

Feb. 4, 1958

P. C. OLIVE  
IMPACT CRUSHERS

2,822,138

Filed June 9, 1954

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FIG. 3.

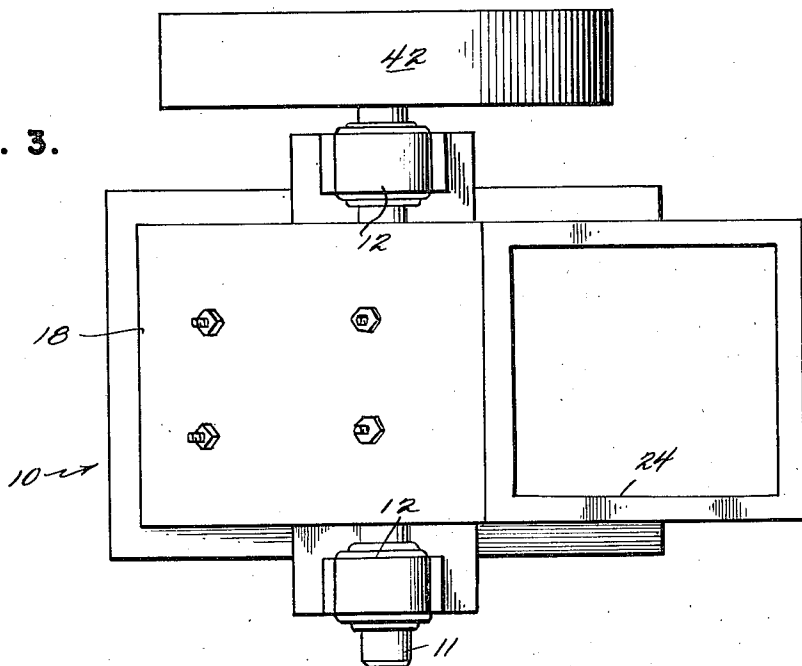
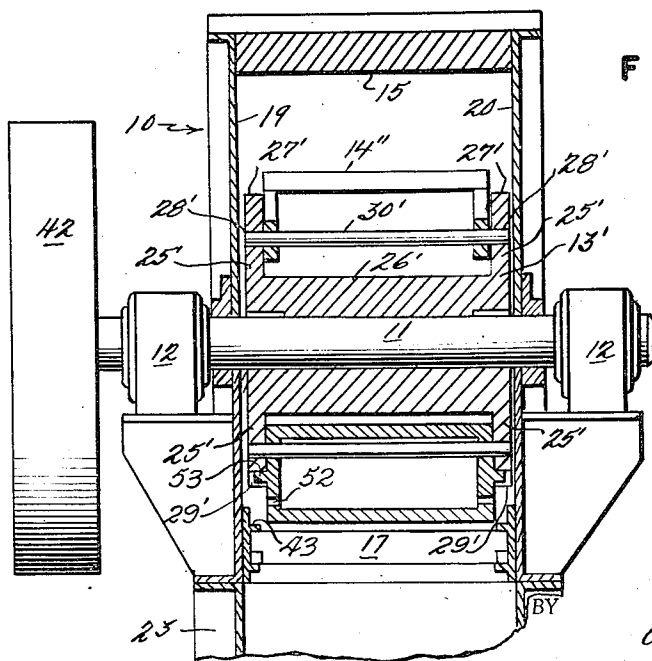


FIG. 6.



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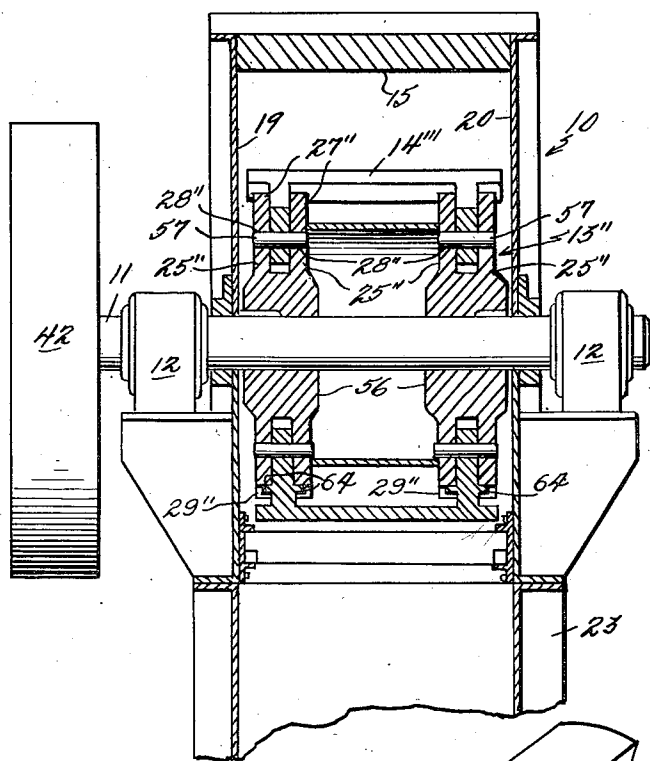


