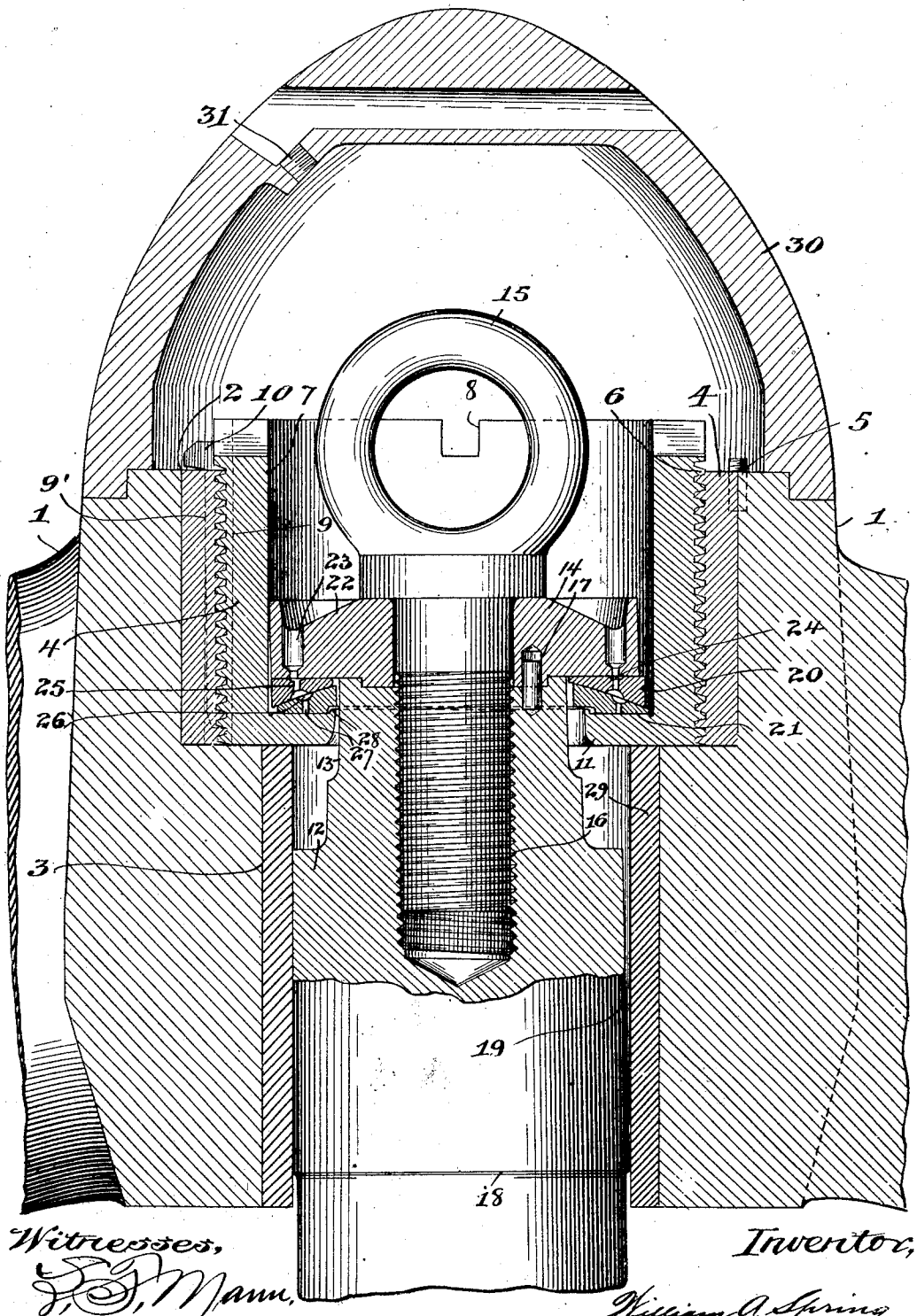
No. 839,901. PATENTED JAN. 1, 1907.

W. A. SPRING.

GYRATORY CRUSHER.

APPLICATION FILED MAR. 11, 1905.



Witnesses,

F. S. Mann,

H. P. Litzenberg.

Inventor,

William A. Spring,

By Offield, Towle & Linthicum.

Attys.

UNITED STATES PATENT OFFICE.

WILLIAM A. SPRING, OF HARVEY, ILLINOIS, ASSIGNOR TO AUSTIN MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

GYRATORY CRUSHER.

