Aug. 9, 1955 S. C. JENSEN 2,714,995

SELF-SHARPENING LAMINATED HAMMER MILL KNIFE

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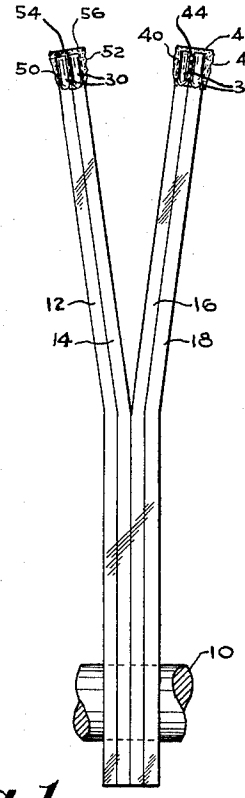


Fig.1.

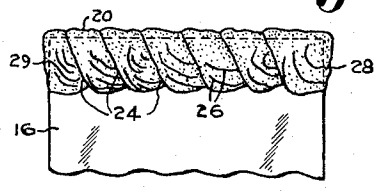


Fig.2.

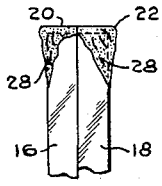


Fig.3.

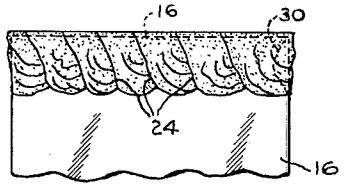


Fig.4.

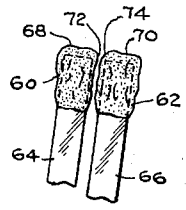


Fig.5.

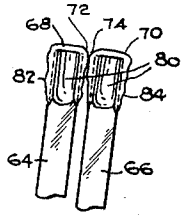


Fig.6.

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SELF-SHARPENING LAMINATED HAMMER MILL KNIFE

Sanning C. Jensen, Neola, Iowa

Application May 26, 1952, Serial No. 289,935

4 Claims. (Cl. 241—195)

This invention relates to hammermills and more particularly it is an object of this invention to provide an improved hammermill hammer.

My new way of making a hammermill hammer is to coat the tip of the hammer with hard facing material. As the hard facing material wears away in use, the tip end of the base material of the hammer wears away much faster as it is softer. After a very short period of use the forward edges of the hard faces which is on a side of the hammer and across the end of the hammer make excellent cutting surfaces as they are less exposed by the wearing away of adjacent portions of the softer base material of the hammer.

Another object of the invention is to provide a hammermill hammer of a more economical construction than heretofore.

A particular object of the invention is to provide a hammermill hammer particularly adapted for cutting grain containing abrasive sand or containing any one of the many abrasive earths.

Another object is to provide a hammer adapted for cutting those of the grains which are themselves considered abrasive.

Still a further object of the invention is to provide an improvement over the hammer described in my copending application titled "Hammermill Tip," filed April 4, 1952, Serial No. 280,446.

Another object is to provide an assembly of hammers as described arranged in two sets, the hammers of a set fitting closely together and touching without hardfacing on the adjoining surfaces thereof.

Yet another object of the invention is to provide as another embodiment a set of hammermill hammers disposed closely adjacent each other with hardfacing of the adjoining surfaces and spacing the hammers of the set apart.

Yet another object of the invention is to provide a device for the purpose described which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture, assemble and utilize.

Other and further objects and advantages of the present invention will be apparent from the following detailed description, drawings and claims, the scope of the invention not being limited to the drawings themselves as the drawings are only for the purpose of illustrating a way in which the principles of this invention can be applied.

Other embodiments of the invention utilizing the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Figure 1 is a top plan view of the preferred embodiment of this invention in which an assembly of hammers are shown arranged on the hammerpin of a hammermill. Only a section of the hammerpin is shown. The hammers in Figure 1 are shown as they would appear after they had been worn away at their tips.

Figure 2 is an enlarged detail side elevation of the two hammers of the right hand side of Figure 1 as they would be seen from the left hand side, and as they would be seen before use and the wearing away of the tips.

Figure 3 is a top plan view of an end section of the hammers on the right hand side in Figure 1 as they would appear before use and after hard facing has been applied.

Figure 4 is a view similar to Figure 2 but showing the appearance of the hammer after a certain amount of wear has taken place.

Figure 5 is a top plan view of the tip ends of a pair of hammers of a set in another embodiment of the invention.

Figure 6 is a view similar to Figure 5 but at a time when the hammers of Figure 5 have been worn away in use sufficient to produce cavities in the tips of the base portion thereof.

Referring now to the drawings for a more complete description, a broken away segment of the hammer pin **10** of a hammermill is shown in Figure 1 with an assembly of hammers arranged thereon. The hammerpin **10** of the hammermill rotates in an orbit around the central axis of the hammermill with the hammers standing outwardly therefrom due to the centrifugal force.

The assembly in Figure 1 includes a pair of hammers **12** and **14** and a second pair of hammers **16** and **18**. The pair **12** and **14** are disposed in parallelism with each other and each hammer has an inner section extending approximately radially outwardly from the hammerpin **10** and an outer end section inclinedly disposed with respect to the inner section and extending to one side thereof.

