Aug. 23, 1932. E. B. SYMONS 1,873,671

YIELDING RELEASE FOR CRUSHER BOWLS

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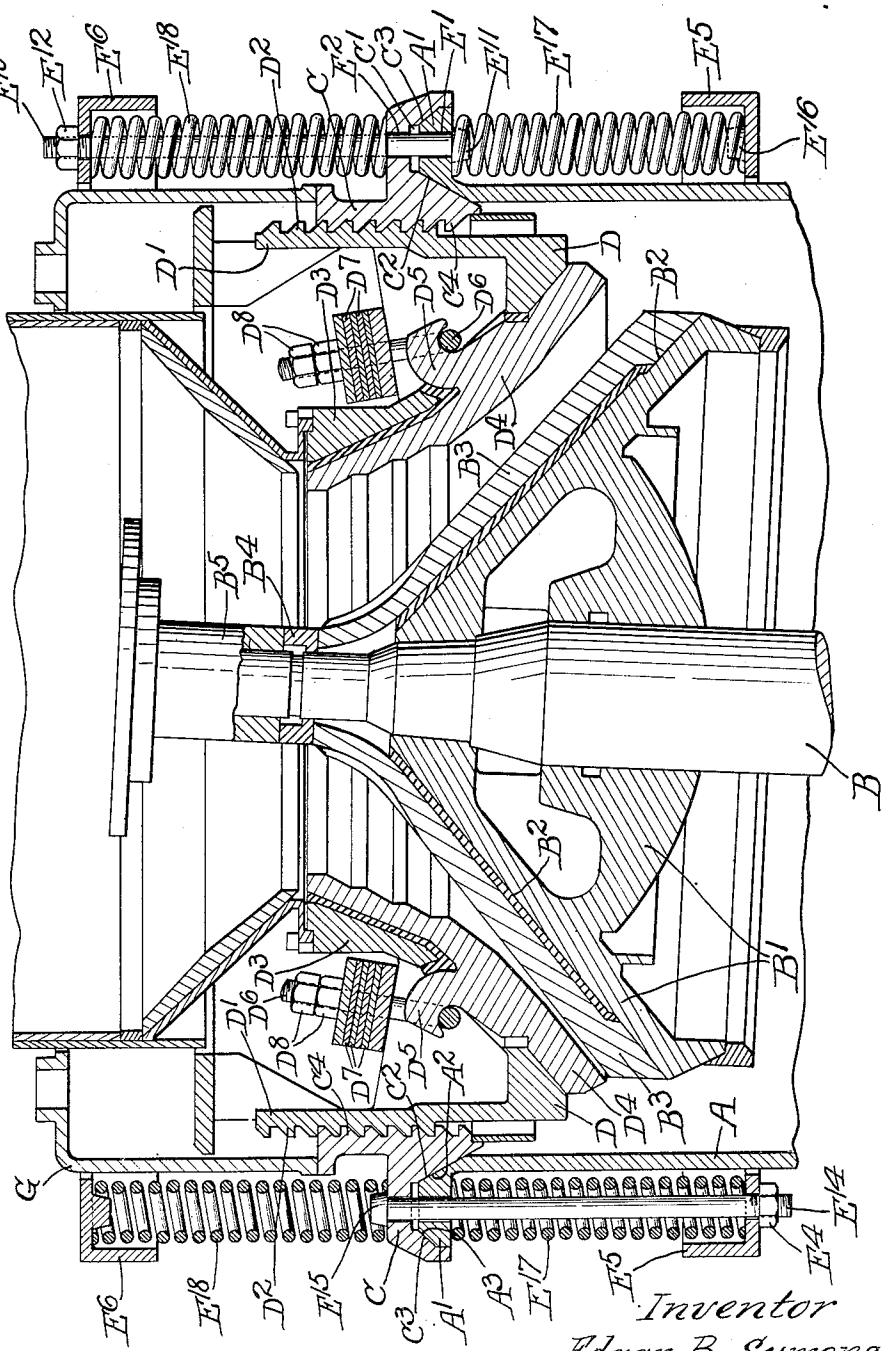


