

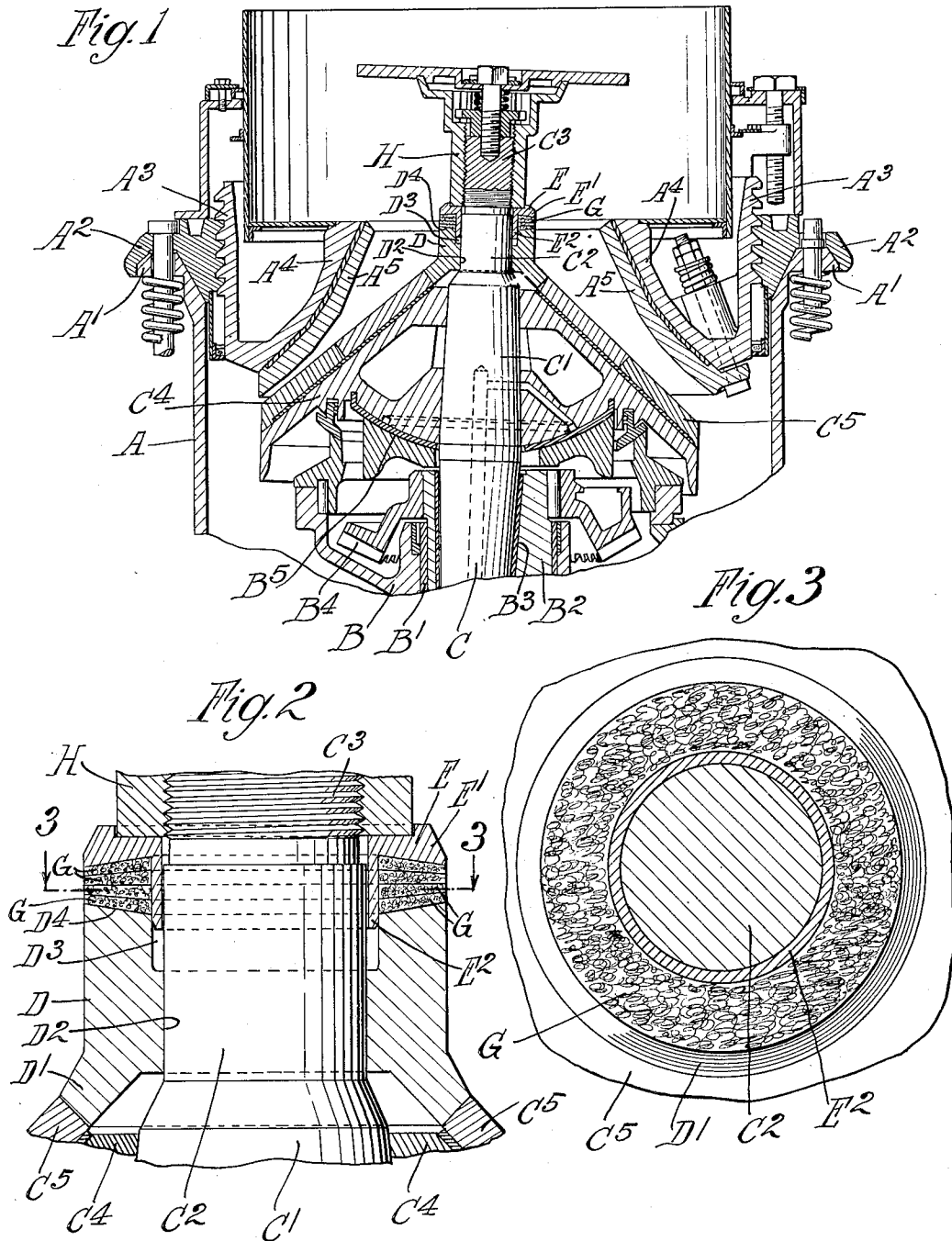
Oct. 24, 1933.

E. B. SYMONS

1,931,633

FABRIC WASHER CONSTRUCTION FOR CRUSHING MACHINERY AND THE LIKE

Filed March 6, 1930



Inventor  
 Edgar B. Symons  
 by Parker & Carter  
 Attorneys.

