

Nov. 28, 1967

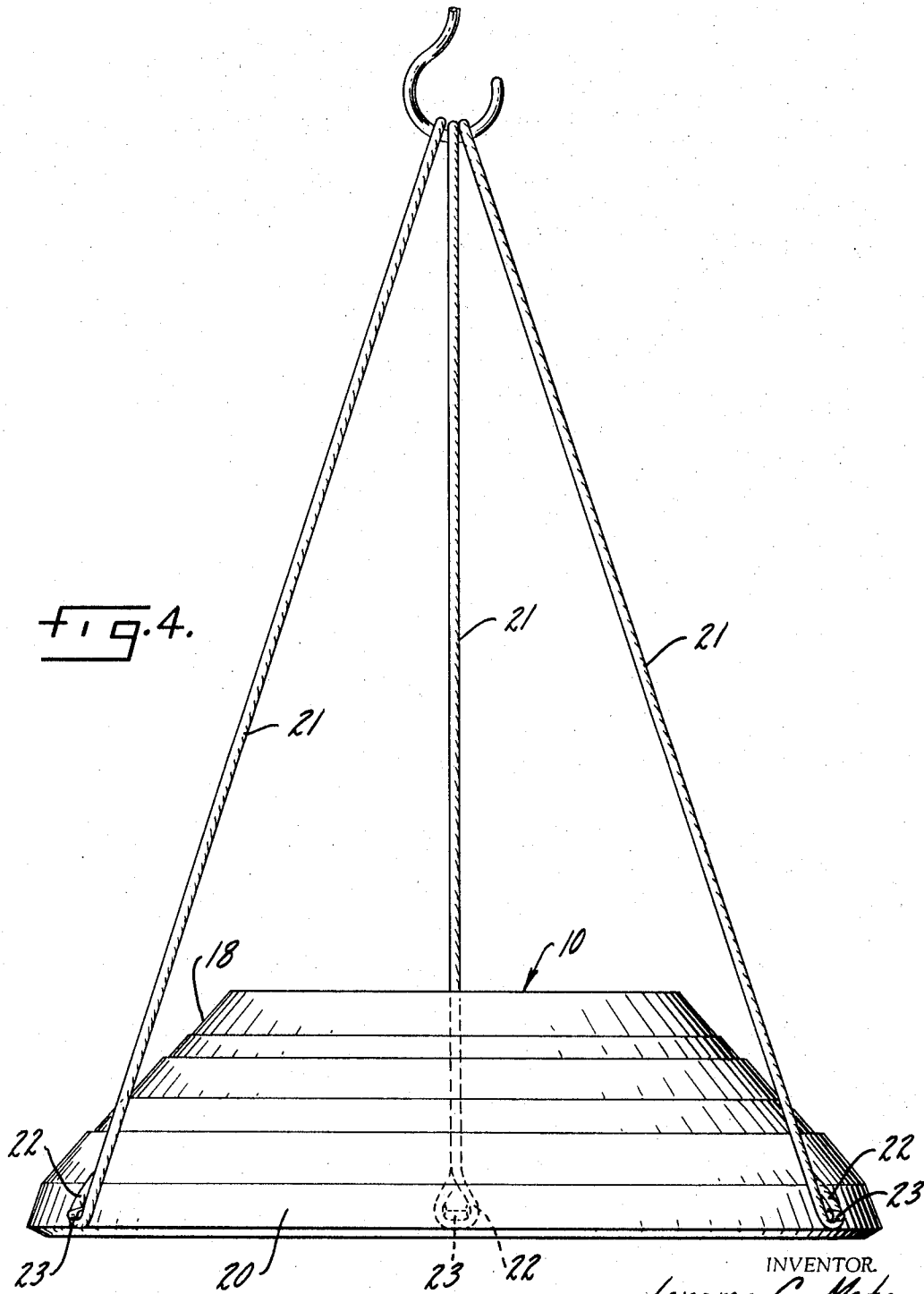
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3,355,114

MANTLE LIFTING MEANS

Filed Sept. 14, 1964

2 Sheets-Sheet 2



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3,355,114

MANTLE LIFTING MEANS

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Filed Sept. 14, 1964, Ser. No. 396,151

2 Claims. (Cl. 241-293)

My invention is in the field of crushers of the gyratory type, and relates to a novel mantle structure for its gyrating head. The invention is more particularly concerned with means for lifting and supporting the mantle during installation and removal from a crusher.

