April 7, 1942. S. W. TRAYLOR ET AL 2,278,625

SUSPENSION FOR CRUSHER SHAFTS

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Fig. 1.

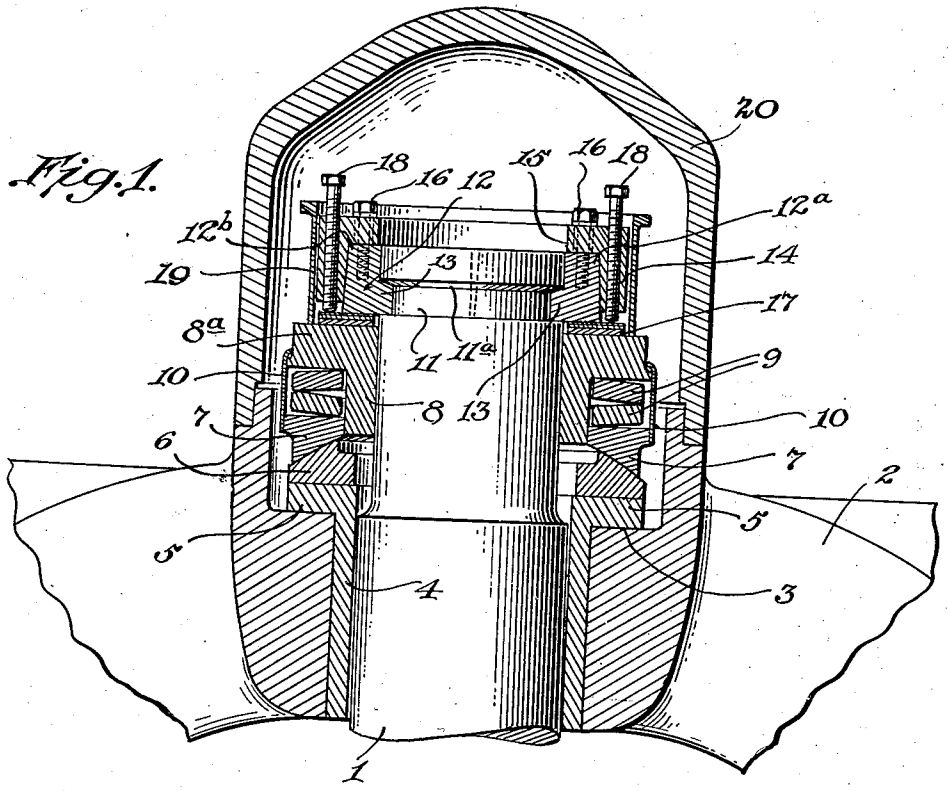
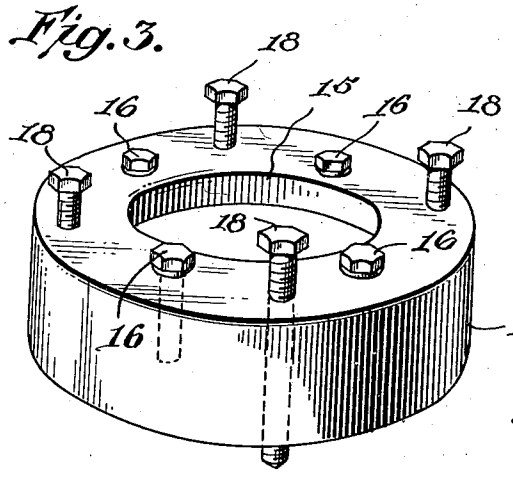


Fig. 3.



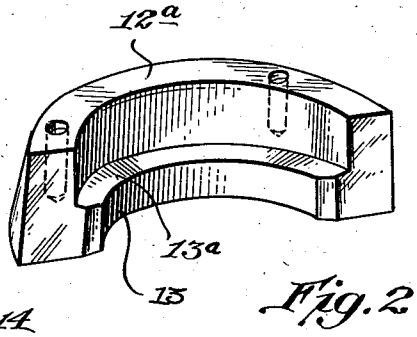


Fig. 2

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SUSPENSION FOR CRUSHER SHAFTS

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7 Claims. (Cl. 308—142)

This invention relates to means for suspending vertical crusher shafts, such for example as gyratory crusher shafts.

An important object of my invention is to provide a supporting collar adapted to be detachably associated with the upper end of a vertical crusher shaft and which is so constructed and arranged that the downward pressure exerted by the shaft tends to effect disengagement of the collar when it is desired to release the crusher shaft to free the crusher of tramp metal or other material that may have become jammed into the space between the crusher head and concave.

Other objects and advantages will be apparent from the following detailed description of a preferred embodiment of the invention, reference being had to the annexed drawing in which:

Figure 1 is a view of the upper end of a gyratory crusher showing in vertical cross-section the bearing for supporting the shaft for gyratory motion;

Figure 2 is a perspective view of one of the collar sections; and

Figure 3 is a perspective view of the retainer cap for holding the sections of the collar in assembly with the shaft.

