June 23, 1931. E. LANGER 1,811,549

RAG GRINDING MACHINE

Filed June 26, 1930

Fig. 1

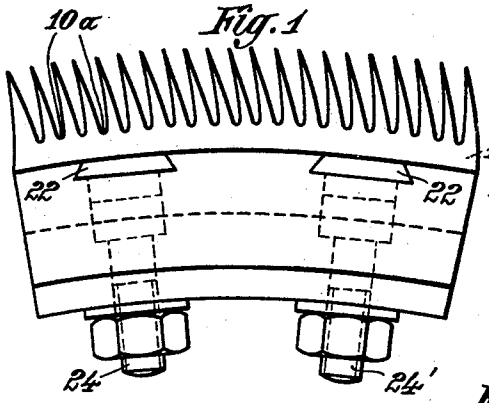


Fig. 2

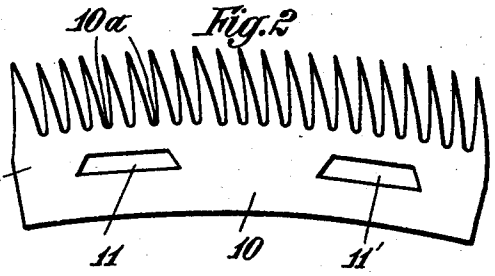


Fig. 3

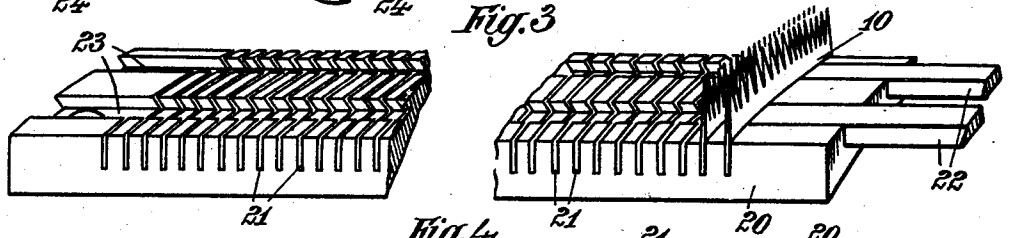


Fig. 4

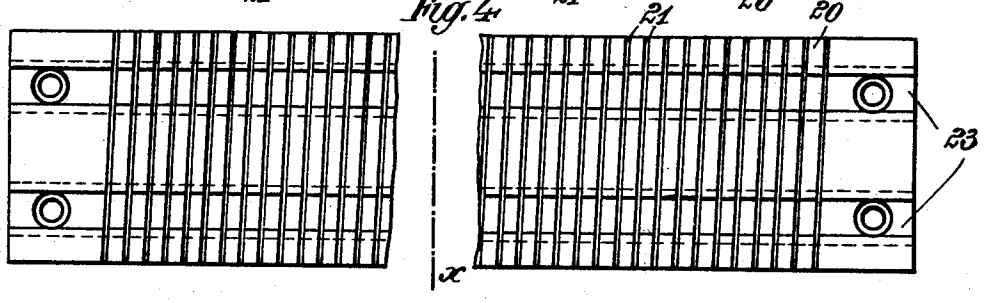
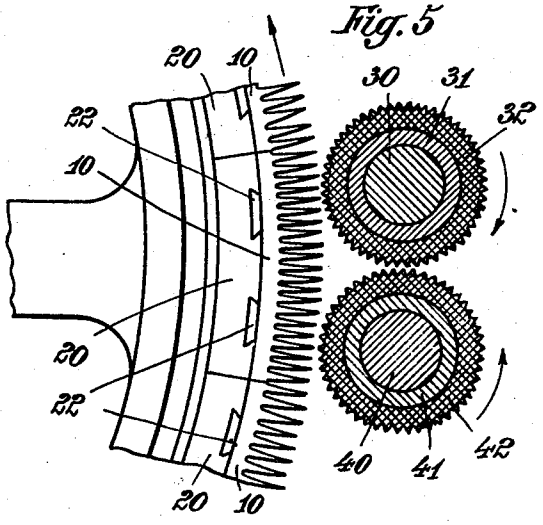


Fig. 5



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UNITED STATES PATENT OFFICE

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RAG GRINDING MACHINE

Application filed June 26, 1930, Serial No. 463,884, and in Germany March 24, 1930.