FIG. 8.

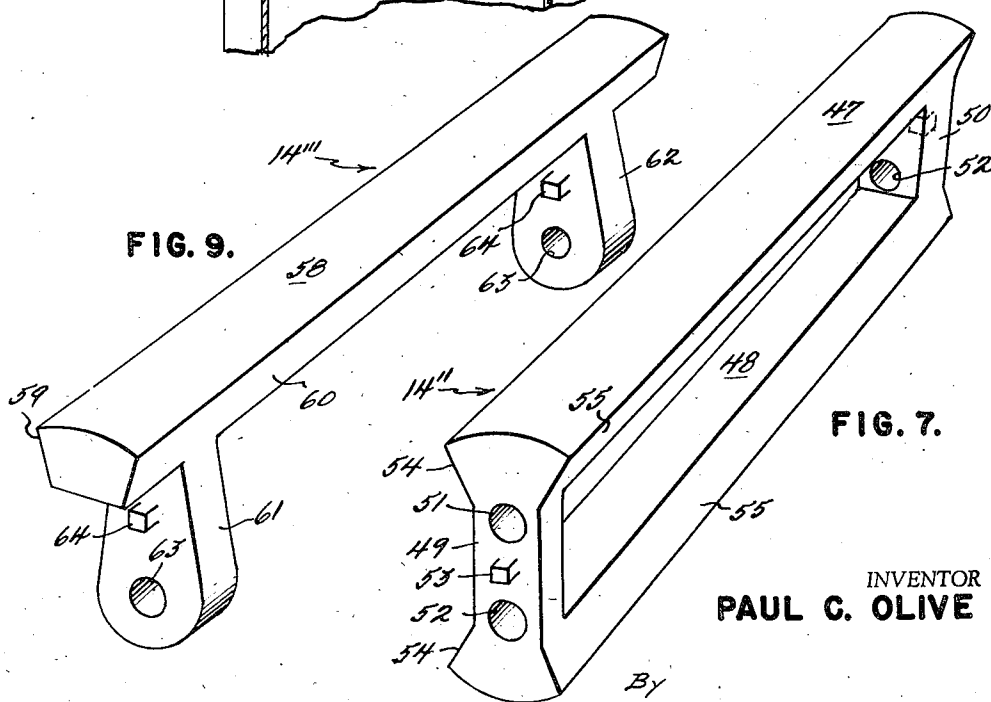


FIG. 9.

FIG. 7.

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## IMPACT CRUSHERS

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5 Claims. (Cl. 241—194)

This invention relates to impact crushers and has more particular reference to impact crushers of the hammer type.

One object of the present invention is to provide a novel and improved impact crusher of the hammer type.

Another object of the present invention is to provide a novel and improved impact crusher, as characterized above, provided with a plurality of pivotally mounted hammers adapted to be held in their impact position by centrifugal force.

Another object of the present invention is to provide a novel impact crusher, as characterized above, wherein the hammers have symmetrical shapes permitting them to be turned over when the impact face or faces are worn out.

Another object of the present invention is to provide an improved impact crusher, as characterized above, wherein each of the hammers is mounted so that its center of mass is spaced from the radius of the rotor passing through the pivotal axis of the hammer, thereby creating a centrifugal torque acting to hold the hammer in working position when the rotor is rotating.

Another object of the invention is to provide an improved impact crusher, as characterized above, having a concave impact plate, a plurality of laterally adjustably spaced impact bars and a plurality of laterally adjustably spaced bars forming a covering for the evacuation outlet for the crushed products.

A further object of the present invention is to provide a novel and improved impact crusher which is simple in construction, inexpensive to manufacture, and efficient in operation.