In Fig. 1 is illustrated the upper portion of a gyratory crusher which is of the general type in which upright shaft 1 carrying the crusher head (not shown) is rockingly supported at its upper end in a spider 2 bridging the top of the crusher frame, and the lower end of this shaft is moved through a circular path by eccentric means, such as is well-known in the art.

The upper end of the crusher shaft extends through a vertical opening centrally provided in the spider, this opening being of enlarged diameter adjacent its top and the two diameters of the opening being connected by a horizontal ledge 3. A bushing 4 is tightly fitted within the smaller diameter of the opening, having a flat terminal flange 5 overlying the ledge 3. A washer 6 loosely surrounding the shaft 1 rests upon the flangs 5, its upper surface being of convex shape so as to cooperate with the concave lower surface of an overlying ring 7, the washer 6 and ring 7 forming companion parts of a swivel shaft-supporting bearing.

Snugly encircling the shaft 1 is a sleeve 8 having an enlarged circular head 8a. The lower end of the sleeve projects downwardly into the ring 7, and between the head 8a and ring 7 are interposed a pair of yielding cup-shaped elements 9 composed of spring metal and arranged in reverse relation. This type of yielding suspension forms the subject of a co-pending application of Richard Bernhard, Serial Number 246,246, now Patent No. 2,218,783, granted October 22, 1940. A cylindrical shell 10 telescopes over and spans the space between the ring 7 and the head of sleeve 8 so as to provide a dust-tight casing about the cup-shaped elements 9.

The shaft 1 a short distance from its upper end is provided with a circumferential recess 11, the upper side wall 11a of this recess being slightly inclined in a direction extending upwardly and outwardly. Encircling the shaft is a collar 12 comprising a pair of independent semi-cylindrical sections 12a of identical but reverse form. Each section has an inwardly directed rib 13 upon its inner circumference adapted to fit within the recess 11 on the shaft, the upper surface 13a of this rib sloping upwardly and outwardly at the same inclination as the upper side wall 11a of the recess 11. When the two sections of the collar are assembled about the shaft the interfitting rib and recess serve as a support for the shaft, the inclined faces of the rib and recess resting in bearing contact.

The outer circumference of the collar 12 tapers slightly outwardly in a downward direction, and adapted to fit over these sections and maintain them in assembly with the shaft is a retainer cap 14 which is internally tapered in a direction and at an angle complementary to the circumferential taper of the collar 12. The top of the cap is provided with an inwardly directed flange 15 adapted to overlie the upper end of the collar 12 when the cap is associated with the collar, and a series of bolts 16 extending through clearance openings in this flange and screwing into the collar sections serve to draw the cap tightly down over the collar and force the collar sections together around the shaft.

Interposed between the collar 12 and the sleeve 8 are a plurality of shims 17 encircling the shaft 1, these shims being of different thicknesses and being selected so as to support the shaft at any desired elevation to obtain the proper clearance between the crusher head and concave. These shims, each of which is composed of two segmental half sections, may be replaced by shims of other thicknesses to attain exactly the right setting of the shaft and without the necessity of disturbing the collar and cap assembly. A series of jack screws 18 extend vertically downwardly through screw-threaded openings in the cap 14, the lower ends of these screws footing upon the shims 17. A protective shield 19 fits

loosely around the cap 14 and shims 17, this shield terminating slightly above the top of retainer 14. A removable dome-shaped head 20 supported upon the spider 2 encloses and provides a cover for the parts of the shaft suspension.

The shaft suspension just described is adapted to function as follows: In rock quarries and also in gravel pits, it sometimes happens that pieces of tramp iron or steel accidentally find their way into the crusher with the material to be crushed. The small pieces of tramp metal pass through the crusher and are reduced without damage to the machine; however, the larger fragments of such metal cannot be crushed and therefore become jammed between the crusher head and concave, stopping the machine and often overstressing its parts. When the crusher jams, the tramp metal is gripped very tightly and it is difficult to remove it. Another case in which difficulty is encountered is in starting the machine when the crushing chamber is full of stone. The load is frequently too great for the ordinary motor to overcome in starting, making it necessary, heretofore, to remove the material from the crushing chamber by hand before initiating a crushing operation.

By virtue of our shaft suspension, the crusher shaft is adapted to be quickly released with a minimum of time and labor to permit the crusher head to descend and free the obstructing material from between the crusher head and concave. To accomplish this, the head 20 is removed and an eyebolt (not shown) is screwed into an axial threaded opening in the upper end of the shaft 1, this eyebolt being engaged with the hook of a chain block or other type of overhead support. The bolts 16 are then withdrawn from the collar 12 and the jack screws 18 turned down against the shims 17, which action forces the cap 14 upwardly over the collar 12. The pressure exerted by the combined weight of the shaft 1 and crusher head upon the inclined upper surface of the rib 13 of the collar tends to urge the collar sections 12*a* apart. If the angle of inclination of the coacting bearing faces 11*a* and 13*a* of the recess 11 and rib 13 is insufficient to allow the downward pressure of the shaft to automatically effect separation of the collar sections, then this may readily be accomplished by driving a tapered wedge into the joint between these sections to urge them apart, the shaft being permitted to settle downwardly under the control of the chain block. After the obstructing material has fallen free or has been forced from the crushing chamber, the shaft is raised by the chain block, the collar sections 12*a* reassembled about the shaft, and the cap 14 screwed tightly down over the collar by means of the bolts 16.

