Oct. 7, 1941. E. B. SYMONS 2,258,075

HOLDING MEANS FOR IMPACT PLATES

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Fig. 2

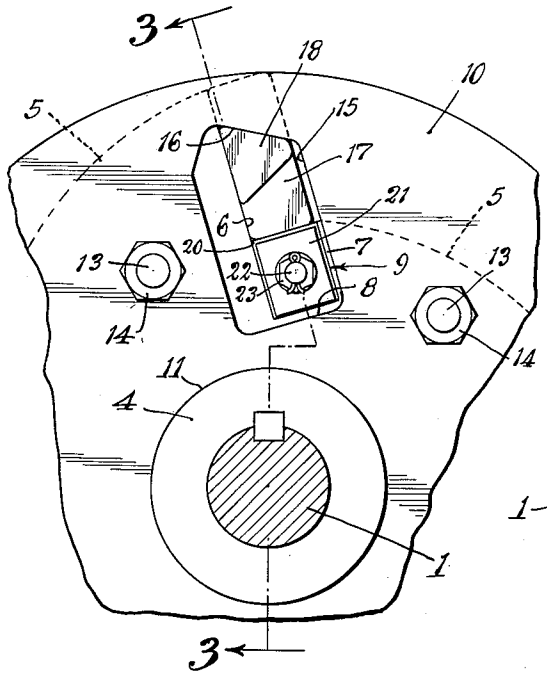


Fig. 3

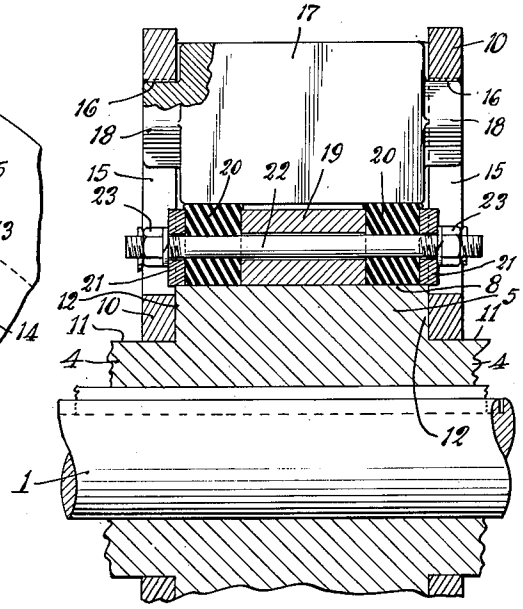
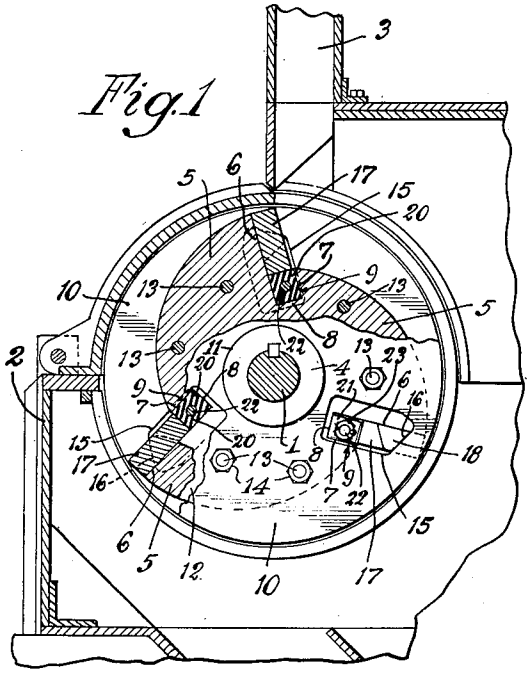