## UNITED STATES PATENT OFFICE

1,931,633

FABRIC WASHER CONSTRUCTION FOR  
CRUSHING MACHINERY AND THE LIKEEdgar B. Symons, Hollywood, Calif., assignor to  
Nordberg Manufacturing Company, Milwaukee,  
Wis., a corporation of Wisconsin

Application March 6, 1930. Serial No. 433,565

8 Claims. (Cl. 83—10)

My invention relates to securing means and particularly to securing means adaptable for use for example with the cone of a gyratory cone crusher. One object of my invention is to provide wide clamping or locking means for holding the mantle upon the cone of such a crusher and for preventing the splitting or cracking of such mantle in response to rigid downward pressure against the upper end thereof. Other objects 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 drawing, wherein—

Figure 1 is a vertical axial section through the crusher;

Figure 2 is a portion of a similar section, on an enlarged scale; and

Figure 3 is a section on the line 3—3 of Figure 2. Like parts are indicated by like symbols throughout the specification and drawing.

A generally indicates the frame of a gyratory cone crusher upon the upper flange or edge A<sup>1</sup> of which may be seated the supporting ring A<sup>2</sup> to which is threaded the bowl supporting member A<sup>3</sup> which may be formed integrally with the bowl A<sup>4</sup>. A<sup>5</sup> indicates any suitable liner for the bowl.

B indicates an internal frame member or sleeve having the bearing B<sup>1</sup> in which rotates the eccentric sleeve B<sup>2</sup> eccentrically apertured as at B<sup>3</sup> to receive the downwardly tapered shaft generally indicated as C. B<sup>4</sup> is a gear associated with the sleeve B<sup>2</sup>, whereby the eccentric sleeve may be rotated to impart a gyratory movement to the shaft C. B<sup>5</sup> indicates an upwardly concave spherical bearing member.

C is a crusher shaft having an upwardly tapered portion C<sup>1</sup> and a further reduced portion C<sup>2</sup> above it which, in turn, terminates in a screwthreaded portion C<sup>3</sup>. Mounted upon the tapered portion C is the cone proper C<sup>4</sup> upon the exterior surface of which, in turn, is positioned a mantle C<sup>5</sup> which may, if desired, be formed of a plurality of individual annular sections.

D indicates a clamping member slidably mounted upon a cylindrical portion C<sup>2</sup> of the shaft C. The member D terminates in a downward and outward extension D<sup>1</sup> adapted to engage the upper edge of the mantle C<sup>5</sup>. It will be understood that any thrust directed downwardly to and through the sleeve D is effective to thrust the mantle C<sup>5</sup> downwardly against the cone C<sup>4</sup> and to clamp the cone C<sup>4</sup> downwardly upon the tapered portion C<sup>1</sup> of the shaft C. The sleeve D includes a bearing portion D<sup>2</sup> adapted to contact

the shaft portion C<sup>2</sup>. D<sup>3</sup> indicates an upper recess or spaced away portion of the sleeve D, as shown for example in Figure 2. The member D terminates in an upper surface D<sup>4</sup> which is shown, as in Figure 2, as somewhat upwardly and outwardly inclined.

Positioned above the sleeve D, and about the portion C<sup>2</sup> of the shaft is the ring generally indicated as E, which includes an outer annular section E<sup>1</sup> and an inner cylindrical section E<sup>2</sup>. As shown in Figure 2 the inner cylindrical section E<sup>2</sup> is formed to fit into the aperture D<sup>3</sup> and is of such diameter as to penetrate between the upper portion of the member D and the shaft portion C<sup>2</sup>. The annular portion E<sup>1</sup> of the ring E has a lower surface which is inclined downwardly and outwardly from the portion E<sup>2</sup>. It will be seen, as from Figure 2, that when the member E is positioned about the shaft portion C<sup>2</sup> and above the sleeve D a chamber may be formed the vertical thickness of which decreases radially outwardly. This space serves as a housing or container for one or more flexible or fabric washers indicated as G. Preferably a group of them are employed. Either by method of manufacture, or because of the compression of the member E against the member D these washers, or the composite washer member formed thereby, is thicker at its inner than at its outer periphery, the washer decreasing in thickness progressively outwardly from the member E<sup>2</sup>.

It will be realized that whereas I have described and shown a practical and operative device, nevertheless many changes might 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 drawing to be taken as in a broad sense illustrative and diagrammatic rather than as limiting me to my specific showing. In particular whereas the washer here employed is well adapted for use with gyratory cone crushers, for the purpose of securing the mantle upon the cone, I do not wish to be limited specifically to such use, as many other uses may be made of it without departing from the spirit of my invention.

