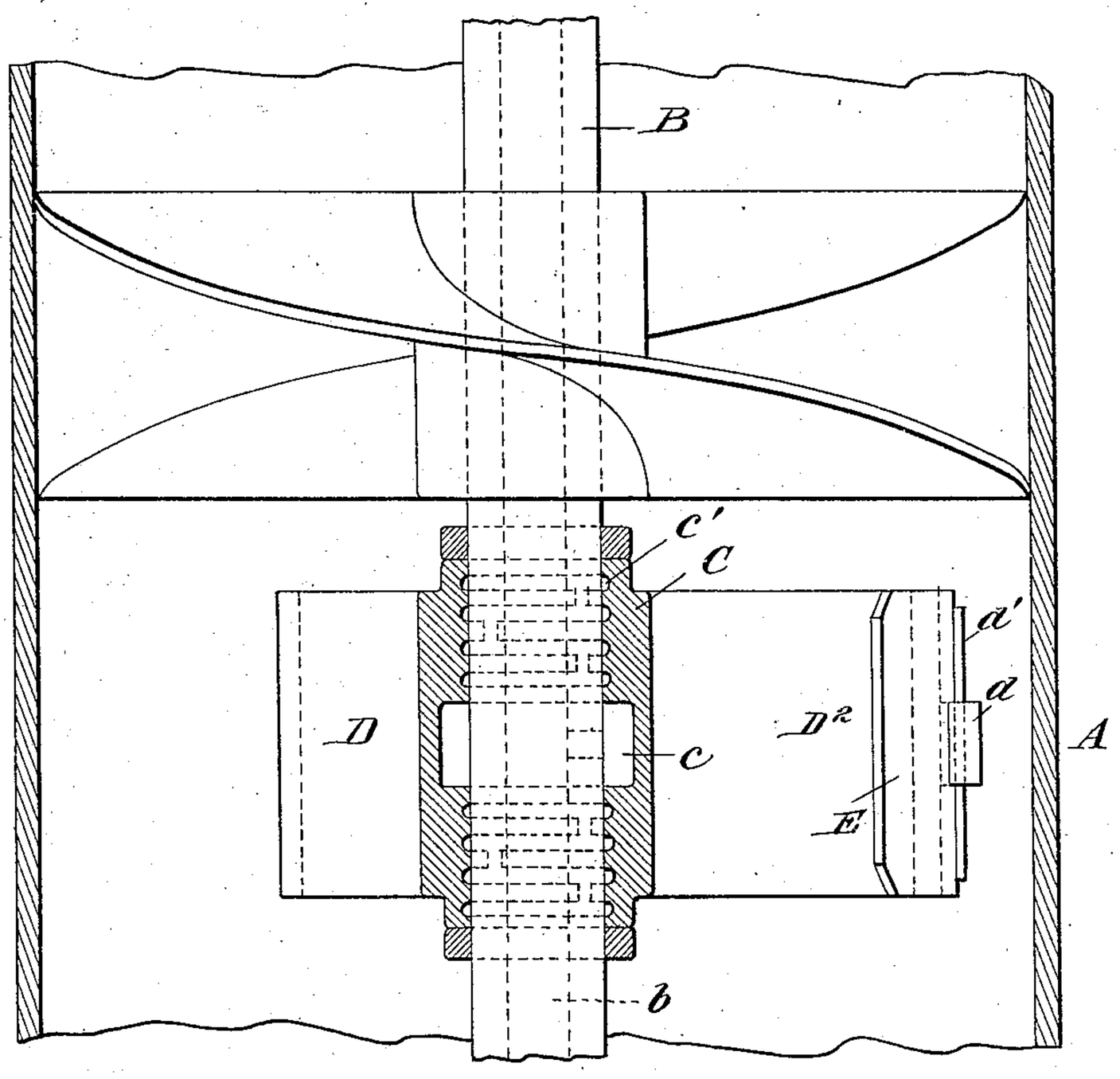


Fig. 4



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UNITED STATES PATENT OFFICE.

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PUMP.

SPECIFICATION forming part of Letters Patent No. 726,259, dated April 28, 1903.

Application filed April 13, 1901. Serial No. 55,677. (No model.)