Fig. 1



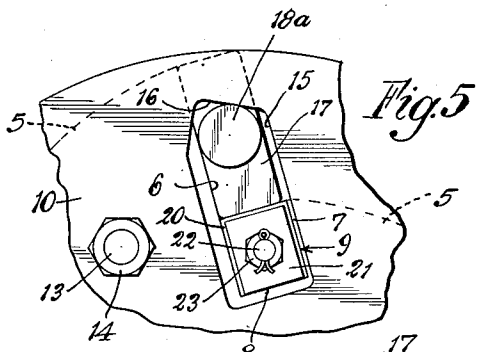
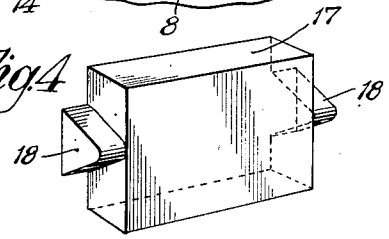


Fig. 5

Fig. 4



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Fig. 6

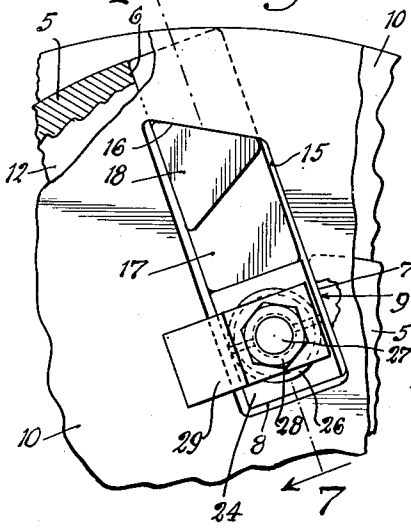


Fig. 7

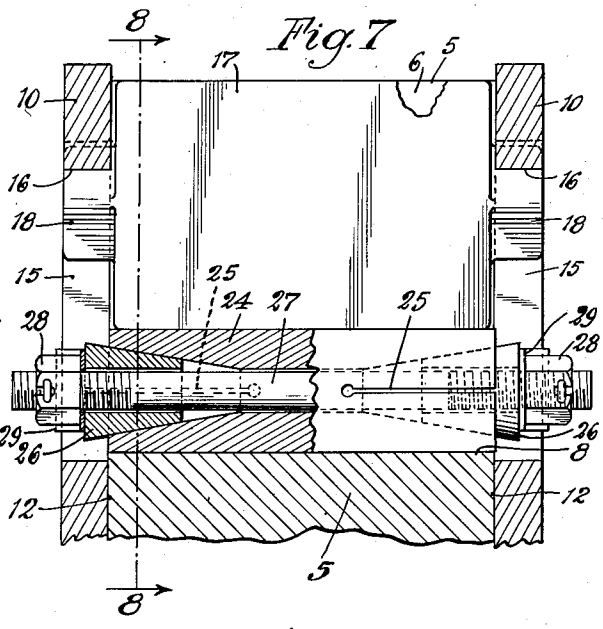


Fig. 8

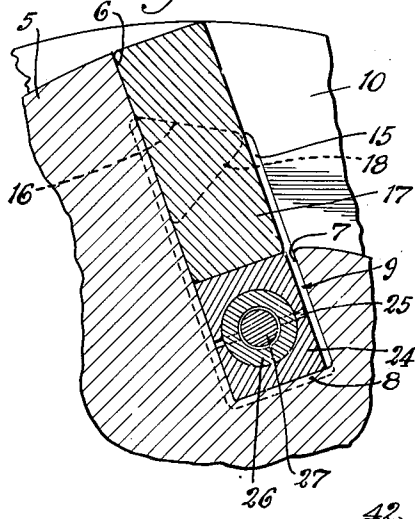


Fig. 9

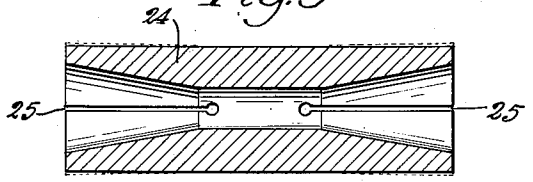


Fig. 13

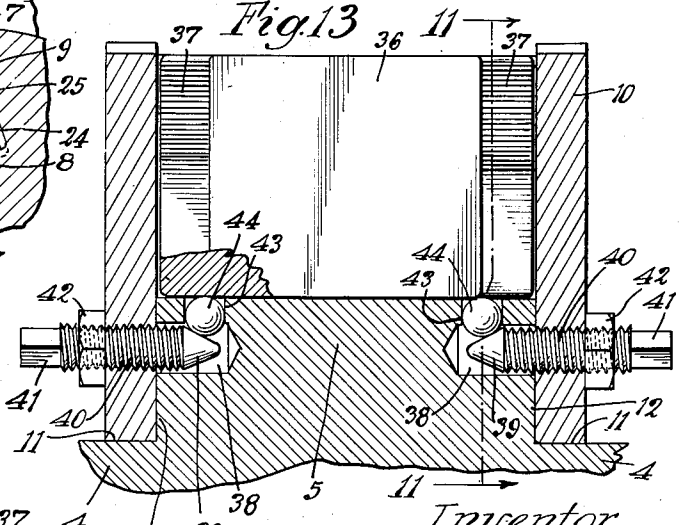
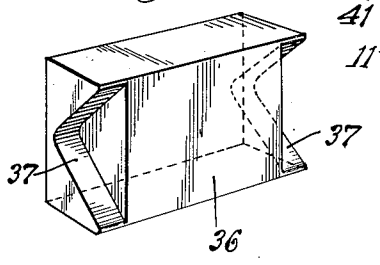


