July 2, 1929. B. A. MITCHELL 1,719,123

IMPELLER FOR VIBRATORS FOR CRUSHERS, ETC

Filed March 2, 1928 2 Sheets-Sheet 1

Fig. 1.

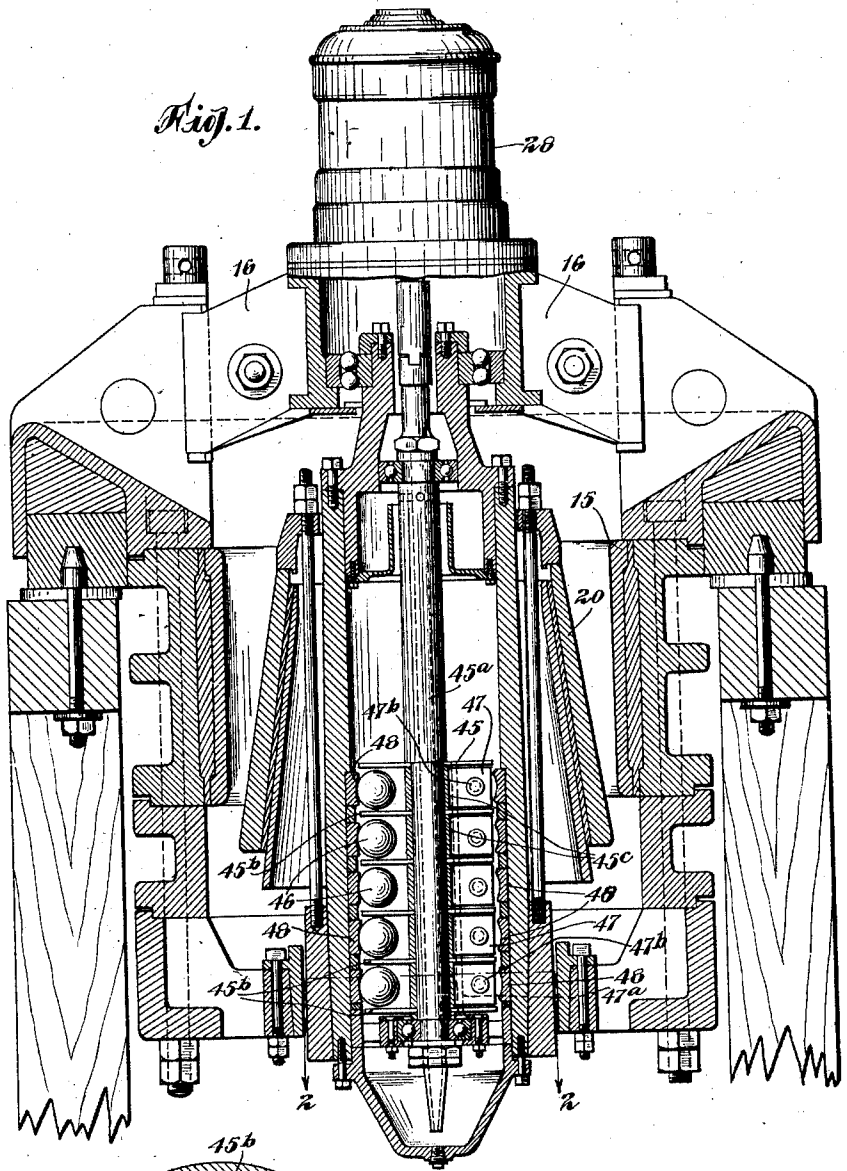
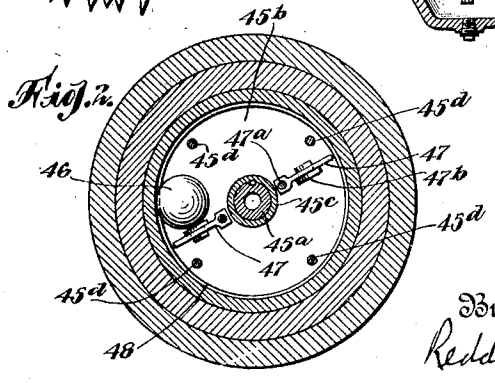


Fig. 2.



