Aug. 8, 1939. H. S. MURRAY 2,168,779

CONCRETE PUMP

Filed June 2, 1934

Fig. 1

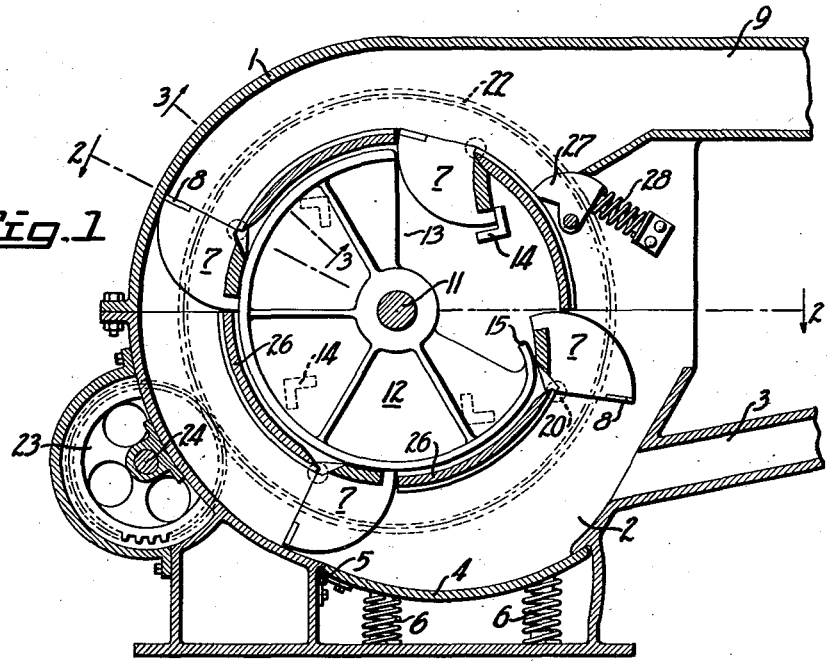


Fig. 2

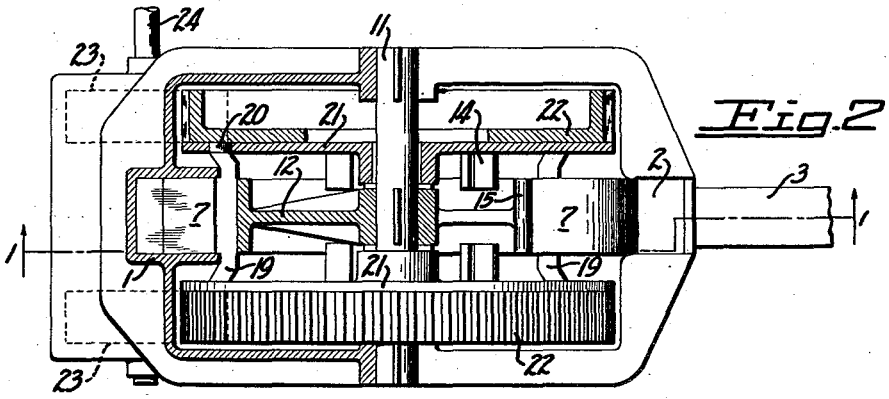


Fig. 3

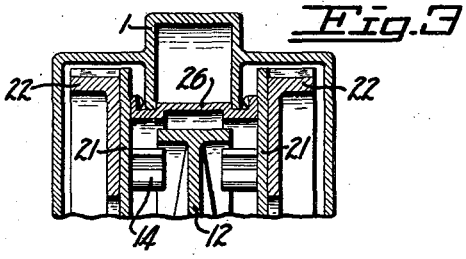
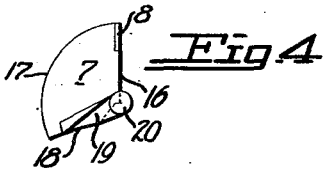


Fig. 4



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2,168,779

CONCRETE PUMP

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Application June 2, 1934, Serial No. 728,701

4 Claims. (Cl. 103—140)

This invention relates to pumps, and more particularly to pumps of the rotary type for pumping concrete.

