P. OSTENBERG.

PUMP MECHANISM.

APPLICATION FILED JUNE 8, 1920.

1,379,579. Patented May 24, 1921.

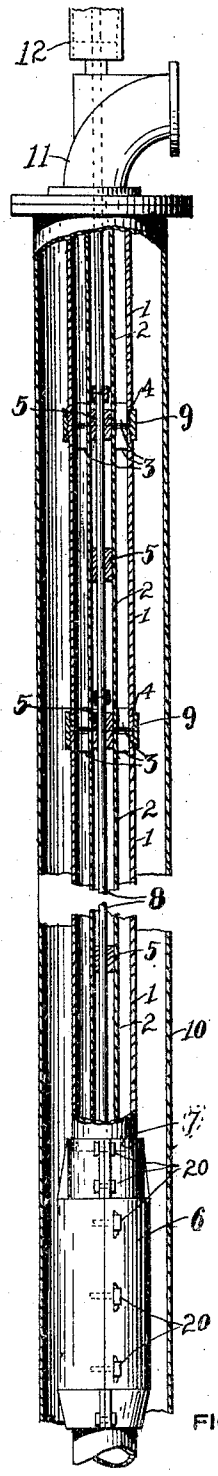
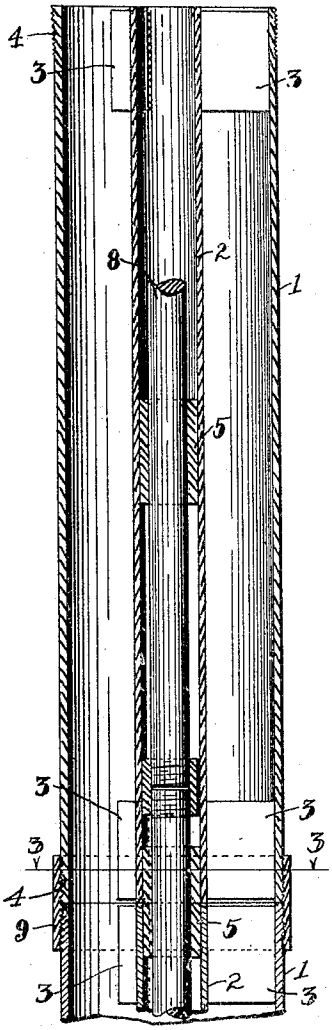


FIGURE 1

FIGURE 2



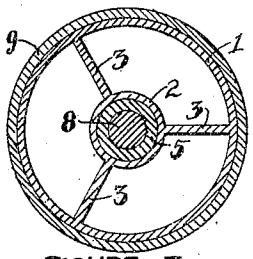
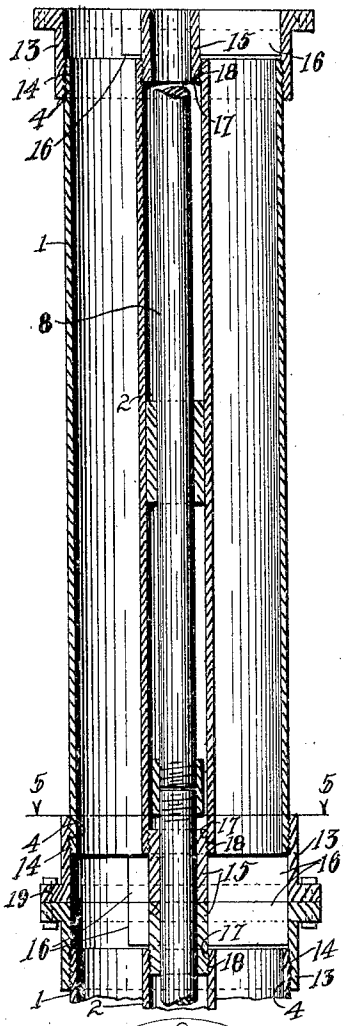


FIGURE 3

FIGURE 4



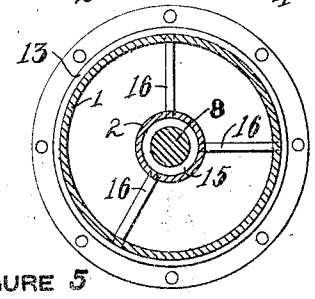


FIGURE 5

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PUMP MECHANISM.