A primary object of my invention is a mantle which can be more easily and safely installed and removed from a gyratory crusher.

Another object is a hoisting attachment means that is simple and inexpensive to cast as part of the mantle.

Another object is a hoisting attachment means that will not interfere with the operation of the gyratory crusher.

Another object is a hoisting attachment means located on the mantle so as to provide maximum stability during handling of the mantle.

Other objects will appear from time to time in the ensuing specification and drawings, in which:

FIGURE 1 is a partial cross-section view taken through a gyratory crusher and showing the mantle and hoisting means attachment;

FIGURE 2 is a top-plan view of a mantle embodying the novel features of the present invention;

FIGURE 3 is an enlarged partial cross-section view of a mantle showing one of the attachment means; and

FIGURE 4 is an elevational view showing hoisting cables attached to the hoisting attachment means on a mantle.

The mantle 10 is of the standard hollow configuration with a frusto-conical cross-section, and having an opening 11 extending axially therethrough as shown in FIGURE 2. When installed in a gyratory crusher, as shown in FIGURE 1, the mantle rests on and is supported by a head 12 and faces and is substantially overlapped by a bowl liner 13. The bowl liner is attached to and supported by a bowl 14, which in turn is threaded and supported by an adjustment ring 15 carried by the main frame 16. A filling or backing 17 is normally provided between the mantle and the head. A main shaft locking nut 19 holds the mantle in position against the head.

When the mantle 10 is positioned in the crusher, its outer surface 18 cooperates with the bowl liner 13 to form a pathway of reducing cross-section for the material to be crushed. As the material moves down this pathway, it is engaged by the mantle and the bowl liner and reduced in size. At the lower end of this pathway an apron portion 20 of the mantle extends beyond the bowl liner to provide a run-off surface for the crushed material.

The mantle 10, while of wear-resistant manganese steel, is a wearing part and, as such, is designed to be removable and replaceable when it wears out. To permit the mantle to be replaced, the bowl 14 and bowl liner 13 are constructed so that they can be unscrewed from the adjustment ring 15. The main shaft locking nut 19 can then be removed so that the mantle is free to be lifted off the head 12 and a new one put in place.

The normal method of installing a new mantle has been through the use of a number of hoisting cables having hooks which are slipped under the lower edge of the mantle below the apron portion 20. This method of handling the mantle has been found to be unsatisfactory and dangerous, because the hooks have a tendency to slip from their positions around the periphery of the lower

edge of the mantle and thus bring about the shifting of the mantle.

In order to eliminate this hazardous condition and to simplify the handling of the mantle, hoisting cable attachment means have been provided on the mantle. The provision of these cable attachment means eliminates the need for hooks and permits the use of cables 21 of the type shown in FIGURE 4, which are equipped with loops or eyes 22 which engage the cable attachment means to support the mantle positively without the danger of slipping, or shifting.

In this embodiment of the invention, the hoisting cable attachment means take the form of lugs 23, which are cast as part of the mantle 10 on the lower portion or apron 20 thereof. The lugs project radially and outwardly from the mantle and are inclined downwardly of a horizontal plane through the mantle. This design provides the double advantages of a downwardly and outwardly sloping upper surface on each lug to offer a low resistance to the flow of crushed material passing thereover and an upwardly and inwardly sloping lower surface on each lug to engage an eye 22 of a cable 21 so that the cable will not slide off the lug. To further reduce the possibility of the cables slipping off the lugs, the under portion of each lug is provided with a notch 24 to receive the eye portion of a cable.