To all whom it may concern:

Be it known that I, WILLARD B. CULVER, a citizen of the United States, residing at Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented a certain new and useful Improvement in Pumps, of which the following is a specification.

The present invention, while capable of use in connection with pumps of other types, is particularly designed for use in rotary pumps employing a casing within which operates a shaft having mounted thereon screws or propellers by means of which water or other material is elevated within such casing. Rotary pumps of this type necessarily employ water-guides by means of which the tendency of the water on leaving the propellers to swirl around within the casing is overcome, and in addition means must be provided for journaling and centering the rotary shaft. A single instrumentality may be employed to perform both functions, or, if desired, separate instrumentalities may be employed for each.

The object of the present invention is to provide such an instrumentality which may be employed for either or both of the purposes last named—*i. e.*, either as a bearing for the rotary shaft or as a guide for the material being elevated within the casing, or as both such bearing and guide.

In carrying out the invention I employ a hub through which the shaft is adapted to be passed and which is provided with a suitable bearing-surface to coact with the exterior of such shaft and with means for feeding a suitable lubricant to such bearing. Extending outwardly from such hub are preferably radial arms extending to and coacting with the interior of the pump-casing. These arms may, if desired, take the form of flat plates, arranged perpendicularly or inclined within the casing in order that they may serve as guides or deflectors of the material being elevated therein. One or more of such arms is provided with means for making yielding contact with the interior of the casing in such manner as that pressure will be exerted on the hub, which shall be opposed by the remaining arms and which will result in accurately centering the hub within the casing.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a horizontal section of a rotary pump provided with my invention. Fig. 2 is a section taken on the line 2 2 of Fig. 1. Fig. 3 is a sectional view of one of the hubs through which the pump-shaft passes, illustrating a somewhat different form of the bearing-surface of said hub; and Fig. 4 is a horizontal section of a rotary pump, illustrating a modified construction of the bearing-surface of the hub.

Referring to the drawings, in which similar letters denote corresponding parts, A designates a pump-casing circular in cross-section and which may be either continuous from end to end or made up of a number of sections, as desired. Within this pump-casing operates a rotary shaft B, here shown as provided with a central perforation *b* for the supplying of lubricant to the bearings in which such shaft is mounted.

C designates a hub, preferably of cast metal and provided with a central vertical perforation designed to receive the shaft B. If desired, this perforation may have a bushing of Babbitt metal or other suitable material. Intermediate of its ends the hub C is provided with a recess *c*, designed to receive a suitable lubricant, which is fed into said recess by means of an oil-port communicating with the interior of the rotary shaft B. Also intermediate of the ends of the hub C and on either side of the lubricant-chamber *c* are annular grooves or recesses *c'*, which may be formed separate from each other, as shown in Fig. 2, or which may communicate with each other, as shown in Fig. 4, or which, finally, may take the form of continuous spiral grooves, as shown in Fig. 3. The purpose of these grooves or annular recesses is to receive lubricant supplied to the chamber *c* either through the hollow pump-shaft or otherwise and to oppose the admission of foreign substances to the interior of the bearing.

The hub C is provided with supporting-arms, here shown as extending radially from said hub and coacting with the interior of the casing. They may, if desired, be formed integral with the hub C or, if preferred, may be of sheet-steel or other material secured to

the hub in any suitable manner. In the present embodiment of the invention I have shown three such arms D D′ D^2, two of which, D D′, are of such length as that when their distant ends are in contact with the interior of the casing the hub C will be in the exact longitudinal center of such casing. The third arm D^2 terminates short of the casing and is provided at its free end with a device adapted to exert such pressure upon the hub C as to maintain the remaining arms in close contact with the interior of the casing and the hub in the exact longitudinal center of such casing. This device is here shown as consisting of a flat steel spring E, provided with a central opening or slot of such size as to receive a stud *d*, formed upon the enlarged end of the arm D^2. Preferably the slot in the spring E and the stud *d* on the arm D^2 will be rectangular in shape, so as to prevent the spring E from turning upon such stud. In order to maintain the spring in position on the stud *d*, I preferably perforate the latter and provide a pin *d′*, coacting with said perforation and confining the spring between said pin and the block d^2 upon the arm.