Fig. 14



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Fig. 11

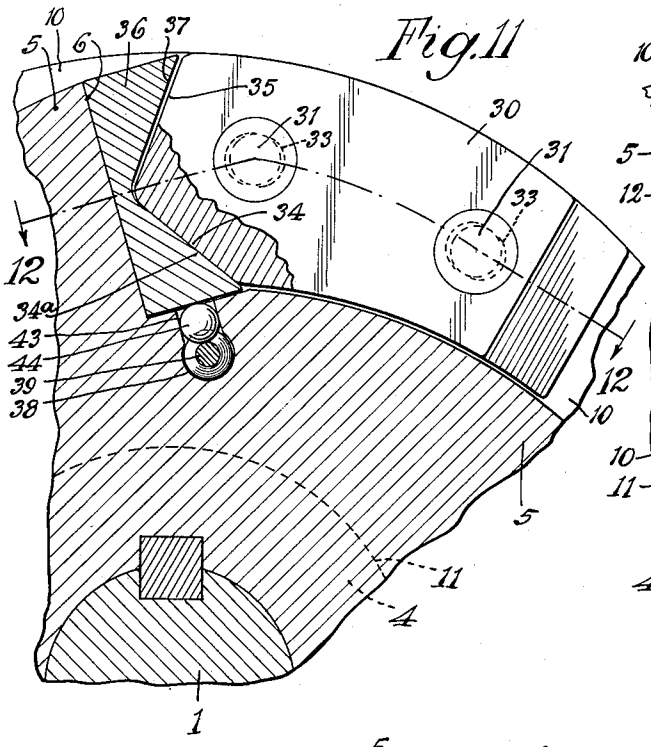


Fig. 10

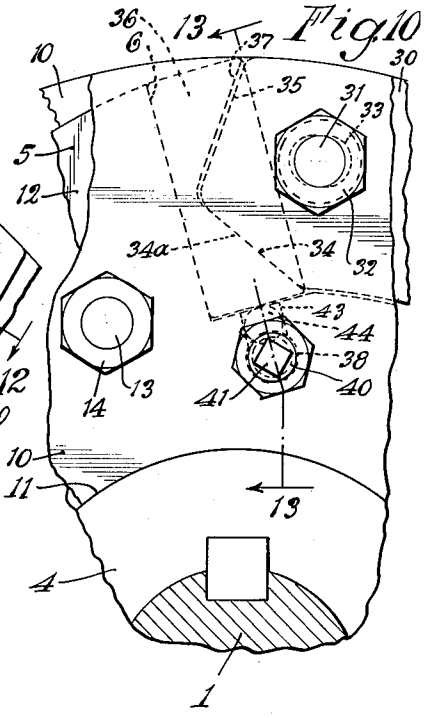
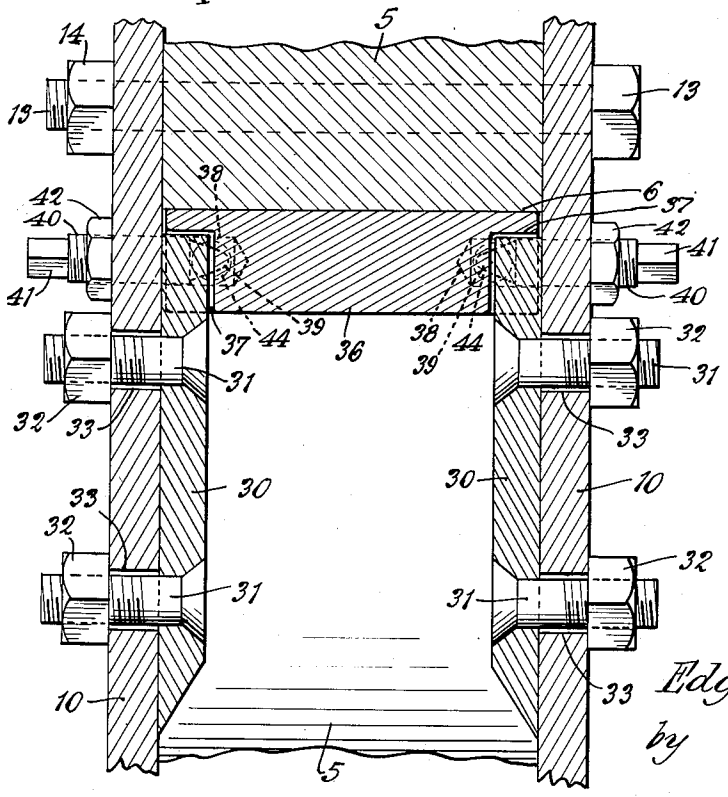


Fig. 12



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Patented Oct. 7, 1941 2,258,075

UNITED STATES PATENT OFFICE

2,258,075

HOLDING MEANS FOR IMPACT PLATES

Edgar B. Symons, Hollywood, Calif., assignor to Nordberg Manufacturing Company, Milwaukee, Wis., a corporation of Wisconsin

Application February 17, 1939, Serial No. 256,912

7 Claims. (Cl. 83—46)

My invention relates to locking means for impact plates in impact crushers, and for impact plates usable with such crushers.

One purpose is the provision of means for locking such plates firmly in position.

Another purpose is the provision of means for providing ready insertion and removal of such plates.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a vertical section perpendicular to the axis of rotation of the impact rotor;

Fig. 2 is a partial side elevation on an enlarged scale showing part of the rotor;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of an impact plate;

Fig. 5 is a view similar to Fig. 2 showing a modified form of impact plate;

Fig. 6 is a similar section showing a still further modified plate and locking means;

Fig. 7 is a section on the line 7—7 of Fig. 6;

Fig. 8 is a section on line 8—8 of Fig. 7;

Fig. 9 is a section through a locking sleeve;

Fig. 10 is a partial side elevation of a variant form;

Fig. 11 is a section on the line 11—11 of Fig. 13;

Fig. 12 is a section on line 12—12 of Fig. 11;

Fig. 13 is a section taken on the line 13—13 of Fig. 10; and

Fig. 14 is a perspective view of an impact plate.

Like parts are indicated by like characters throughout the specification and drawings.

Referring to the drawings, 1 generally indicates a rotor shaft which may be rotated in any practical manner and may be mounted in bearings not herein shown. 2 generally indicates the housing surrounding the rotor and 3 a feed chute herein shown as generally perpendicular, for delivering the material to be crushed into the path of movement of the rotor.