In order to obtain stability during lifting, yet utilize the minimum number of lugs 23, it has been found desirable to provide a total of three lugs and to space these lugs about 120° apart around the periphery of the mantle. As previously mentioned, the lugs project from the apron portion 20 of the mantle which is located at the base thereof. The positioning of the lugs around the base of the mantle also adds to the stability of the mantle during hoisting operations. Additionally, in this location, the lugs are located downwardly of the bowl liner 13 where they will not interfere with the crushing operation or with the free flow of material in the passage between the mantle and the bowl liner.

The use, operation and function of my invention are as follows:

One of the most difficult problems in the proper use and operation of a gyratory crusher is installing new manganese wearing parts. This is particularly true of the mantle which, due to the nature of the machine and its operation, has a shape that does not provide anything that can be grabbed or gotten hold of. In and of itself, the mantle is heavy enough to be difficult, but its shape compounds the problem.

The more difficult side is positioning a new mantle in the machine. When the worn out mantle is to be removed, its weight has been substantially reduced since most of it has been worn away. So any damage and rough handling in removing a worn out mantle is of little concern. But the new mantle must be handled rather gingerly, first, due to its weight and awkward configuration and shape, and, second, to prevent damage to the machine itself. This is particularly true of recently developed gyratory cone crushers which are becoming automated and have delicate electric and hydraulic automatic controls.

For years, crusher manufacturers have attempted to use all sorts of sockets, lugs, projections, and the like to aid in holding a new mantle so that it can be more easily positioned in the machine, but to no avail. Any such arrangement must satisfy several points. First, it must be inexpensive. Second, it preferably must be an integral part of the mantle itself. Third, it must not in any way reduce the efficiency of the mantle as a crushing element in the machine. Fourth, it must not hinder the operation of the machine. Fifth, it must in no way cause the basic machine to require enlargement or redesign.

The present arrangement satisfies all of these requirements and more. The lugs are positioned on the outwardly sloping shoulder or apron so that they do not get in the way of the crushing operation. The diameter or outermost extension of the lugs is such that they do not contact the threads of the tilting or adjustment ring 15 when the new mantle is positioned in the machine. While I have stated that the lugs are or may be approximately 120° apart, this is merely the preferable way and they may be differentially spaced if any particular spacing is desired. While I have shown three lugs, and in fact prefer three, it should be understood that more may be used. I would say that two, however, should not be used since this would be awkward and unbalanced.

The shape of the lugs themselves is important since the upper surface is such that it does not in any way impede the flow of material through the machine. The lower surface is specifically shaped to receive a sling. I wish particularly to call attention to the disposition of the lug in the machine, as shown in FIGURE 1, where it will be noted that the lug does not in any way interfere with or affect the basic operation of the machine.

While I have not shown the holding means for the bowl liner in FIGURE 1, it should be understood that any suitable means may be used.

Picture in FIGURE 4 the mantle resting on a flat surface, such as the floor of the shop. It will be noticed that the lugs are spaced above the lower edge or bottom of the mantle so that the slings can be easily positioned under them. Compare this with trying to insert hooks under the lower edge of the mantle which may weigh several tons.

While I have shown and described the preferred form of my invention, it should be understood that numerous additional modifications, changes, substitutions, alterations and additions can be used where appropriate, and

should be considered to fall within the scope of my invention. I, therefore, wish that the invention be unrestricted except as by the appended claims.

I claim:

- 5 1. For use on a gyratory crusher or the like, an upwardly truncated, centrally open, frusto-conic mantle formed and adapted to fit on a gyratory head in a supported relation and to be applied to it, or removed from it, by linear displacement along the axis of a head, said
- 10 mantle having an upwardly and inwardly inclined, generally conic outer wear taking surface and a lower circumferential border surface inclined downwardly from the wear taking surface, whereby to be out of the crushing zone which the mantle assists in defining, said border
- 15 surface having outwardly projecting lugs angularly spaced thereabout and downwardly and outwardly spaced from the wear taking surface, each of said lugs having a downwardly opening notch located on the under side thereof, with said lugs out of the path of flow of crushed material
- 20 delivered by the wear taking surface, and being adapted to receive a cable or cables for the movement of the mantle, with said cables converging at a single point of support.

- 25 2. The structure of claim 1 characterised by the provision of at least three of the outwardly projecting lugs.

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