Oct. 22, 1957 S. C. JENSEN 2,810,529

HAMMERMILL ROTOR INCLUDING PAIRED DIVERGENT-END HAMMERS

Original Filed May 9, 1952

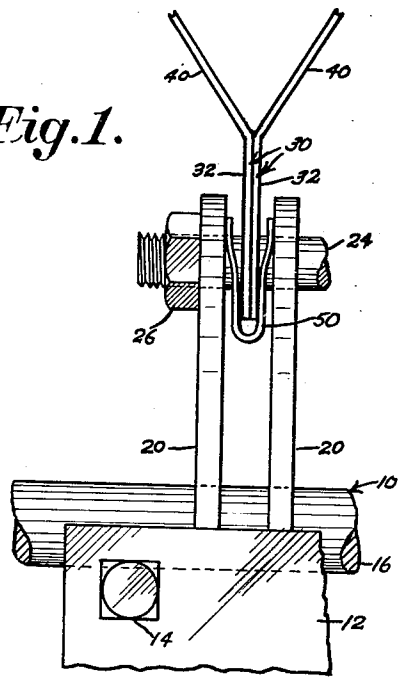


Fig.1.

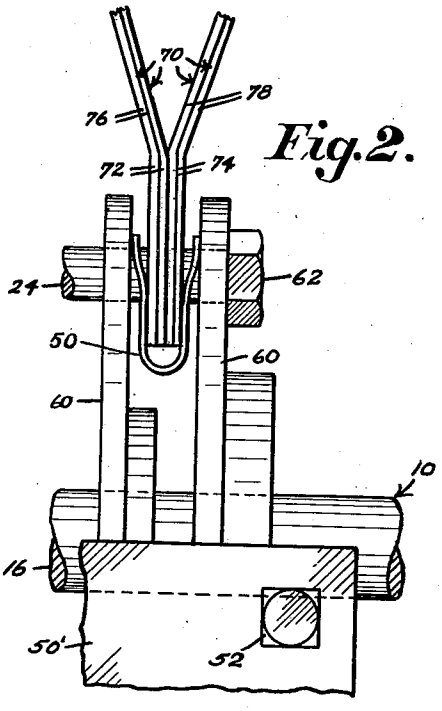


Fig.2.

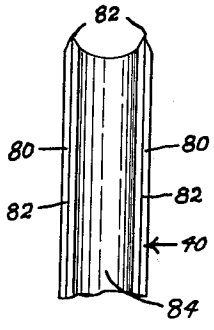


Fig.3.

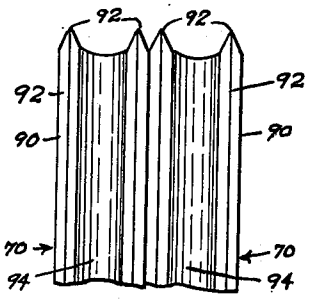


Fig.4.

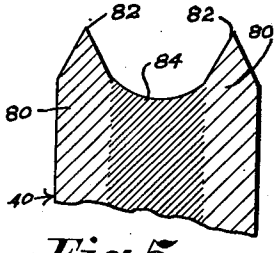


Fig.5.

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HAMMERMILL ROTOR INCLUDING PAIRED DIVERGENT-END HAMMERS

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Continuation of application Serial No. 287,010, May 9, 1952. This application October 17, 1956, Serial No. 616,572

2 Claims. (Cl. 241—194)

This invention relates to hammermills and more particularly it is an object of this invention to provide a hammermill assembly the tips of the knives of which are spread apart.

It has been the practice for grain hammermill knives to be disposed against each other in side by side parallelism. This construction makes it impossible for the load to get between the tips of the knives.

It is therefore an object of this invention to provide knives arranged with widely spaced apart tips so that grain in the mill can flow into the face or front of the tip for efficient cutting thereof.

Another object of the invention is to provide a knife assembly having two knives disposed against each other at their inner ends and having divergently arranged outer ends terminating in widely spaced apart tips.

Another object of the invention is to provide a knife assembly having two sets of knives, each set comprising two or more knives; the knives of each set being disposed in parallelism, and the outer ends of the knives of each set being divergently disposed with respect to the outer ends of the knives of the other set for widely spacing apart the tip ends of the knives of one set with respect to the knives of the other set.