No. 839,901. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed March 11, 1905. Serial No. 249,651.

To all whom it may concern:

Be it known that I, WILLIAM A. SPRING, a citizen of the United States, residing at Harvey, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gyratory Crushers, of which the following is a specification.

This invention relates to improvements in gyratory crushers, and refers more specifically to an improved construction in suspension-bearings for the main gyratory shaft.

The salient object of the present invention is to provide a construction in which the great weight of the gyratory main shaft and crusher-head carried thereby is carried by a suspension-bearing which provides a large and substantially unvarying area of bearing-surfaces, the character of the support being substantially unaffected by the gyratory movements of the shaft, while the necessary freedom of movement of the latter to insure full bearing against the laterally-confining journal remains unimpaired.

Subordinate objects of the invention are to provide a construction which permits the gyratory shaft to oscillate freely without necessitating any bodily rising or falling movement of the same, this end being accomplished by providing main supporting-surfaces movable upon each other and disposed in an arc concentric with the center of gyration; to provide a construction which permits adjustment of the crusher-head up or down to vary the throat-opening of the crusher and the size of the product without the necessity of stopping the crusher; to provide a construction which may be kept thoroughly lubricated and requires a minimum amount of attention to prevent it from getting out of order; to provide a construction which enables most of the machines which are now in common use to be conveniently and economically remodeled to embody the present invention and improvements, and, in general, to provide a simple and improved construction of the character referred to.

To the above ends the invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims.

The invention will be readily understood from the following description, reference being had to the accompanying drawing, forming a part thereof, wherein the single view shows in axial section the central portion of the main gyratory shaft and my improved form of bearing suspending said shaft.

Referring to the drawings, 1 designates, as a whole, the spider-head, of which only the central or hub portion and fragmentary parts of the two radial arms are shown, it being understood that this spider-head is of a usual construction so far as its general form and arrangement are concerned. In an annular recess 2, formed concentrically with the main vertical bearing 3 of the spider-hub, is seated a suitable cylindrical bushing 4, which fits accurately within said annular seat and is keyed against movement therein by means of a removable key 5. The interior of the bushing is screw-threaded, as indicated at 6, to receive a main bearing-sleeve 7, externally threaded to fit therein and provided at its upper end with suitable spanner-recesses 8, whereby it may be adjusted to position. This bearing-sleeve constitutes the means for raising and lowering the main shaft, and to this end a keyway is formed partially within the exterior of the bushing, as indicated at 9, and partially within the sleeve, as indicated at 9', within which is seated a removable key 10, which serves to lock the parts in adjusted relation.

The lower end of the sleeve 4 is provided with an inwardly-extending annular flange or ledge 11, which forms the main support that carries the gyratory shaft.

12 designates the main shaft, which is reduced at its upper end, as indicated at 13, and has connected thereto a cap 14 of larger diameter than the shaft, so as to overhang the supporting-flange 11. This cap is conveniently rigidly connected with the shaft by means of an eyebolt 15, extending centrally therethrough and threaded into the end of the shaft, as indicated at 16, the eyebolt serving the double function of securing the cap to the shaft and providing a means whereby the main shaft may be lifted out of the crusher for repair or replacement. The cap is held rigidly against rotation relatively to the shaft by means of a dowel-pin projecting partly into each member, as indicated at 17.

As is well understood in crushers of this

type that part of the main shaft which is located above the center of gyration has a gyratory motion, and this gyratory movement must be provided for in such suspension-bearings. Moreover, the upper end of the shaft must be so supported against lateral thrust that it has at all times a relatively long bearing-surface against the part within which it is journaled. In the construction shown herein, the shaft has a free swing on a spherical surface described from a point in line 18, this line being located at the lower end of the cylindric portion 19 of the shaft, which constitutes the bearing-surface, and the shaft below this point being slightly reduced in diameter. It follows that lateral movement must be provided for in the bearing members, which rest upon the supporting-ledge 11, and this movement I provide for by interposing between the under side of the cap 14 and the ledge 11 a pair of washers 20 and 21, respectively, which have part-spherical meeting faces described from a center located in the axis of the shaft in the plane of the line 18 and substantially coincident with the center of gyration—that is to say, the upper surface of the lower washer 21 is convex and the meeting or lower surface of the washer 20 is correspondingly concave. Preferably, and as herein shown, both of said washers are capable of slight lateral movement independently of each other and independently of the bearings between which they are interposed, the washers being to this end made slightly smaller in external diameter than the seat within which they rest, and having their central openings made slightly larger than the diameter of that part of the main shaft which they encircle.