It is among the objects of my invention to provide a pump which will deliver a continuous, non-pulsating flow of concrete.

Another object of my invention is to provide a pump which will handle the concrete without clogging, and without imposing undue strain on the pumping elements.

Other objects of my invention include the provision of a concrete pump which is superior in point of simplicity, inexpensiveness of construction, and positiveness of operation.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawing:

Figure 1 is a vertical sectional view of a pump embodying the improvements of my invention, taken along the line 1—1 of Figure 2.

Figure 2 is a cross section of the pump, taken along the line 2—2 of Figure 1.

Figure 3 is a sectional view taken along the line 3—3 of Figure 1; and

Figure 4 is a side view of an individual impeller.

In terms of broad inclusion, the concrete pump embodying my invention comprises a fixed cam, an annular pumping chamber disposed circumferentially about the cam, a rotor interposed between the cam and chamber, and an impeller for the chamber mounted on the rotor and riding on the cam. The pumping chamber is provided with an inlet and outlet, and the impeller is mounted on the rotor for movement into the chamber adjacent the inlet and out of the chamber adjacent the outlet. The cam is designed to move the impeller into the chamber and hold it there during the pumping stroke. A yieldable wall section is preferably provided in the chamber adjacent its inlet, and a yieldable sealing element is preferably provided between the chamber and rotor adjacent the outlet.

In greater detail, the concrete pump embodying my invention comprises a circular trough shaped casing 1 providing an annular pumping chamber, and having a lower compartment 2 which serves as an inlet or receiving receptacle for the concrete to be pumped. Concrete of mushy consistency, already mixed and prepared, is delivered to the pump compartment 2 through a suitable inlet duct 3. An arcuate and inclined supporting plate 4 is fulcrumed at 5 and is yieldably supported by springs 6 to form the bottom wall of the compartment 2.

When concrete in the compartment 2 is pushed in a clockwise direction by the pump impellers 7, the plate or wall section 4 will yield in the event the volume of the concrete picked up by an impeller exceeds the capacity of the pumping chamber. Furthermore, if a piece of aggregate is caught under an impeller the plate 4 will yield to prevent stalling of the pump or breakage of the impeller. By providing this flexible arrangement, clogging of the pump and undue strain on the pump elements is prevented. Preferably the impellers 7 are provided with replaceable wearing plates 8 on their leading edges.

The impellers 7 drive the concrete from the compartment 2 into the arcuate pumping chamber 1 and thence around to the outlet duct 9 by means of which concrete is distributed. The mechanism for mounting and operating the impellers 7 comprises a stationary shaft 11, on which a circular cam 12 having a cut-out portion 13 is fixedly mounted. The impellers 7 are moved circumferentially around the cam and slide on its outer cylindrical surface until they come to the cut-out portion, where they drop down and rest against lugs 14, as shown in Figure 1, and remain in this position until they contact the in-curved portion 15 of the cam, at which time they are moved outwardly into position to engage a new load of concrete.

As best shown in Figure 4, the impellers 7 are block-like elements having a flat driving face 16 and an arcuate back face 17. A cam face 18 is provided on the bottom of the impeller for riding on the cam 12, and two offset lugs 19 are provided at the sides of the impeller, the outermost ends of which are formed into stub shafts 20 to provide trunnions.

A pair of disks 21 are disposed on opposite sides of the cam 12, and are rotatably mounted on the stationary shaft 11. These disks, taken together, comprise the rotor of my pump. Each of these disks carries a ring gear 22, meshing with pinions 23 keyed to a common drive shaft 24. The latter is connected with a suitable source of motive power, not shown in the drawing. The impellers are supported between the disks with their trunnions 20 journaled in the disks adjacent the periphery of the latter. The diameter of the cam 12 is less than that of the disks 21, and

the cam faces 18 on the impellers are arranged to ride freely on the cylindrical face of the cam.