4 is a hub surrounding and keyed to the shaft 1 and provided with generally spiral surfaced outward extensions 5 having forward faces 6 slightly rearwardly inclined from the radial. Adjacent the lower portion of each of the faces 6 is an opposed face 7, the two faces with a bottom portion 8 defining a generally rectangular aperture or recess 9. 10, 10 are end members or rings mounted on ledges 11 of the hub 4 and drawn in any suitable manner against opposed abutment portions 12 of the hub, for example by bolts 13 and nuts 14, as shown in Fig. 1.

Each of the plates 10 is provided with a plurality of apertures 15, the corresponding apertures in each plate being alined. The apertures 15 are shown as inclined somewhat to the radial and as parallel with the faces 6 of the members 5. The upper end of each aperture 15 is herein shown as inclined as at 16 to engage the corresponding inclined face of the end lugs 18 of the impact plates 17. The width of the aperture 15 is shown as substantially greater than the thickness of the impact plate 17, and its height is sufficient to permit the plate 17 readily to be slid through the aperture into and out of alinement with the face 6.

After the plate 17 has been slid into position, it is then moved outwardly along the face 6, for example by gravity, the rotor being turned to bring the aperture 15 below the shaft 1. It may then be locked in position by the insertion of a spacing sleeve 19, fitting within the recess 9. At each end of the sleeve 19 I illustrate blocks of rubber or the like 20 which may be compressed by washers 21, the bolts 22 and the nuts 23 at the ends of the bolts. In response to such compression the rubber blocks 20 are expanded, and being confined on three sides within the recess 9 they expand outwardly in the fourth side against the lower edge of the plate 17 and lock it in the position in which it is shown for example in Figs. 2 and 3.

The camming effect of the inclined face of the member 16 is also effective to lock the rear face of the plate 17 against the opposed rotor face 6, as shown in Fig. 2. While I find it advantageous to have under some circumstances a triangular lug as shown at 18, I may also employ a round lug with the same effect, as illustrated at 18a in Fig. 5.

In the form of Figs. 6 to 9, I illustrate a variant arrangement in which, in place of the spacer or abutment blocks 19 and the rubber blocks 20, I illustrate a split sleeve 24 split at each end as at 25. I then insert into each end of it conic wedges 26 and draw the wedges together by the bolt 27 and nut 28, thus expanding the ends of the sleeve 24, as shown in dotted line in Fig. 9, against the lower edge of the impact plate 17. This results in locking the lugs of the impact plate against the inclined surfaces 16 of the aperture 15, and also in thrusting the back of the plate against the opposed rotor surface 6. If desired, lock washers 29 may be employed to prevent displacement.

I may employ a still further variant solution of the problem as shown in Figs. 10 and following. As there shown, I provide removable wear plates 30 provided with securing screws 31 and exterior nuts 32, the screws passing through apertures 33 in the side plates 10, the apertures being preferably of sufficient size to permit slight adjustment. The ends of the plates 30 are provided with outwardly converging inclined faces 34, 35.

36 indicates a variant form of impact plate, as shown for example in Fig. 14. At each end it is

provided with a generally triangular recess 37 adapted to receive the ends of the plates 30, as shown for example in Fig. 1. Beneath the ends of the plates 30, as shown for example in Fig. 11, are recesses 38 adapted to receive the conic ends 39 of the screws 40 screw-threaded in the side plates 10. They are headed for adjustment as at 41 and provided with lock nuts 42.

43 is an aperture upwardly extending from the recess or aperture 38 and adapted to hold the locking ball 44 which is engaged by the conic end 39. It will be understood that in response to rotation of the screw 40 the conic end 39 directs an upward thrust on the ball 44 which in turn engages the bottom of the impact plate 36 and thrusts it generally radially outwardly, as shown in Fig. 11, so that the inclined face 34a of the impact plate engages the opposed face 34 of the wear plate 30. The result is to lock the plate 36 against the opposed face 6 of the rotor by a wedging action.

It will be understood that as to all of the forms herein shown, centrifugal force will of itself tend to lock the various types of plate in position. However, I find it useful to supplement centrifugal force and to prevent any rattling, chatter or looseness by the various locking devices above described.