From the foregoing description it will be apparent that we have provided a suspension for vertical crusher shafts which obviates the use of threaded nuts, the threads of which frequently become mutilated or corroded which causes the nuts to freeze to the shaft and resist removal; and that we have devised a suspension which affords a readily releasable connection between the supporting collar and shaft due to the spreading action exerted by the shaft upon the collar. Furthermore, the shims 17 by reason of being made in half sections, may be assembled with the shaft to obtain precise adjustment of the crusher head with respect to the concave. To do this it is unnecessary to dismantle the suspension but by simply raising the shaft slightly shim sections of desired thickness may be introduced between the sleeve 8 and the collar 12.

It should be understood that it is not desired to limit the invention to the exact details of construction herein shown and described, for obvious modifications within the scope of the claims may occur to persons skilled in the art.

We claim:

1. A support for a vertical crusher shaft comprising a collar composed of a plurality of independent sections adapted to encircle the upper end of said shaft, an interfitting circumferential rib and recess connection between the shaft and collar, said rib and recess having inclined faces in bearing contact such that the downward pressure exerted by the shaft tends to force said sections apart to release the shaft, and removable means for holding the collar sections in assembly with the shaft.

2. A support for a vertical crusher shaft comprising a collar composed of a plurality of independent sections adapted to encircle the shaft, a rib upon the inner circumference of said collar and receivable within a recess extending about the outer circumference of the shaft, the coacting bearing races of the rib and the upper side wall of the recess being inclined outwardly and upwardly, whereby the downward pressure exerted by the shaft tends to force said sections apart to release the shaft, and a removable retainer member encircling the collar for holding the sections in assembly with the shaft.

3. A support for a vertical crusher shaft comprising a collar composed of a plurality of independent sections adapted to encircle the shaft, a rib extending about the inner circumference of said collar and receivable within a recess extending about the outer circumference of the shaft, said collar being circumferentially tapered downwardly and outwardly, the upper surface of the rib and the upper side wall of the recess being inclined outwardly and upwardly, whereby the downward pressure exerted by the shaft tends to force said sections apart to release the shaft, and a removable retainer member encircling the collar and having its inner circumference tapered complementary to the taper of the collar so as to fit thereover and hold the sections in assembly with the shaft.

4. A support for a vertical crusher shaft comprising a collar composed of a plurality of independent sections adapted to encircle the shaft, a rib extending about the inner circumference of said collar and receivable within a recess extending about the outer circumference of the shaft, said collar being circumferentially tapered downwardly and outwardly, the upper surface of the rib and the upper side wall of the recess being inclined outwardly and upwardly, whereby the pressure exerted by the shaft tends to force said sections apart to release the shaft, a removable retainer member encircling the collar and having its inner circumference tapered complementary to the taper of the collar so as to fit thereover and hold the sections in assembly with the shaft, said retainer member having a top overlying the collar, and bolts extending through said top and threadedly engaging openings in the collar for drawing the retainer member downwardly onto the collar.

5. A support for a vertical crusher shaft comprising a collar composed of a plurality of independent sections adapted to encircle the shaft, a rib extending about the inner circumference of said collar and receivable within a recess extend-

ing about the circumference of the shaft for supporting the shaft, said collar being circumferentially tapered downwardly and outwardly, the upper surface of the rib and the upper side wall of the recess being inclined outwardly and upwardly, whereby the pressure exerted by the shaft tends to force said sections apart to release the shaft, a retainer member encircling the collar and having its inner circumference tapered complementary to the taper of the collar so as to fit thereover and hold the sections in assembly with the shaft, said retainer member having a top overlying the collar, and bolts extending through said top and threadedly engaging openings in the collar for drawing the retainer member downwardly onto the collar, and jack screws extending through threaded openings in the collar and adapted to foot against a fixed part of the crusher.

6. In a vertical crusher including an upright crusher shaft adapted to support a crusher head, a collar adapted to encircle the upper part of said shaft and composed of a plurality of independent segmental sections, an interfitting circumferential rib and recess connection between the shaft and collar, said rib and recess having inclined faces in bearing contact such that the downward pressure exerted by the shaft tends to force said sections apart to release the shaft, and removable means for holding the collar sections in assembly with the shaft.

7. In a vertical crusher including an upright crusher shaft adapted to support a crusher head, a collar adapted to encircle the upper part of said shaft and composed of a plurality of independent segmental sections adapted to encircle the upper end of said shaft, an interfitting circumferential rib and recess connection between the shaft and collar, said rib and recess having inclined faces in bearing contact such that the downward pressure exerted by the shaft tends to force said sections apart to release the shaft, means for holding the collar sections in assembly with the shaft, and a plurality of shims of different thicknesses underlying and supporting the collar, said shims each being composed of a pair of segmental half sections to permit their lateral assembly with the shaft.

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