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To all whom it may concern:

Be it known that I, PONTUS OSTENBERG, a citizen of the United States, and resident of San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Pump Mechanisms, of which the following is a specification.

My invention relates particularly to casing construction for centrifugal pump shafts where two concentrically arranged casings are used, namely, a shaft casing and a discharge casing.

The object of my invention is to provide a casing construction that will eliminate a large number of the parts ordinarily required in casing construction; that will be simple in form and cheap to manufacture; that will maintain the required alinement of both shaft and casings; that will practically eliminate vibration of the shaft; in which the shaft bearings are independent elements slidably inserted in the shaft casing; in which the nonvibrating characteristics of the whole casing are embodied in each casing section; and, finally, it is an object of my invention to so secure the shaft and discharge casing sections together that the former is held under tension by the latter whereby the nonvibrating characteristics are secured.

In the drawing:

Figure 1 is a vertical section through a portion of a deep well centrifugal pump construction embodying my invention.

Fig. 2 is an enlarged sectional view of a portion of the pump mechanism shown in Fig. 1.

Fig. 3 is a sectional view on line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view of a portion of the pump shown in Fig. 1 illustrating another embodiment of my invention.

Fig. 5 is a sectional view on line 5—5 of Fig. 4.

In carrying out one embodiment of my invention I first provide a discharge casing section 1 and a shaft casing section 2. These two casings are concentrically arranged with relation to each other and spaced and held by webs 3 welded edgewise first to the discharge casing section 1 and then to shaft casing section 2, after sufficiently heating the latter to cause it to expand somewhat throughout its length. After the two sections are welded to webs 3 at each end the heated section 2 is allowed to cool. Since in the cooling of section 2 it tends to contract again to its normal condition but is held at both ends by webs 3 secured to section 1, the portion betwen the terminal webs 3 is subjected to a tensional strain that holds it taut and consequently the amplitude of any vibrations imparted to it is reduced in proportion to the degree of stress to which it is subjected, the degree of stress being determined by the amount of the expansion of said section. It is obvious that webs 3 may be welded to section 2 first and finally to section 1 if so desired.

These double casing sections are incorporated in the pump mechanism in the follow manner, the two sections being of substantially the same length and the section 1 being externally threaded at each end as at 4.

First I provide a number of lignum-vitæ bushings 5 and slidably insert them in section 2 as shown, one being inserted half way in each end thereof and one or more intermediate its length and held in position by frictional contact with the section. The lower end of one section 1 is screwed into pump bowl 6 as at 7, the shaft 8 passing through bushings 5. A second double section having a collar 9 threaded on to its lower end is now placed over shaft 8 with the lower end of section 2 engaging the projecting portion of bushing 5 previously inserted in the upper end of the next lower section 2 and the collar 9 screwed down on to the threaded portion 4 of the next lower section 1. In this way the shaft and discharge casing sections are built up around shaft 8 to any required height, the whole being suspended in a well casing 10 and provided with a discharge head 11 and the shaft with a driving pulley 12.

It is clear that the life and efficiency of a pump depends largely upon the degree of success attained in eliminating the vibration from the driving shaft and maintaining the

same in perfect alinement. Vibration not only subjects the shaft bearings and casing joints to unequal strains but also causes the operating parts of the pump proper to be worn down by irregular contact with the pump bowl. Imperfect alinement of the pump shaft causes unequal distribution of bearing surfaces resulting in irregular and more rapid wearing away of the shaft bearings and of the shaft itself.