Fig. 1

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Fig. 2

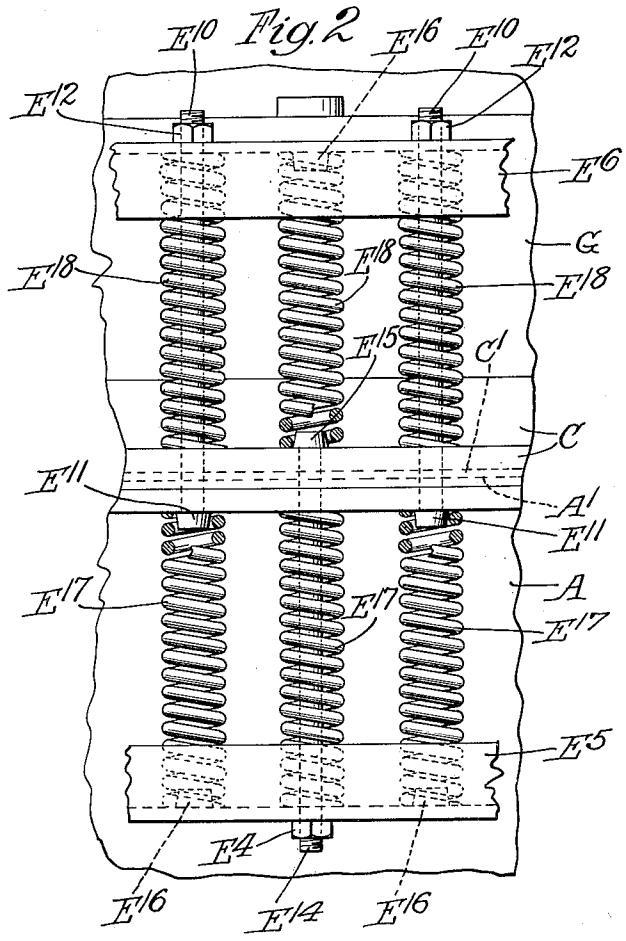
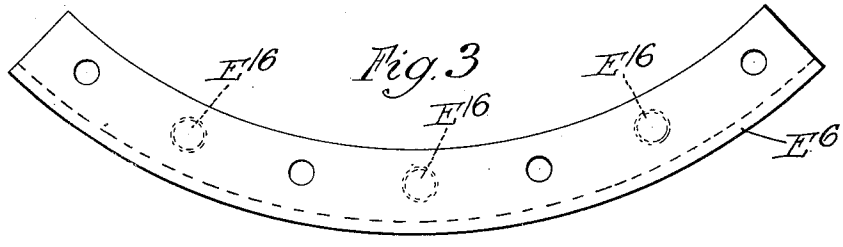


Fig. 3



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Patented Aug. 23, 1932 1,873,671

UNITED STATES PATENT OFFICE

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YIELDING RELEASE FOR CRUSHER BOWLS

Application filed August 5, 1931. Serial No. 555,215.

My invention relates to an improvement in crushing machines and has for one object the provision of an improved yielding release for the bowl or concave of a gyratory crusher. Another object is the provision of improved yielding means for normally holding the bowl fixed in predetermined crushing position. Other objects will appear from time to time in the course of the specification and claims.

The invention is more or less diagrammatically indicated in the accompaying drawings, wherein

Figure 1 is a vertical section;

Figure 2 is a partial elevation; and

Figure 3 is a detail of a spring abutment segment.

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

Referring to the figures, A generally indicates a fixed main frame for the crusher. Its upper edge is provided with an outwardly projecting flange A^1, the opposite sides of which are bevelled or inclined as at A^2 A^3.

B generally indicates a shaft, on the upper end of which is mounted a crushing head or cone B^1 having an outer generally conic surface B^2. The supporting means for the cone and shaft are omitted from the present drawings, since they do not of themselves form part of the present invention.

It will be understood that any suitable means may be employed for supporting and gyrating the shaft and head. B^3 indicates a crushing mantle positioned upon the head B^1. It may be held in position as by the sleeve B^4 and the locking member B^5. The details of the locking means are omitted, since they do not of themselves form part of the present invention.