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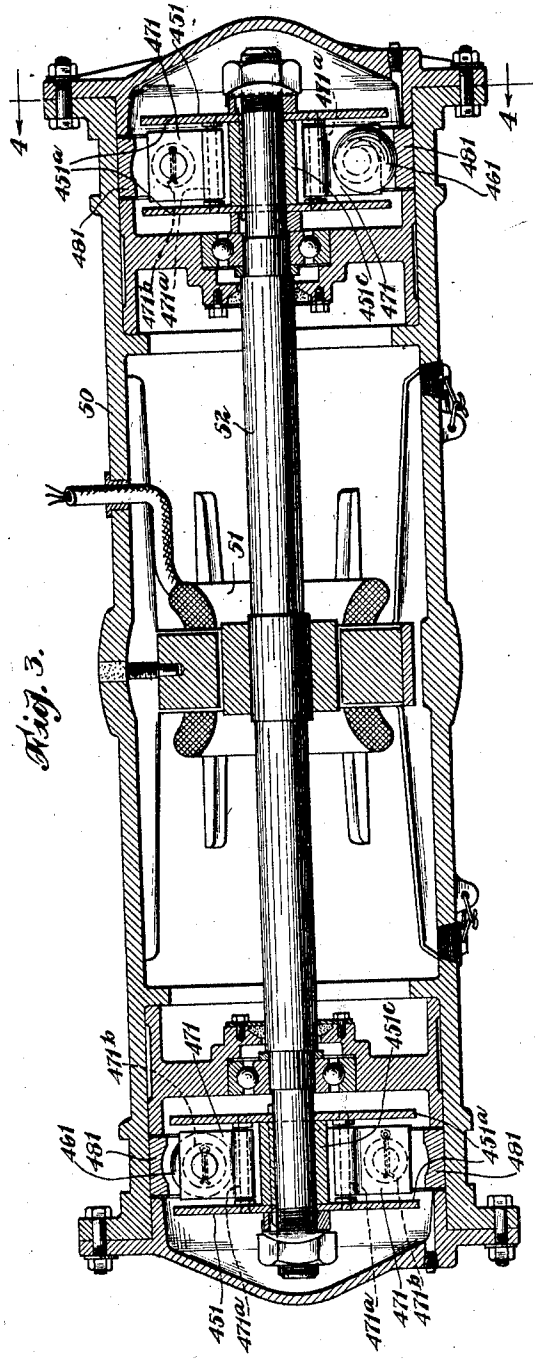


Fig. 3.

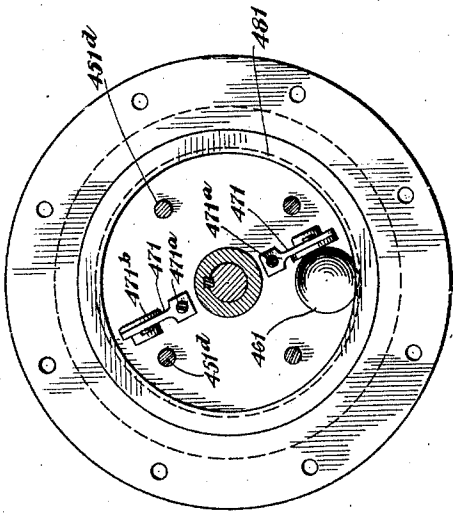


Fig. 4.

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UNITED STATES PATENT OFFICE.

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IMPELLER FOR VIBRATORS FOR CRUSHERS, ETC.

Application filed March 2, 1928. Serial No. 258,537.

This invention relates to devices for effecting gyratory vibration of screens and crushers, as shown, for example, in Letters Patent of the United States No. 1,459,841, dated June 26, 1923, and No. 1,557,307, dated October 13, 1925, both granted to the present applicant, in which a freely movable body, such as a ball, is caused by a rotating impeller to revolve about the axis of the impeller and within a race-way carried by the member which is to be vibrated or gyrated. In the operation of such devices, when operated at the high speed at which they are designed to operate, say 3500 R. P. M., it has been found that when the ball is carried in a recess of the impeller the driving surface is subject to excessive wear and to a peening action which increases the contact surface and tends to displace the ball from its proper path, with resultant increase of friction and wear and development of heat. In the continued practical operation of such devices it has been found that this difficulty can be overcome by the provision in the impeller of a contact member for the ball which shall be yielding and preferably so subject to centrifugal action that the force applied through it to the ball shall increase with the speed of the impeller. In the more practical embodiment of the invention, therefore, the contact member is pivotally hung on the impeller. It will be understood that the weighted body which is independent of the impeller and is driven by the impeller and whose mass is eccentric to the axis of the impeller may take the form of a cylindrical roller, for example, or some other suitable form, and that the term "ball" is used herein for convenience and not as restricting the invention to the use of a spherical body.

