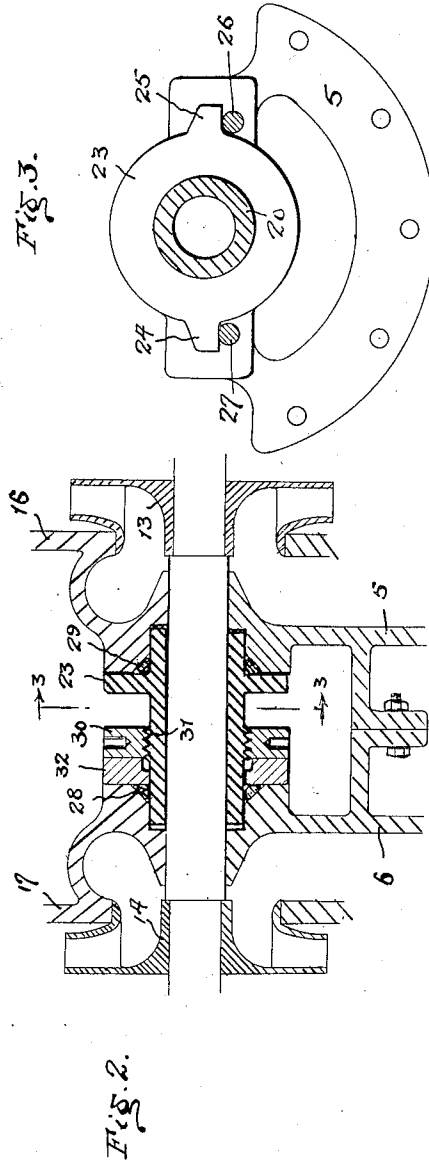
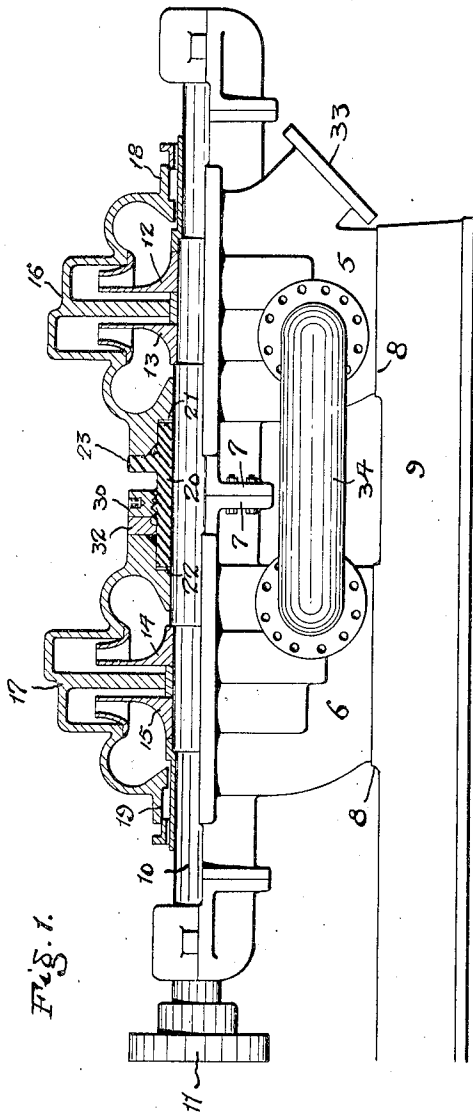


O. HAENTJENS,
CENTRIFUGAL PUMP.
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CENTRIFUGAL PUMP.

1,408,291.

Specification of Letters Patent.

Patented Feb. 28, 1922.

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To all whom it may concern:

Be it known that I, OTTO HAENTJENS, a citizen of the German Republic, residing at Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention relates to centrifugal pumps, and particularly to an installation in which two centrifugal pumps are arranged in series. The object of my invention is to provide an improved construction, in which the usual center bearings and the customary center coupling are eliminated, while the casings are rigidly united together in alignment and a single driving shaft used.

In the accompanying drawings—

Fig. 1 is a front elevation partially in section of a series pump installation, in which my invention is embodied in one form;

Fig. 2 is a vertical section through the central portion of the installation; and

Fig. 3 is a section on the line 3—3, Fig. 2. The present invention is particularly applicable to installations in which two centrifugal pumps are arranged in series. While it is customary to mount the pump casings on a common bed plate, they are otherwise independent of each other, and it is very difficult to secure and maintain their exact alignment. The installation is quite lengthy over all, and the shaft must be in two parts to facilitate handling. This requires a coupling of the adjacent shaft ends at a point between two casings. The alignment of the bearings for the two shafts is very difficult to obtain. Moreover, there are four stuffing boxes to be attended to, one at each end of each pump unit. These require frequent repacking, and moreover the packings cause considerable friction, with resulting increased demands on the power source.

These difficulties are in large part eliminated by the construction forming the subject matter of the present invention.

The installation shown in the accompanying drawings comprises a pair of two-stage pump units 5 and 6 of the split casing type, the lower halves of the respective casings having on their adjacent ends flanges 7, by which they are bolted directly together. The two units are mounted on appropriate seats 8 on a common bed plate 9.