C generally indicates a bowl supporting ring which is positioned upon the flange A^1. It is provided with a concavity generally indicated as C^1, which receives the flange A^1, and which has inclined surfaces C^2 C^3 opposed to the corresponding surfaces A^2 A^3 of the flange A^1. The member C is provided with an internally screwthreaded portion C^4.

D generally indicates the bowl structure proper, which may include an outer generally cylindrical portion D^1 screwthreaded to mesh with the screwthreading C^4, as at D^2. Any suitable means may be employed for imparting relative rotation to the members C and D, whereby to effect vertical adjustment of the bowl structure D. D^3 indicates a generally conic inner wall of the bowl structure, herein shown as overhanging the head B^1. The bowl liner D^4 may be secured thereto in any suitable manner as by the lugs D^5 engaged by the hooks or bolts D^6 with the adjusting shims D^7 and the lock nuts D^8.

It will be understood that in the normal use of the device, the bowl liner D^4 is held normally fixed in the position in which it is shown, while the head, including the mantle B^3, is gyrated to effect the crushing action. In order, therefore, to hold the ring C normally locked against the flange A^1 in the position shown in Figure 1 I provide the following means. I may employ a number of bolts E^{10} E^{14} which pass through apertures E^1 E^2 in the members A^1 and C respectively. The bolts may be headed or provided with nuts at top and bottom. It will be noted, as in Figure 2, that the bolts E are arranged in two series. E^{10} indicate bolts having heads E^{11} at the lower ends. The bolts E^{10} project upwardly through the ring C and through the upper segments E^6, being provided with upper nuts E^{12}. Another set of bolts E^{14} are headed at the top as at E^{15}, and project downwardly along the frame A, to support the lower segments E^5 by means of the nuts E^4. The upper and lower segments are provided with spring positioning abutments E^{16} and it will be noted from Figure 2 that these abutments on the lower segments are aligned with the heads E^{11} of the bolts E^{10}, while the abutment E^{16} of the upper segments E^6 are aligned with the bolt heads E^{15}. The bolts E^{10} and E^{14} alternate, so that the springs E^{17} E^{16} of each series are alternately positioned by bolts passing through them and by the spring abutments E^{11} E^{16} and E^{15} E^{16}.

G indicates an upper housing which may be positioned upon the member C within the upper springs E^{10}. Preferably it extends above the top segments E^6. The member G,

therefore, serves as a guide for the upper segments B^6 and the springs E^{18}, preventing any substantial lateral movement thereof. Similarly the main frame A serves as a guide for the lower segments E^5 and the lower springs E^{17}.

In the use of the present device, the upper and lower sets of springs are of sufficient strength to hold the ring C, and thus the crushing liner D^4, normally fixed in crushing position. In case tramp iron or other uncrushable material penetrates the crushing zone, the springs will permit the entire bowl structure, including the ring C, to tilt upwardly to permit the passage of the uncrushable material or to prevent the breakage of the crusher.

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

I claim:

1. In a gyratory crusher, a fixed circumferential frame member, a crushing head and means for gyrating it, a bowl surrounding the head, supporting means for the bowl tiltably mounted upon the upper edge of the frame member, and yielding means for holding said supporting means normally fixed in relation to said frame, said means including a set of springs positioned above said supporting means and a set of springs positioned below said supporting means, abutment members confining the upper and lower ends respectively of said sets of springs, and compression members, extending respectively upwardly and downwardly from said bowl supporting means in securing relationship with the upper and lower abutment members respectively.

2. In a gyratory crusher, a fixed circumferential frame member, a crushing head and means for gyrating it, a bowl surrounding the head, supporting means for the bowl tiltably mounted upon the upper edge of the frame member, and yielding means for holding said supporting means normally fixed in relation to said frame, said means including a set of springs positioned above said supporting means and a set of springs positioned below said supporting means, abutment members confining the upper and lower ends respectively of said sets of springs, and compression members, extending respectively upwardly and downwardly from said bowl supporting means in securing relationship with the upper and lower abutment members respectively, said compression members including headed bolts, the heads of said bolts being adapted to serve as spring positioning abutments.