Other objects and advantages of the invention will appear in the specification when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a transverse sectional view of an impact crusher constructed in accordance with the present invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a plan view of the apparatus shown in Fig. 1;

Fig. 4 is a perspective view of one of the impact hammers shown in Figs. 1 and 2;

Fig. 5 is a view similar to that shown in Fig. 4, but showing a modified form of hammer adapted to be mounted in the apparatus shown in Fig. 1;

Fig. 6 is a view similar to that shown in Fig. 2, but showing a modified form of rotor with a modified form of hammer mounted thereon;

Fig. 7 is a perspective view showing the details of the modified form of hammer shown in Fig. 6;

Fig. 8 is a view similar to that shown in Fig. 2, but showing a modified form of rotor having a modified form of hammer mounted thereon; and

Fig. 9 is a perspective view showing the details of one of the hammers shown in Fig. 8.

In general, the present invention provides a novel and improved impact crusher comprising a housing; a rotor assembly mounted for rotation therein and carrying a plurality of peripherally spaced pivotally mounted hammers, with each hammer having a plurality of impact faces or

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edges so positioned that when one impact face is worn out the hammer can be changed on its pivotal mounting to bring another impact face into working position and with each hammer being so mounted on the rotor assembly as to be held in working position by centrifugal force when the rotor assembly is rotating.

The invention further contemplates the provision of a concave impact plate mounted in the top portion of the housing; a plurality of removably adjustably mounted impact bars positioned in the bottom of the housing below the impact plate; and a plurality of adjustable laterally spaced grate bars extending across the evacuation opening in the housing.

Referring now to the drawings, there is illustrated in Figs. 1, 2 and 3, one embodiment of the impact crusher constructed according with the present invention. As there shown, the crusher comprises a housing 10; a shaft 11 extending horizontally through the end walls of the housing with its projecting ends journaled in suitable bearings 12 mounted on brackets fixedly attached to the housing, with one end of the shaft carrying means for rotation thereof; a rotor assembly, indicated generally at 13, fixedly mounted on the shaft 11 for rotation therewith and carrying a plurality of hammers 14 pivotally mounted thereon; a concave impact plate 15 attached to the upper portion of the housing; a plurality of impact bars 16 extending longitudinally of the housing with their ends removably supported by the end walls of the housing; and a plurality of laterally spaced grate bars 17 extending longitudinally of the housing with their ends removably supported by the end walls of the housing.

The housing 10 may be of any suitable shape. It is shown as having a concave top wall, indicated at 18, vertical side walls 19, 20 and vertical end walls 21, 22. The housing is mounted on a suitable support or base, indicated at 23, and is provided with an inlet conduit 24 for the entrance of the products to be treated.

The rotor assembly comprises a plurality of disc-like members 25 axially spaced along the shaft 11. The disc-like members 25 may have separate hubs, or, and as shown, may have a common hub 26 and be formed integral therewith. The disc-like members 25 are identical in construction with each having a contour as shown in Fig. 1, and with each having a plurality of circumferentially spaced radially extending support members or wings 27. Each of the support members 27 has an opening 28 extending therethrough and has a hook-shaped recess formed in one end portion to provide an abutment or stop 29.

As shown, the discs 25 are formed integral with the hub member 26 with their support members or wings 27 in horizontal alignment forming a plurality of axially extending circumferentially spaced rows with the openings 28 and abutments 29 of the wing members in each row in horizontal alignment. An axle or rod 30 extends through the opening 28 in each of the rows of wing members to form an axle on which the hammers are pivotally mounted (see Figs. 1 and 2).

The hammers 14 are identical in construction and are of the shape shown in Fig. 4. Each hammer is provided with an opening or bore 31 so that it may be pivotally mounted on one of the rods 30 between an adjacent pair of wings or support members 27. Each hammer, as shown in Fig. 4, is provided with stops 32, one on each side wall, in position to engage, when the hammer is in impact position, with the abutment 29 on the adjacent wing member. In this particular modification, each of the hammers is shown as being symmetrical with respect to a vertical plane passing through its pivotal axis and has two similar impact faces or edges 33, 34 formed on opposite sides of its free end. This permits the hammers

with oppositely disposed stop members 64 on its side walls.

Each of the hammers 14'', as shown in Fig. 9, is symmetrical with respect to a vertical plane passing through its pivotal axis and may be turned around on its pivotal axis when one impact face is worn out to bring its other impact face into working position.

Each hammer 14'' is pivotally mounted between aligned pairs of wing members 27'' with the axles or rods between the wing members passing through the opening 63 in one of the legs 61, 62.