The hammers **12** and **14** are disposed in parallelism with each other and disposed adjacent and touching each other along both their inner and outer sections. The pair of hammers **16** and **18** are similarly constructed and disposed as the pair **12** and **14**, however, the hammers **16** and **18** incline outwardly and in an opposite direction whereby the two pairs are divergently disposed at their outer ends to provide spaced apart tip ends.

Each hammer comprises the base portion and in accordance with this invention the outer end of each hammer is provided with hard facing **20** as best seen in Figures 2 and 3. The hard facing **20**, at the time of manufacture, covers the outer tip ends of the hammers **16** and **18** as shown at **20** and **22** and also extends down along each of the sides of the hammers **16** and **18** which are disposed on the outside. In the preferred form the adjoining and touching side surfaces of the hammers **16** and **18** are not coated with hard facing material. This is so that the adjoining surfaces of the hammers **16** and **18** of a pair can fit closely adjacent each other in touching parallelism.

As best seen in Figure 2, the hard facing forms flow lines **24** in the process of its application as well as smaller wrinkles **26**. It will be noticed that the hard facing extends at least partially across the forward and rearward sides of the hammer **16** as shown at **28** and **29** respectively.

Referring to Figure 4, the hammer of Figure 2 is shown in Figure 4 as it would appear after it has been in the hammermill a short length of time. In Figure 4 it will be seen that the flow lines **24** have become less accentuated due to the wear and that a cavity **30** has been formed in each hammer as shown in dotted lines in Figure 4. The cavity **30** is at the forward edge of the hammer and starts to form after the hard facing on the forward side of the hammer **28** has worn away whereby the wear has cut a cavity **30** in the softer base portion

of the tip of each hammer. Also, in Figure 4 it will be seen that the hard facing on the tip end of the hammer at **20** has become less rough and more smooth due to wear.

Referring now to Figure 1, the cavities **30** can be seen in full line and from the forward side of the hammers in top plan view. The cavities **30** of the hammers **16** and **18** are thus surrounded by side walls **40** and **42** and end walls **44** and **46** of hard facing material. The walls **40**, **42**, **44** and **46** present sharp cutting edges to the material being cut, and cut very efficiently because the forward edges of the hard facing have good access to the material due to the cavity **30**.

A similar condition exists on the ends of the hammers **12** and **14** of the left hand set of hammers, the hammers **12** and **14** having side walls **50** and **52** and end walls **54** and **56** surrounding the cavity **30** and for cutting the grain.

It will be understood that any one of the many suitable hardfacing materials now on the market could be employed in the manufacture of this hammer.

In Figures 5 and 6 another modification of the invention is shown.

In Fig. 5 hardfacing material **60** and **62** is placed on the tip ends of a pair of hammers **64** and **66**. The hammers **64** and **66** are similar to the hammers **16** and **18** of Figure 1. In the embodiment of Figure 5, however, the hardfacing material is placed not only on the sides of the hammers which face outward as at **60** and **62** but in addition upon the ends of the hammers as at **68** and **70** and upon the inner adjacent surfaces of the hammers as at **72** and **74**.

This construction causes the face portions **64** and **66** of the hammers to be spaced apart in use.

In Figure 6 the hammers **64** and **66** of Figure 5 are shown as they would appear after a certain amount of wear has taken place. In Figure 6 the hardfacing is worn away from the forward or upper surfaces of the tip ends of the hammers whereby the soft base material is worn away forming cavities **80** in the tips of the hammers surrounded on the inside by exposed hardfacing cutting walls **68** and **70** at the end, **70** and **72** at the adjoining surfaces and **82** and **84** on the outer sides.

It will be seen that this invention has provided an efficient and economical way to manufacture a hammermill hammer with particular advantages for use in cutting through the more abrasive loads such as grain with a high percentage of sand in it, such as grain containing many of the abrasive earths and even certain of the grains which themselves are considered highly abrasive.

From the foregoing description, it is thought to be obvious that a hardfaced hammermill constructed in accordance with my invention is particularly well adapted for use, by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof, and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

I claim:

1. A hammer set for a hammermill comprising two hammers disposed alongside each other with inner end sections adapted to be attached to the rotor of said hammermill, said hammer also having parallel outer end sections disposed closely adjacent each other, said hammers each having a base, and the outer end of each of said hammer bases having hardfacing bonded thereto on the sides thereof disposed away from the other hammer of the set and being without hardfacing on those sides of said hammer bases which are disposed adjacent each other whereby the hammers will fit closely adjacent each other and whereby as the forward sides of the tips of each hammer base is worn away in operation the hardfacing will present to the work a hard cutting edge on the forward side of each hammer.

2. A hammer set as described in claim 1 in which hardfacing is also bonded to the tip end surface of the base of each hammer.

3. A hammer for a hammermill comprising an elongated base having an inner end adapted to be attached to the rotor of said hammermill; exterior hardfacing bonded to one side adjacent the outer end of said hammermill base and extending over the forward approaching side of the tip of the hammermill base and leaving exposed a portion of the forward approaching face of the hammermill base, said elongated base being formed of a material which is soft relative to the hard facing, whereby as the forward side of the tip of the hammer base is worn away in operation the hardfacing will present to the work a hard cutting edge on the forward side of the hammer.

4. A hammer as described in claim 3 in which hardfacing is also bonded to the end of the base thereof.

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