As will be seen, I have herein illustrated and described a construction designed to perform the two functions hereinbefore referred to—*i. e.*, that of a bearing for the rotary pump-shaft and that of a guiding mechanism to guide or deflect the water or other material being elevated within the pump-casing. The arms D D′ D^2, here shown as arranged perpendicularly within the pump-casing, (although they may be inclined at an angle thereto,) are of such height as that the swirling motion of the water due to the action of the rotary propellers will be overcome and such water caused to pass upwardly in a substantial perpendicular. In addition to providing for the guidance of the water within the pump-casing the arms maintain the hub C, serving as the bearing for the rotary shaft, in the longitudinal center of the casing. It is obvious, however, that, if desired, the construction herein described may be readily so modified as that the structure described will perform only the function of centering the rotary shaft, in which case, if preferred, other means may be employed, either separable from or combined with the hub C, for guiding or deflecting the water within the casing.

In operation where a continuous pump-casing is employed the pump-shaft may be provided at suitable intervals with propellers and with hubs and their attached mechanism, as herein described. The whole may be forced into the pump-casing, and, due to the pressure exerted by the springs E, the arms D D′ of each hub will be maintained in contact with the interior of the casing, so as to assure accurately locating the shaft in the longitudinal center of the casing. The shaft B and the propellers secured thereto may then be rotated by any suitable means. The free end of the shaft may be connected with a source of oil-supply, and such lubricant fed under pressure or otherwise to the interior of each of the hubs C by means of the ports through such shaft and which communicate both with the interior *b* thereof and with the chambers *c*, formed in the hubs. The lubricant will also be forced from the chamber *c* into the recesses or grooves *c′*, so as to provide not only for the complete lubrication of the shaft at each wearing-surface, but also to preclude the admission of sand or other foreign matter thereto.

What I claim is—

1. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, a hub through which said shaft passes, a part connected to said hub which exerts yielding pressure against the interior of said casing at one side, and a part also connected to said hub, on the other side, which has a rigid bearing against the interior of said casing and opposes the application of said yielding pressure, substantially as described.

2. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, substantially rigid arms extending from said hubs and coacting with the interior of said casing, and an arm or arms also extending from said hubs and exerting yielding pressure against the interior of said casing, substantially as set forth.

3. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, arms, substantially rigid, extending radially from said hubs and coacting with the interior of said casing, and a spring arm or arms also extending from said hubs and exerting yielding pressure against the interior of said casing, substantially as set forth.

4. In a pump the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, radial arms extending from said hubs, their ends being independent and coacting directly with the interior of the casing, and means other than said arms for exerting yielding pressure upon said hubs to maintain the same in the longitudinal center of the casing and said radial arms in contact with the interior of said casing, substantially as set forth.

5. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, radial, non-resilient arms extending from said hubs and coacting directly with the interior of the casing, and means for exerting yielding pressure upon said hubs to maintain the same in the longitudinal center of the casing and said radial arms in contact with the interior of said casing, substantially as set forth.

6. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, annular recesses in said hubs communicating with a source of oil-supply, outwardly-extend-

ing arms coacting directly with the interior of said casing, and means other than said arms for exerting yielding pressure upon said hubs to maintain the same in the longitudinal center of said casing and said arms in contact with the interior of said casing, substantially as set forth.

7. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, non-resilient arms extending from said hubs and coacting with the interior of said casing, and spring mechanism operatively connected with said hubs and coacting with the interior of said casing to maintain said hubs in the longitudinal center thereof and said non-resilient arms in contact with the interior of said casing, substantially as set forth.

8. In a pump, the combination with a casing, of a shaft having propellers mounted thereon, hubs through which said shaft passes, radial non-resilient arms extending from said hubs, and a spring carried by one of the arms on each of said hubs and coacting with the interior of the casing to maintain said hubs in the longitudinal center thereof and said non-resilient arms in contact with the interior of said casing, substantially as set forth.

9. In a pump, the combination with a casing, of a hollow shaft the interior of which communicates with a source of oil-supply, propellers on said shaft and a shaft-bearing having an internal recess or chamber communicating with the interior of said hollow shaft and grooves in the wearing-surface of said bearing adjacent to said recess or chamber, substantially as set forth.

This specification signed and witnessed this 7th day of February, 1901.

WILLARD B. CULVER.

Witnesses:
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C. P. O'CONNOR.