The abutments on the wing members 27'' and the stops on the legs 61, 62 are so positioned relative to the axles 57 that the center of gravity of the hammer, when in its working position, is spaced from a radius of the shaft 11 passing through the pivotal axis of the hammer, when the rotor assembly rotates, thereby creating a constant centrifugal torque holding the hammer against the abutments on the wing members.

From the foregoing, it readily will be seen that there has been provided a novel and improved impact crusher comprising a rotor assembly having a plurality of hammers pivotally mounted thereon so as to be held in their working position by centrifugal force and with each hammer having its center of gravity spaced from a radius of the rotor passing through the pivotal axis of the hammer to provide an increased and constant torque and with each hammer being made of a symmetrical shape so that it may be turned over when one impact face is worn out to present a new impact face, or reversed end for end to present additional new impact faces; a curved impact plate portion to receive material thrown thereagainst by the hammers; impact bars mounted below the impact plate to act as anvils for the hammers; and grate bars forming a grating for the evacuation outlet.

Obviously, the invention is not restricted to the embodiments thereof herein shown and described.

What is claimed is:

1. In an impact crusher, a housing, a rotor assembly mounted for rotation therein, said rotor assembly including a plurality of peripherally spaced abutments; a plurality of peripherally spaced pivotally and removably mounted impact hammers carried by said rotor assembly, each of said hammers being symmetrical with respect to its longitudinal axis and provided with stop means positioned to engage at least one of said abutments when the hammer is in working position and opposed impact faces on its free end portion so that when one impact face becomes worn the hammer may be removed and replaced on its pivotal axis to bring the other impact face into position to be used, said stop means on each hammer and the abutment engaged thereby, when the hammer is in working position, being so positioned relative to each other and the pivotal axis of the hammer that the radius of the rotor assembly passing through the center of gravity of the hammer will be angularly displaced, in a direction opposite the direction of rotation of the rotor assembly, from the radius of the rotor assembly passing through the pivotal axis of the hammer, thereby creating a constant centrifugal torque holding the hammer in working position when the rotor assembly is rotating; means for rotating said rotor assembly; and means for feeding a stream of the product to be crushed into the path of movement of said impact hammers.

2. Apparatus as set forth in claim 1, wherein each of said hammers is symmetrical with respect to its median transverse axis and has opposed impact faces on each of its ends and is provided with pivoted mounting means adjacent each end, the construction and arrangement being such that the hammer may be pivotally mounted by either of its ends so that any one of its four impact faces may be brought into working position.

3. Apparatus as set forth in claim 1, wherein said rotor assembly is mounted for rotation about a horizontal axis

and includes a hub member carrying a plurality of longitudinally extending circumferentially spaced rows of flat radially extending laterally spaced support members each having an abutment formed thereon, and a plurality of axles, one extending through all of the support members in each of said rows, and wherein said impact hammers are pivotally and removably mounted on said axles, one between each adjacent pair of support members in each of said rows; and wherein each of said hammers is provided with opposed laterally extending stop members positioned to engage the abutments carried by the pair of support members between which it is mounted when in working position.

4. Apparatus as set forth in claim 1, wherein said rotor assembly is mounted for rotation about a horizontal axis and includes a hub member having two circumferential rows of radially extending circumferentially spaced flat support members formed thereon, one on each end, with each support member in one row horizontally aligned with a corresponding support member in the other row and with each support member having an abutment formed thereon; and a plurality of axles, one extending between each corresponding pair of support members; wherein each of said impact hammers is in the form of an elongated rectangular frame formed by a spaced parallel pair of impact bars connected together at their ends by leg members, each of said bars having opposed impact faces and each of said leg members having a pair of spaced openings horizontally aligned with the corresponding openings in the other leg and with each leg carrying stop members positioned to engage the abutments on the support members between which the hammer is mounted when in working position, the construction and arrangement being such that each hammer may be pivotally mounted to bring any one of its four impact faces into working position.