In order to provide for lubrication of the bearing parts, the cap member 14 is provided with an annular recess 22 in its upper side, from which lead downwardly a plurality of oil-ports 23, which open into an annular groove 24, formed in the top surface of the washer 20. From the groove 24 similar ports 25 lead through the washer into another annular groove 26, formed between the meeting surfaces of the washers, and from the groove 26 other ports 27 lead down to the top surface of the supporting-ledge. Preferably a slight upturned lip 28 surrounds the inner edge of the ledge 11, so as to tend to retain the lubricant between the surface of the ledge and the washer 21, but nevertheless free flowway is provided over the lip 28 and downwardly between the inner edge of the ledge and the main shaft, so that the oil may pass downwardly to the cylindrical bearing-surface 19 of the shaft. That part of the hub of the spider which coöperates with this cylindrical bearing 19 is lined with a suitable bushing 29, which is capable of removal for renewal. The entire upper end of the hub is inclosed with a conical cap 30, as is common, this cap being provided with a removable screw-plug 31, occupying an aperture through which oil may be poured.

The operation of the mechanism has been clearly indicated in connection with the description of the parts thereof, and need not therefore be repeated.

While I have herein shown and described what I deem to be a preferred embodiment of the invention, yet it will be obvious that the details of construction and arrangement may be modified without departing from the invention, and I do not therefore limit myself to such details except in so far as they are made the subject of specific claims.

I claim—

1. In a gyratory crusher, the combination of a spider-head bored axially to accommodate a main gyratory shaft, a supporting-sleeve having screw-threaded engagement with said spider-head and provided with an internal annular supporting-shoulder, and a main shaft provided at its upper end portion with an overhanging annular shoulder supported by the annular shoulder of the supporting-sleeve.

2. In a gyratory crusher, the combination of a spider-head bored to accommodate the upper end of a main gyratory shaft, a supporting-sleeve externally screw-threaded vertically adjustable in said spider-head, an inwardly-projecting, upwardly-facing annular supporting-shoulder upon said sleeve, a main shaft provided with an annular overhanging supporting-shoulder adapted to coöperate with the supporting-shoulder of the sleeve, and an independent bearing-ring interposed between said shoulders.

3. In a gyratory crusher, the combination of a spider-head bored to accommodate the upper end of a main gyratory shaft, a supporting-sleeve vertically adjustable in said spider-head, means for locking said sleeve in adjusted position, an inwardly-projecting, upwardly-facing annular supporting-shoulder upon said sleeve, a main gyratory shaft provided with an annular overhanging supporting-shoulder adapted to coöperate with the shoulder of the sleeve, and a washer member interposed between said shouldered parts, one face of said washer member being formed with a surface concentric with the center of gyration of said main shaft, and a contacting member which engages said surface provided with a corresponding surface.

4. In a gyratory crusher, the combination of a spider-head bored axially to accommodate a main gyratory shaft, a supporting-sleeve vertically adjustable in said spider-head and provided with an internal annular supporting-shoulder, a main shaft provided with an annular overhanging supporting-shoulder arranged in overlapped relation to the supporting-shoulder of the sleeve, and a pair of bearing-rings interposed between

said shoulders in superposed relation, the meeting surfaces of said bearing-rings being formed substantially concentric with the center of gyration of the main shaft.

5. In a gyratory crusher, the combination of a spider-head bored axially to accommodate a main gyratory shaft, a supporting-sleeve vertically adjustable in said spider-head and provided with an annular inwardly-projecting supporting-shoulder, a main shaft provided at its upper end with a detachable cap member, the peripheral portions of which project beyond the sides of the main shaft and form an overhanging supporting-shoulder, and one or more bearing-rings interposed between the shoulder of said cap member and the annular shoulder of the supporting-sleeve.

6. In a gyratory crusher, the combination of a spider-head bored to accommodate the upper end of a main shaft and counterbored above the bearing for said main shaft, a fixed bushing seated in said counterbore and internally threaded, a supporting-sleeve externally threaded and fitting within said bushing, said supporting-sleeve being provided with an inwardly-projecting annular supporting-shoulder, and a main shaft provided with an annular overhanging shoulder overlapping the shoulder of the supporting-sleeve and supported by the latter, substantially as described.

WILLIAM A. SPRING.

Witnesses:

ALBERT H. GRAVES,

FREDERICK C. GOODWIN.