3. In a gyratory crusher, a fixed circumferential frame member, a crushing head and means for gyrating it, a bowl surrounding the head, supporting means for the bowl tiltably mounted upon the upper edge of the frame member, and yielding means for holding said supporting means normally fixed in relation to said frame, said means including a set of springs positioned above said supporting means and a set of springs positioned below said supporting means, abutment members confining the upper and lower ends respectively of said sets of springs, and compression members, extending respectively upwardly and downwardly from said bowl supporting means in securing relationship with the upper and lower abutment members respectively, the upwardly extending and downwardly extending compression members alternating.

4. In a gyratory crusher, a fixed circumferential frame member, a crushing head and means for gyrating it, a bowl surrounding the head, supporting means for the bowl tiltably mounted upon the upper edge of the frame member, and yielding means for holding said supporting means normally fixed in relation to said frame, said means including a set of springs positioned above said supporting means and a set of springs positioned below said supporting means, abutment members confining the upper and lower ends respectively of said sets of springs, and compression members, extending respectively upwardly and downwardly from said bowl supporting means in securing relationship with the upper and lower abutment members respectively, the upwardly extending and downwardly extending compression members alternating, each such compression member including a headed bolt, said bolt heads being adapted to serve as spring positioning abutments for springs of one set, the bodies of the bolts being adapted to serve as spring aligning means for spring of the other set, the heads of the upwardly extending bolts abutting against the frame member, the heads of the downwardly extending bolts abutting against the bowl.

5. In a gyratory crusher, a normally fixed circumferential frame member, a crushing head within said frame member and means for gyrating it, a bowl, surrounding said head, said bowl being tiltably positioned upon the upper edge of the frame member, the frame member being provided with a flange outwardly extending about its upper edge, the bowl including a portion overlying said flange, and yielding means for holding the bowl normally fixed in relation to the frame, said means including a lower set of springs positioned about the frame member and vertically aligned beneath the flange,

and an upper set of springs vertically aligned with the lower set of springs and positioned above the portion of the bowl which overlies the flange, abutment means for the upper ends of the upper springs and for the lower ends of the lower springs, and compression members therefor, the compression members for the lower set of springs connecting the overlying portion of the bowl with the lower abutment means, the compression members for the upper set of springs connecting the flange of the frame with the upper abutment means.

6. In a gyratory crusher, a normally fixed circumferential frame member, a crushing head within said frame member and means for gyrating it, a bowl surrounding said head, said bowl being tiltably positioned upon the upper edge of the frame member, the frame member being provided with a flange outwardly extending about its upper edge, the bowl including a portion overlying said flange, and yielding means for holding the bowl normally fixed in relation to the frame, said means including a lower set of springs positioned about the frame member and vertically aligned beneath the flange, and an upper set of springs vertically aligned with the lower set of springs and positioned above the portion of the bowl which overlies the flange, abutment means for the upper ends of the upper springs and for the lower ends of the lower springs, and compression members therefor, the compression members for the lower set of springs connecting the overlying portion of the bowl with the lower abutment means, the compression members for the upper set of springs connecting the flange of the frame with the upper abutment means, said compression members being headed, the heads of the compression members for each set of springs being adapted to serve as spring positioning abutments for the adjacent ends of the springs of the opposite set.

7. In a gyratory crusher, a normally fixed circumferential frame member, a crushing head within said frame member and means for gyrating it, a bowl, surrounding said head said bowl being tiltably positioned upon the upper edge of the frame member, the frame member being provided with a flange outwardly extending about its upper edge, the bowl including a portion overlying said flange, and yielding means for holding the bowl normally fixed in relation to the frame, said means including a lower set of springs positioned about the frame member and vertically aligned beneath the flange, and an upper set of springs vertically aligned with the lower set of springs and positioned above the portion of the bowl which overlies the flange, generally circular abutment means for the upper ends of the upper springs and for the lower ends of the lower springs, and compression members therefor, the compression members for the lower set of springs connecting the overlying portion of the bowl with the lower abutment means, the compression members for the upper set of springs connecting the flange of the frame with the upper abutment means, the frame being adapted to serve as a guide for the lower set of springs and the lower abutment means, and an additional housing member, positioned above the bowl, adapted to serve as a guide for the upper set of springs and the upper abutment means.

Signed at Hollywood, county of Los Angeles and State of California, this 24th day of July, 1931.

EDGAR B. SYMONS.