5. Apparatus as set forth in claim 1, wherein said rotor assembly is mounted for rotation about a horizontal axis and comprises a shaft having an axially spaced pair of hub members mounted thereon for rotation therewith, each of said hub members having two axially spaced circumferential rows of radially extending circumferentially spaced flat support members formed thereon with each support member in one row horizontally aligned with a corresponding support members in the other row and with each support member having an abutment formed thereon; a plurality of axles, one extending between each corresponding pair of support members carried by each of said hub members; wherein each of said hammers comprises an elongated bar having longitudinally extending impact faces formed on each side and carrying a pair of laterally extending legs, one on each end, provided with horizontally aligned openings and horizontally aligned stop members, and wherein each hammer is mounted on the rotor assembly with its legs pivotally mounted on the axles extending between corresponding pairs of support members and with the stops on its legs positioned to engage the abutments on the support members between which it is mounted when the hammer is in working position.

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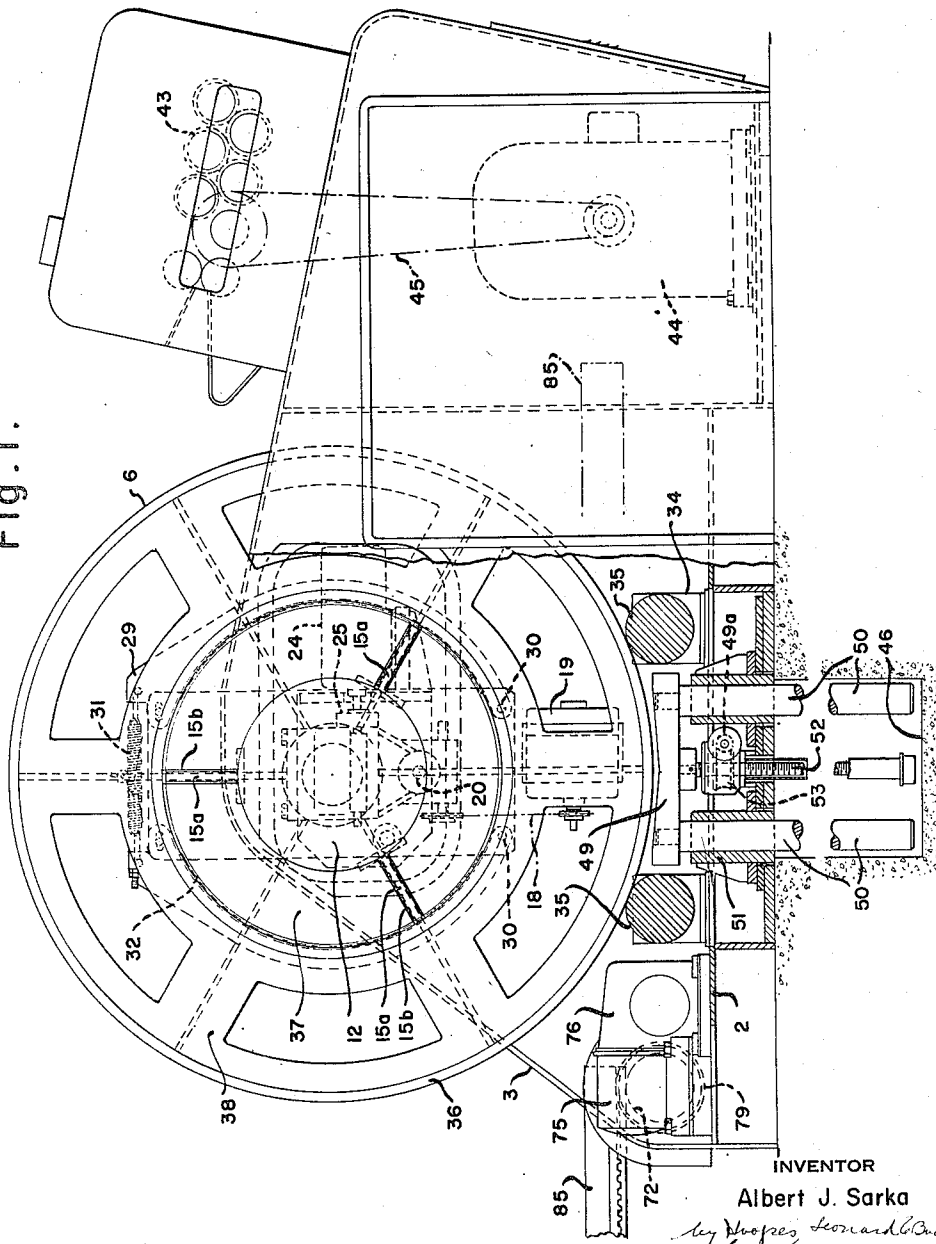
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COIL HANDLING MECHANISM

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Fig. 1.



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