In the invention herein disclosed each bushing is a bearing for the shaft 8. Since the construction described provided a double section in which vibration is practically eliminated from each individual shaft casing section and consequently in each individual discharge casing section, and since the several discharge casing sections are coupled immovably together, it results that the whole line of double sections must be held in substantially perfect alinement and practically vibrationless, thereby increasing the efficiency and lengthening the effective working life of the mechanism.

In reducing the number of parts to double casing sections, bushings and collars the labor of construction and assembly is reduced to a minimum and a material saving is effected in material used.

Another embodiment is shown in Figs. 4 and 5 in which shaft casing section 2 is placed under tension in the following manner.

A coupling 13 is provided and internally threaded at 14 to engage threaded portion 4 on casing section 1. A bushing is shown at 15 supported by coupling 13 through the medium of webs 16, and externally threaded at 17 to engage section 2 internally threaded as at 18. These parts 13—15 and 16 should be integrally formed in any suitable manner and the threaded portion 14 provided with more threads to the inch than the threaded portion 17, say fifteen and thirteen respectively. In assembling the two sections the couplings are screwed into position but the variation in the threads as above described causes section 2 to be subjected to a tensional strain since the engaging threads 14—4 will draw the parts together less rapidly than the engaging threads 17—18. As shown the parts 15 provide bearings for shaft 8 and the adjacent couplings are bolted together at 19.

It is understood of course that webs 3 may be provided in any suitable number, arranged in any suitable manner, and secured or attached to sections 1 and 2 in any suitable manner to secure the results desired.

The pump bowl 6 is here shown split lengthwise into two halves bolted together at 20.

It is to be understood that changes in form, arrangement of parts and method of construction and assembly may be made within the scope of the appended claims.

I claim:

1. An article of manufacture comprising a discharge casing section and a shaft casing section arranged therein and supported under tension thereby.

2. An article of manufacture comprising a discharge casing section and a shaft casing section arranged therein, and means carried by said discharge casing section for supporting said shaft casing section under tension.

3. An article of manufacture comprising integrally formed discharge and shaft casing sections.

4. An article of manufacture comprising integrally formed discharge and shaft casing sections, the shaft casing section being under greater tensional strain than the discharge casing section.

5. An article of manufacture comprising a discharge casing section, a shaft casing section arranged therein, and a plurality of radially arranged webs connecting the adjacent ends of said sections and formed integrally therewith.

6. An article of manufacture comprising a discharge casing section, a shaft casing section arranged therein, and a plurality of radially arranged webs connecting the adjacent ends of said sections and formed integrally therewith and maintaining said shaft casing section under tension.

7. An article of manufacture comprising a discharge casing section, a shaft casing section arranged therein, and a plurality of radially arranged webs connecting the adjacent ends of said sections and welded thereto and maintaining said shaft casing sections under tension.

8. A pump mechanism including a discharge casing section comprising a plurality of connected discharge casing sections, a pump supported by said casing, a pump shaft in said casing, a shaft casing section supported under tension by each discharge casing section, a plurality of shaft bearings arranged in said shaft casing, and shaft bearings connecting the adjacent ends of said shaft casing sections.

9. A discharge casing section, a shaft casing section arranged therein and supported under tension thereby, and shaft bearings slidably inserted in said shaft casing section.

10. The method of constructing a double casing section for pump mechanisms, which consists in expanding a shaft casing section within a discharge casing section by the application of heat thereto then permanently joining the adjacent ends of the two sections, and finally allowing the expanded shaft casing section to cool.

11. The method of constructing a double

casing section for pump mechanism, which consists in expanding a shaft casing section within a discharge casing section by the application of heat thereto then permanently joining the adjacent ends of the two sections by welding connecting webs thereto, and finally allowing the expanded shaft casing section to cool.

12. An article of manufacture comprising a discharge casing section, a plurality of webs formed integrally therewith, a shaft casing section supported by said webs, and bearings supported by said shaft casing section.

PONTUS OSTENBERG.