The use and operation of my invention are as follows:

In the type of cone now upon the market, a rather widely flared cone is employed, as shown in Figure 1. Upon the conic surface of this cone a mantle is employed, such mantles being prevailingly of manganese steel. One characteristic of manganese is that it will flow and stretch under pressure, setting up strains in that part

of the mantle which is not working hard in response to the subjection of other variations of the mantle to crushing strain. An example of such occurrence is when a crusher is set to produce a fine product, and the reduction for crushing takes place in a restricted area of the crushing zone. Under such conditions, and in response to the stretching or flowing of the manganese, cracks may develop even though the mantle is only partly worn out. Manganese has a tendency to stretch lengthwise as well as in circumference, when employed for such mantles. The mantle is held down on the head by means of the adjusting sleeve D and it is through this adjusting sleeve that pressure is directed downwardly against the mantle and cone. I employ for example the nut H screwthreaded to the screwthreaded portions C<sup>3</sup> of the shaft. Rotation of the nut H directs pressure downwardly against the ring E and through it against the sleeve D. Assume that the washers G are omitted. In such case the mantle is held down on the cone by means of the adjusting sleeve and nut, and cannot yield in an upward direction. If the mantle then flows or stretches in response to crushing the above described tendency for the mantle to crack will not be checked. I prefer, however, to interpose somewhere in the line of thrust, some yielding medium or member, to loosen the tendency for the mantle to crack and to provide some yield or give in response to vertical stretching of the mantle. This is the function of the washer or washers G, which may be of any suitable compressible or yieldable material. I may, for example, employ fiber or fabric washers formed of any suitable number of layers of fabric. Such washers may be employed for a considerable time without renewal, and may be easily renewed when necessary. In practice, the employment of such washers has very much reduced the tendency of the mantles to split or crack in service.

I claim:

1. In a crusher, a generally conic head, a shaft, said shaft extending upwardly above the top of the conic head, a mantle mounted upon said head, said mantle being formed of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for locking said mantle upon said head, including a thrust member mounted upon said shaft, means for forcing said thrust member downwardly along said shaft against said head and mantle, and a washer, formed of compressible fibrous material, associated with said thrust member and adapted to compensate for the stretching or extension of the mantle, and means for confining said washer.

2. In a crusher, a generally conic head, a shaft, said shaft extending upwardly above the top of the conic head, a mantle mounted upon said head, said mantle being formed of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for locking said mantle upon said head, including a thrust member mounted upon said shaft, means for forcing said thrust member downwardly along said shaft against said head and mantle, and a washer, formed of compressible fibrous material, associated with said thrust member and adapted to compensate for the stretching or extension of the mantle.

3. In a crusher, a generally conic head, a shaft, said shaft extending upwardly above the top of the conic head, a mantle mounted upon said

head, said mantle being formed of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for locking said mantle upon said head, including a thrust member mounted upon said shaft, means for forcing said thrust member downwardly along said shaft against said head and mantle, and a washer, formed of compressible fibrous fabric, associated with said thrust member and adapted to compensate for the stretching or extension of the mantle.

4. In a crusher, a generally conic head, a mantle mounted upon said head, said mantle being of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for securing said mantle upon said head, including a sleeve adapted to engage the upper edge of the mantle, means for thrusting said sleeve downwardly against the upper edge of said mantle, and a compressible fibrous washer interposed between said sleeve and said thrusting means.

5. In a crusher, a generally conic head, a mantle mounted upon said head, said mantle being of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for securing said mantle upon said head, including a sleeve adapted to engage the upper edge of the mantle, means for thrusting said sleeve downwardly against the upper edge of said mantle, and a plurality of super-posed compressible washers interposed between said sleeve and said thrusting means.

6. In a crusher, a generally conic head, a mantle mounted upon said head, said mantle being of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for securing said mantle upon said head, including a sleeve adapted to engage the upper edge of the mantle, means for thrusting said sleeve downwardly against the upper edge of said mantle, and a plurality of compressible washers interposed between the upper portion of said sleeve and the means for directing downward pressure thereagainst, and a contact member adapted to engage said washers, said member including an annular portion overlying the washers, and a cylindrical portion extending between said washers and the shaft.

7. In a crusher, a generally conic head, a mantle mounted upon said head, said mantle being of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for securing said mantle upon said head, including a sleeve adapted to engage the upper edge of the mantle, means for thrusting said sleeve downwardly against the upper edge of said mantle, and compressible fibre washer means interposed between said sleeve and said thrusting means.

8. In a crusher, a generally conic head, a mantle mounted upon said head, said mantle being of a material adapted to extend in response to the crushing impacts to which it is subjected, and means for securing said mantle upon said head, including a sleeve adapted to engage the upper edge of the mantle, means for thrusting said sleeve downwardly against the upper edge of said mantle, and compressible fibre washer means interposed between said sleeve and said thrusting means, said washer means being of greater thickness at its inner than at its outer edge.

EDGAR B. SYMONS.