It will also be understood that whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

I claim:

1. In combination, in an impact crusher, a rotor and means for rotating it, said rotor including a pair of spaced end members having closed ended apertures, an impact plate mounted on said rotor and outwardly extending lugs at each end thereof, said lugs penetrating said apertures, and being of smaller size than said apertures, and means for locking said lugs against the outer ends of said apertures, said aperture ends and lugs having opposed wedging faces.

2. In combination, in an impact crusher, a rotor and means for rotating it, said rotor including a pair of spaced end members having closed ended apertures, an impact plate mounted on said rotor and outwardly extending lugs at each end thereof, said lugs penetrating said apertures, and being of smaller size than said apertures, and means for locking said lugs against the outer ends of said apertures, including a member of compressible material located adjacent a lower edge of said plate, and means for compressing said material and for thereby directing outward thrust against the lower edge of said plate, said aperture ends and lugs having opposed wedging faces.

3. In combination, in an impact crusher, a rotor and means for rotating it, said rotor including end members having closed ended apertures, an impact plate mounted on said rotor and outwardly extending lugs at each end thereof, said lugs penetrating said apertures, and means for locking said lugs against the outer ends of said apertures, including a rubber member opposed to a lower edge of said plate and means for compressing said rubber member in a direction generally parallel with the axis of rotation of the rotor and thereby laterally expanding it against the lower edge of said plate.

4. In combination, in an impact crusher, a rotor and means for rotating it, said rotor including a pair of spaced end members having closed ended apertures, an impact plate mounted on said rotor and outwardly extending lugs at each end thereof, said lugs penetrating said apertures, and means for thrusting said lugs outwardly against the outer ends of said apertures, each said aperture having its outer end face inclined in relation to a plane perpendicular to the length of said aperture whereby, in response to said thrust, said lugs are locked also against a side face of said aperture.

5. In combination, in an impact crusher, a rotor and means for rotating it, said rotor including a hub, a pair of spaced end members mounted on said hub, said end members having closed ended apertures, said hub having outward extensions provided with impact plate receiving faces, said apertures being generally alined with said faces whereby the impact plates may be inserted endwise through said apertures, lugs at each end of said plates, adapted to penetrate said apertures when the plate is in operating position, and means for directing a generally radial outward thrust against each such plate, and for thereby locking said lugs against the outer ends of said apertures, the opposed surfaces of said lugs and of said apertures being adapted to cause a locking thrust of said plate against the oppposed plate receiving surface of the rotor, in response to said outward thrust.

6. In combination, in an impact crusher, a rotor mounted for rotation, and means for rotating it, said rotor including a pair of spaced end members having generally radial closed ended apertures, the outer ends of said apertures terminating in faces inclined to a side wall of said apertures, a plurality of impact plates mounted on said rotor, each such plate having outwardly extending lugs at each end thereof penetrating said apertures, said lugs being of lesser length and width than the radial length and the width of said apertures, supporting means for said plates extending generally radially outwardly from said rotor, and means for urging said lugs and said plates laterally toward said supporting members, including means for directing a generally radial outward thrust against each plate and for thereby causing said lugs to travel upwardly and laterally along the said inclined faces of said apertures.

7. In combination in an impact crusher, an impeller and means for rotating it, and unitary impact plates mounted on said impeller, said impeller having faces adapted to receive and support the rear faces of said impact plates, said impeller including a hub and a pair of spaced end members thereon, said end members having apertures therethrough, said impact plates being bodily insertable endwise through said apertures, lugs at each end of each said plate, formed integrally with the plates and adapted to penetrate the apertures when the plate is in operating position, and means for directing a generally radial outward thrust against said plate and for thereby locking said lugs in said apertures, said means including movable balls mounted in said impeller and opposed to the lower edge of the plate, and means for directing a thrust against said balls and for thereby urging them upwardly against the lower edge of said plate.

EDGAR B. SYMONS.