Extending through both units is a com-

mon shaft 10 driven at 11 and carrying a pair of oppositely faced impellers 12 and 13 for unit 5, and a second pair of impellers 14 and 15 for unit 6. The upper halves 16 and 17 of the split casings are removably bolted in position upon the lower halves, so that they may be readily opened for inspection and repair of the impellers or other interior parts.

It will be noted that there are but two packed bearings 18 and 19, one for each of the pump units, and that these bearings are located at the remote ends of the respective units. Between the adjacent ends of the units is arranged on the shaft 10 a bronze sleeve 20, which enters stuffing boxes 21 and 22 on the respective casings. A flange 23 on the sleeve carries lugs 24 and 25, which bear against pins 26 and 27 inserted in the lower half of the casing of unit 5 and serve to hold the sleeve from rotation during the operation of the pump. To prevent leakage at this joint, the stuffing boxes 21 and 22 are slightly counter-bored to receive rubber rings 28 and 29. These rings are forced home in the counter-bores by a nut 30 working on an external threaded portion 31 of the sleeve and bearing against a washer 32. By turning the nut against the latter, not only is the washer 32 forced against the ring 28, thus compressing it into the counter-bore of stuffing box 22, but the flange 23 is simultaneously forced against the ring 29, which is thus compressed into the counter-bore of the stuffing box 21. The usual center packings are thus replaced by a simple joint which effectively prevents leakage at this point.

If it is desired to open the casing for interior inspection, the nut 30 is first loosened and the washer 32 and flange 23 moved away from the respective casings, so that the top halves may be freely lifted off.

As here shown the unit 5 is provided with an intake 33 leading to the impellers 12 and 13, while a connecting pipe 34 extends from the unit 5 to unit 6, delivering to the impellers 14 and 15 of the latter, from which opens the delivery port (not shown).

The construction shown is but a single illustrative embodiment of the invention. The construction affords a pump of great capacity in a structure of unusual simplicity. It will be readily recognized that a pump which combines four volutes in one casting would produce very complicated

waterways, and impair the efficiency. It would also be difficult to obtain sound casing castings on account of the complexity of the design. The difficulties with a construction in which two-stage volute pump units are arranged in series, with independent shafts, coupling, and the usual packed bearings, have been above pointed out. The present construction has but two bearings, while the rigid coupling is omitted, and the impellers are all mounted on one shaft. The bronze sleeve inserted in the center stuffing boxes eliminates the necessity for packing at this point, while friction and wear at the center of the shaft are greatly reduced. Perfect alignment can easily be maintained by the rigid bolting together of the casings, while the difficulty of keeping the alignment of three bearings and two casings set independent on the bed plate, is eliminated. As the impellers are mounted on the shaft alternatively opposed, heavy under thrusts cannot occur in starting, and in case the impellers become partly blocked. The split casing construction permits the rotor to be taken out and a spare rotor installed in a very short time.

Having thus described my invention in connection with an illustrative embodiment thereof, I claim—

1. A centrifugal pump installation, comprising pump units arranged in series, each unit having a horizontally split casing, means for securing the lower halves of the casings rigidly together in alignment, a common shaft for said units, shaft packings at the remote ends of said casings, and means arranged between the casings at their juxtaposed ends to prevent leakage, said means comprising a sleeve on the shaft and extending freely between the casing ends, together with means for effecting a tight joint between the casings and the sleeve.

2. A centrifugal pump installation, comprising pump units arranged in series, each unit having a horizontally split casing, means for securing the lower halves of the casings rigidly together in alignment, a common shaft for said units, shaft packings at the remote ends of said casings, and means arranged between the casings at their juxtaposed ends to prevent leakage, said means comprising a sleeve on the shaft and extending freely between the casing ends, together with means for effecting a tight joint between the casings and the sleeve.

posed ends to prevent leakage, said means comprising a sleeve on the shaft and extending freely between the casing ends, together with gasket rings on the sleeve, and means for forcing said gaskets into tight joint with said sleeve and the respective casings.

3. A centrifugal pump installation, comprising pump units arranged in series, each unit having a horizontally split casing, means for securing the lower halves of the casings rigidly together in alignment, a common shaft for said units, shaft packings at the remote ends of said casings, and means arranged between the casings at their juxtaposed ends to prevent leakage, said means comprising a sleeve surrounding the shaft and telescoping with the adjacent casing ends, means for preventing relative rotation of the sleeve and casing ends, and means for effecting a tight joint between the sleeve and casings.

4. A centrifugal pump installation, comprising pump units arranged in series, each unit having a horizontally split casing, means for securing the lower halves of the casings rigidly together in alignment, a common shaft for said units, shaft packings at the remote ends of said casings, and means arranged between the casings at their juxtaposed ends to prevent leakage, said means comprising a sleeve surrounding the shaft and extending between the adjacent ends of the casings, gaskets on the exterior of the sleeve, and means on the sleeve for pressing said gaskets into close engagement with said sleeve and casings to seal the joint between the same.

5. A centrifugal pump installation, comprising pump units arranged in series, each unit having an independent casing, a shaft common to said units, a sleeve surrounding the shaft and extending between the adjacent ends of the casings, gaskets on said sleeve, and means on the sleeve between the casings for forcing said gaskets into tight joint with the sleeve and casings to seal the connection.

In testimony whereof I have signed my name to this specification.

OTTO HAENTJENS.