A further object of the invention is to provide such knife assemblies in combination with an adapter for holding each assembly in place.

Still another object of the invention is to provide knife assemblies of the type described, the outer sides of which are hardened whereby they wear away less quickly than the portions of the knives between the hardened sides whereby the wearing away of the softer center portions of the knives cause the harder outer surfaces to protrude for providing sharp cutting surfaces.

It is another object to provide as an article of manufacture a knife for grain hammermill knives having an outer section bent at an angle with respect to the inner section.

It is a further object to provide as an article of manufacture a knife for a hammermill having an outer section bent with respect to the inner section and further having a construction such that the outer side surfaces of the knives are hardened and the center section of the knives is left softer whereby the hardened surfaces tend to form sharp cutting edges as the inner section wears away in use.

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.

This application is a continuation of the applicant's co-pending patent application Serial No. 287,010, filed May 9, 1952, now abandoned.

In the drawings:

Figure 1 is a top plan view of a section of a grain hammermill showing a portion of a housing thereof, a portion of the rotor shaft, half portions of two outwardly extending discs, and an end portion of the hammerpin, a knife assembly of this invention having two knives and an adapter for use therewith are shown on the hammerpin;

Figure 2 is a top plan view of a portion of a grain hammermill also showing a housing portion, a portion of the rotor shaft, two spaced apart discs, a hammerpin, a larger adapter than in Figure 1, and a knife assembly comprising four knives arranged in two sets;

Figure 3 is an enlarged view of an end of one of the knives of Figure 1 showing the manner in which the knife wears away to form sharp cutting edges;

Figure 4 is a view similar to Figure 3 but of the tips of a pair of knives of one set as shown in Figure 2; and

Figure 5 is a view-in-section of a knife as seen in Figure 3 with the upper portion thereof removed.

In grain hammermills a rotor is provided such as is generally indicated at **10**. Such rotors are disposed inside housings and a portion of the housing is indicated at **12** having a bolt **14** therethrough. The rotor **10** has a center rotor shaft **16** and hammerpin holding members or discs **20** extend radially outwardly from the rotor shaft **10** and support a hammerpin **24** which is disposed through apertures in the outer end of the discs **20** and is held in place by a nut **26** at one of its ends.

Upon the hammerpin **24** many hammers or knives are arranged, one assembly of knives being shown in Figure 1. The assembly in Fig. 1 comprises two knives generally indicated at **30**. The hammers or knives **30** have inner end sections **32** disposed in parallelism with each other extending substantially radially outwardly from the hammerpin **24**.

The inner sections **32** have apertures therethrough for receiving the hammerpin **24**. Each knife **30** has an outer end section **40** which extends outwardly at an inclination with respect to its respective inner section **32**. The outer end sections **40** of the two knives extend divergently outwardly with respect to each other whereby the outer ends of the knives **40** are widely spaced apart with respect to each other in directions spaced along the axis of the rotor **10** with respective inner sections **32**.

An adapter **50** is provided for holding the knives **30** in place. The adapter **50** is formed of resilient material and extends about the inner ends of the knife **30**. The adapter **50** has two outwardly extending arms pressing against the sides of the knives **30** to hold the inner ends of the hammers together. The arms of the adapter **50** each have an aperture therethrough for receiving the section **24**.

In Figure 2 a modification of the invention is seen which is similar in most respects to the modification of Figure 1. In Figure 2 the housing portion shown is given the numeral **50'** and the bolt shown is numbered **52**. In Figure 2 the rotor is generally indicated at **10** and the rotor shaft is shown at **16**. Two discs **60** are shown more widely spaced apart than the discs **20** of Figure 1. A hammerpin **24** is disposed through the discs **60** and has a head **62**.

Upon the hammerpin **24** four knives generally indicated at **70** are arranged. The knives **70** are arranged in two

ets of two. The two knives of each set are arranged n parallelism with one another and are disposed alongside one another. The knives of the two sets have their nner sections 72 disposed in parallelism with the inner nd sections 74 with the knives of the other set. However, the outer end sections 76 of the knives of one set re divergently disposed with respect to the outer end ection 78 of the knives of the other set.