In the accompanying drawings in which the invention is illustrated—

Figure 1 is a view in sectional elevation showing so much of a crusher as is necessary to enable the application of the invention thereto to be understood.

Figure 2 is a detail view on the plane indicated by the broken line 2—2 of Figure 1 and on a somewhat larger scale.

Figure 3 is a view in sectional elevation of a vibrator designed particularly for application to a screen and embodying the present invention.

Figure 4 is a view in section on the plane indicated by the broken line 4—4 of Figure 3.

In the embodiment of the invention shown in Figures 1 and 2, in which the invention is illustrated as applied to the gyratory crusher such as that shown in Letters Patent No. 1,557,307, the relatively fixed crusher member 15 is surmounted by a frame 16 which supports a housing 28 for a motor by which may be driven the shaft 45^a which carries the impeller 45. Supported from the frame, so as to be capable of gyratory movement, is the relatively movable member 20 of the crusher, this gyratory or vibratory member carrying the internal race-ways 48 with which coact, under the influence of centrifugal action, the balls or intermediate members 46.

In the construction shown in said Letters Patent No. 1,557,307, the balls 46 are received in recesses of the impeller 45, but in the present instance the impeller is made up of a series of plates 45^b transverse to the axis of the shaft 45^a and secured thereto so as to rotate therewith. The plates are shown as spaced by spacing sleeves 45^c to receive between them the balls 46. In each ball receiving space between the plates 45^b is placed a yielding contact member 47 which is shown as a plate or wing pivotally mounted, as at 47^a, between adjacent plates and provided, it may be, with a wear plate 47^b. Studs 45^d may be provided to limit the backward swing of the plates 47, two of such studs being shown as placed in diametrically opposite position in each ball space in order that the impeller may be balanced.

In the operation of the impeller as shown in Figures 1 and 2, when the rotation is slow, as in starting, the contact members 47 normally rest against the studs 45^d, with the balls 46 resting against them. As the speed of the impeller increases and approaches its maximum the contact members 47 tend to assume radial positions, driving the balls before them but being free to yield to such relative backward movements of the balls as may take place and in fact do take place in operation. It will be seen that the pressure with which each contact member acts upon the ball with which it coacts increases with the increase of centrifugal effect on the contact member as the speed of rotation of the impeller increases.

It will be obvious that the invention is applicable to the gyratory vibrators of the form of that shown in said Letters Patent No. 1,459,841, such an embodiment of the invention being illustrated in Figures 3 and 4.

In the construction there shown a generally cylindrical housing 50 is supported at its middle portion so as to be capable of vibratory or gyratory movement about its center, being, in this case, the member to which the vibratory or gyratory movement is imparted. It receives a motor 51 by which rapid rotation is imparted to the impeller shaft 52, supported in suitable bearings in the housing 50. Also mounted in the housing 50 are race-ways 481 for coaction, under the influence of centrifugal action, with the independent balls or intermediate members 461. At each end of the shaft 52 is an impeller 451 which consists of plates 451^a, which form between them a ball receiving space, a spacing sleeve 451^c, and yielding contact members 471 pivotally mounted, as at 471^a, between the plates 451^a, and, it may be, provided each with a wear plate 471^b. Studs 451^d may be provided to limit the backward swing of the plates 471, two such studs being provided in order to balance the impeller. The operation of the improved impeller is the same as that of the impeller shown in Figures 1 and 2 and need not be further explained.

I claim as my invention:

1. The combination of a rotatable shaft, a member to be vibrated and having an internal race-way, an intermediate body to coact with the race-way and subject to centrifugal action, and a yielding contact member carried with the shaft for coaction with the intermediate body.

2. The combination of a rotatable shaft, a member to be vibrated and having an internal race-way, an intermediate body to coact with the race-way and subject to centrifugal action, and a pivotally mounted contact member carried with the shaft for coaction with the intermediate body.

3. The combination of a rotatable shaft, a member to be vibrated and having an internal race-way, an intermediate body to coact with the race-way and subject to centrifugal action, plates secured to the shaft to form a receiving space for the intermediate body, and a yielding contact member carried by said plates for coaction with the intermediate body.

4. The combination of a rotatable shaft, a member to be vibrated and having an internal race-way, an intermediate body to coact with the race-way and subject to centrifugal action, plates secured to the shaft to form a receiving space for the intermediate body, and a contact member pivotally mounted between said plates to be subject to centrifugal action for coaction with the intermediate body.

This specification signed this 28th day of February A. D. 1928.

BENJAMIN A. MITCHELL.