The circumferential space between the disks, not occupied by the impellers 7, is closed by means of transverse partitions 26. These partitions rigidly connect the disks and complete the rotor structure, and are shaped to provide a cylindrical periphery for the rotor. This peripheral surface is maintained by the impellers when the latter are in their retracted position. As best shown in Figure 1, the driving faces of the impellers lie in and provide a continuation of the cylindrical peripheral face of the rotor. The rotor extends into the trough-shaped casing 1 and by reason of this arrangement forms the inner circumferential wall of the pumping chamber.

The pumping chamber is sealed adjacent its outlet by a pivoted element 27 pressed by a spring 28 into contact with the rotor. The element 27 also operates as a scraper to remove concrete which adheres to the rotor. Any concrete accidentally escaping past the seal 27 finds its way down into the compartment 2, from which it is again repumped to the outlet duct.

The device operates as follows: Concrete is fed into the compartment 2 by means of the inlet 3, and is driven into and carried around the pumping chamber 1 by the impellers 7. If too much concrete is picked up by an impeller, or if a piece of aggregate in the mix should interfere with the forward movement of the impeller, the plate 4 will yield downwardly to relieve the congestion. Each impeller rides upon the cylindrical surface of the cam 12 until it reaches a position over the cut-out portion 13, at which point it drops by gravity, and passes out of the pumping chamber under the sealing element 27. The back flow of concrete is checked by the following impeller. The element 27, operating as a scraper, keeps the periphery of the rotor clear of adhering concrete particles. On further movement the impeller meets the in-curved portion of the cam 12 and is forced outwardly into a position to dip into the compartment 2 and drive another quantity of concrete into the pumping chamber. In event the impeller does not drop inwardly of its own weight when reaching the cut-out portion of the cam, it is positively moved to its retracted position upon engagement with the element 27, as will be readily understood.

It will be seen that pumping chamber 1 is in the nature of an annular conduit, the open inner circumferential side of which is closed by the rotor carrying the impellers 7. The rotor therefore is in the nature of an endless conveyor having openings in which the impellers are oscillatably mounted for movement from a folded position substantially flush with the conveyor to an extended position projecting into the conduit like pumping chamber. The pump handles the concrete exceptionally well and rapidly, and will pump a mix containing as large as nine inch aggregate.

I claim:

1. A concrete pump comprising an annular pumping chamber having an outlet, a rotor, an impeller mounted on the rotor for movement from a retracted position within the rotor to an extended position projecting into the pumping chamber, said outlet having a wall with a lip lying adjacent the periphery of the rotor, a pivotally mounted sealing element having an arcuate face lying adjacent the edge of said lip, and means for pressing the sealing element against the rotor.

2. In combination with a pump having a rotor and cam; an impeller comprising a body portion having a driving face, a base portion for riding on the cam; and trunnion mountings for journaling the impeller on the rotor and comprising lugs projecting from the sides of the impeller, and shafts projecting outwardly from said lugs journaled in the rotor.

3. In combination with a pump having a rotor and cam; an impeller comprising a body portion having a driving face, a base portion for riding on the cam; and trunnion mountings for journaling the impeller on the rotor and comprising lugs having portions projecting outwardly from the sides of the impeller and portions projecting forwardly therefrom, and shafts projecting outwardly from the forward ends of said lugs journaled in the rotor, the axis of said shafts lying adjacent the lower edge of said driving face.

4. A concrete pump comprising an annular pumping chamber having an outer peripheral wall, a collection chamber connected with the pumping chamber, a rotor having a cylindrical surface providing an inner peripheral wall of the pumping chamber and concentric with said outer wall, an impeller on the rotor for pushing concrete from the collection chamber through the pumping chamber, and a yieldable wall section in the collection chamber and having a smooth curved surface providing a continuation of said outer peripheral wall of the pumping chamber.

HOWARD SLATER MURRAY.