The outer end sections 76 of the one set of knives are lisposed in climbing outwardly with respect to the inner ections of the knives of the same set. The outer end ections of the knives of each set incline outwardly in lirections spaced along the axis of the rotor 10 with respect to the respective inner end sections of the respective nives, with the outer end sections of the knives of one et inclinedly disposed outwardly with respect to the nives of the other set whereby the tip ends of the knives f different sets are widely spaced apart.

As thus described, it will be seen that the knives 40 f Figure 1 and each set of knives of Figure 2 are spaced part at their outer ends whereby grain can get between he tips and can flow onto the face or front of tips of he knives more efficiently and for more efficient cutting ction.

Referring to Figure 3, it will be seen that the outer tip f each knife 40 is provided with hardened outer surfaces 0 which latter tend to wear away into sharp cutting dges 82. The hardened outer surfaces 80 wear away ess quickly than the softer center portion 84 of the nives whereby the hardened outer edges 80 are exposed or cutting.

In Figure 4 two of the knives 70 of Figure 2 are shown with hardened outer surfaces 90, sharp edges 92 and soft enters 94.

In Figure 5 a magnified view of the outer tip of the nife of Figure 3 is shown in cross section to more fully llustrate the construction.

From the foregoing description, it is though to be bvious that a hammermill rotor including paired diverent-end hammers constructed in accordance with my nvention is particularly well adapted for use, by reason f the convenience and facility with which it may be assembled and operated, and it will also be obvious that ny invention is susceptible of some change and modification without departing from the principles and spirit hereof, 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. In a hammermill: a rotor; two hammerpin holding members attached to and outstanding radially from said rotor, said holding members being spaced apart lengthwise of the axis of said rotor and having aligned apertures therethrough, said apertures being arranged on a line which latter is disposed in parallelism with and spaced from the axis of said rotor; a hammerpin disposed through said apertures in said holding members; a hammer assembly comprising two sets of hammers, each set having at least two hammers, the hammers of each set being in parallelism with each other and disposed alongside each other along the lengths thereof, said hammers having inner end sections disposed alongside each other and disposed extending substantially radially outward, said

inner ends being attached to said rotor, said hammers each having an aperture through its inner end receiving said hammerpin, said hammers each having an outer end section inclinedly disposed with respect to the inner section of the respective hammer, said outer end sections inclining outwardly at an obtuse angle with respect to the inner ends and in directions spaced along the axis of said rotor with respect to the respective inner end sections, the outer end sections of the hammers of said one set inclining outwardly with respect to the outer end sections of the hammers of the other set whereby the tip ends of the hammers of different sets are widely spaced apart; and an adapter formed of resilient material extending around the inner ends of said hammers and having two outwardly extending arms pressing against the sides of said hammers to hold the inner ends of said hammers together, said adapter arms each having an aperture therethrough receiving said hammerpin.

2. In a hammermill: a rotor having two outstanding radially disposed parallel spaced apart hammerpin holding members having aligned apertures therethrough, said apertures being arranged on a line which latter is disposed in parallelism with and spaced from the axis of said rotor, a hammerpin disposed through said apertures, a hammer assembly comprising two hammers, said hammers each having inner end sections disposed alongside each other and disposed substantially radially outward with respect to said rotor, the inner end sections of each hammer having an aperture therethrough receiving said hammerpin, said hammers each having an outer end section inclinedly disposed in respect to the inner section of the respective hammer, the outer end section of each hammer being disposed inclining outwardly at an obtuse angle with respect to the inner end thereof and said outer end being in a position spaced along the axis of said rotor with respect to the respective inner end section, the outer end section of each hammer inclining divergently outwardly with respect to the outer end section of the other hammer whereby the tip ends of each hammer are widely spaced apart, and an adapter formed of resilient material extending around the inner end sections of said hammers and having two outwardly extending arms pressing against those sides of the inner end sections of each of said hammers which are disposed away from the other hammer respectively to press the said inner end sections of said hammers toward each other, said adapter arms each having an aperture therethrough receiving said hammerpin.

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