My invention relates to the production of so-called re-manufactured wool i. e. wool reclaimed from rags of various types such as hosiery, felted material, knitted articles, tailors' clippings and the like—by tearing up said rags into threads and fibres; the invention relates more particularly to improvements in the construction of rag grinding machines, so called rag devils, comprising a quickly rotating drum or "swift" studded with sharply pointed steel pins, and cooperating with a pair of rollers by which the rags are fed into the machine and are supported during the tearing action.

The drums of rag devils usually consist of a cylindrical inner shell carried by spokes and naves on a rotary shaft, and of an outer coat consisting of a plurality of boards of hard wood so-called lags detachably mounted by screws and rings on the circumferential surface of said shell, the pointed steel pins being fastened within and projecting from the said lags.

As a matter of fact known to practitioners in this field the pins soon lose their sharp points and tearing capacity whereby the output of the machine is considerably reduced, and the driving power consumed is highly increased inasmuch as the rags presented to the drum instead of being readily opened up are gathered and transformed into a pad which acts like a brake shoe.

The object of the invention is to provide an improved rag grinding machine the drum of which can be held in proper working order and repair at considerably smaller expense than it was possible heretofore, inasmuch as less time and smaller wages are required, for replacing worn pins by new ones, and as the cost of spare parts required for keeping the improved machines in repair is lower than in the case of rag grinding machines used heretofore.

Another object of the invention is to thus design the drum of the improved rag grinding machine that it can be studded with a considerably larger number of steel pins (about 20% more) at its circumference when compared with machines having wooden lags attached to their drum, and that the efficiency and the output of the machine is increased accordingly.

The invention also aims at providing improved feed and rag supporting rollers for rag grinding machines, cooperating with the rotary drum by which the ever threatening danger is eliminated resulting from the tendency of the opened up highly inflammable material to catch fire from sparks produced through accidental frictional contact of the steel pins with the feed and supporting rollers of steel as used heretofore.

Further objects aimed at and advantages obtained by the invention will be incidentally apparent hereinafter:

The nature and scope of this invention are briefly outlined in the appended claims and will be more fully understood from the following specification taken together with the accompanying drawings in which

Figs. 1 and 2 are side elevations in full scale showing my improved steel pins integrally associated with each other in the form of toothed blades and being adapted to be detachably fixed in holders of special design and of special material,

Fig. 3 is a perspective view of one of the blade holders showing also the keys for locking the toothed blades in their working position,

Fig. 4 is a plan view of one of the blade holders,

Fig. 5 is a cross section through the feed and rag supporting rollers in reduced scale, illustrating their cooperation with the grinding drum.

As known to practitioners in this art with ordinary rag grinding machines the steel pins in the middle section of the rotary drum are subject to be prematurely worn i. e. before the pins located in other sections towards both ends of the drum have lost their sharp points; in practice the operator of the plant must either put up with the drawback which consists therein that a large proportion of the pins does not properly work and that the output of the machine is reduced, while its driving power required is increased—or he must have replaced the whole number of wooden lags in which the steel pins are fas-

tened by new ones, which means high expenses and interruption of the work for a considerable length of time.

I have overcome the said drawbacks by providing small sets or units of pins integrally associated with each other in the form of toothed blades 10, stamped of sheet metal such as steel, phosphor bronze, etc., and which are thus designed that each blade can be singly fixed on and detached from the rotary drum without dismounting the latter or the blade holders.

As seen in Figs. 1–4 the toothed blades 10 are formed with holes 11, 11′ of dove-tail shape and are adapted to be inserted into narrow slots 21 of holders 20 and to be locked within the latter by keys 22 sliding in keyways 23 of the holders 20.

The blade holders 20 are attached in juxtaposition to each other to the circumference of the rotary drum and may be secured by any suitable means—e. g, by screw bolts 24, 24′; it should be noted that none of the holders needs to be detached while any of the blades 10 are exchanged—because the latter are inserted in radial direction relatively to the drum and can be detached simply by partly withdrawing their keys 22.

My experiments have shown that wooden lags—as used heretofore, even if made of the hardest and toughest kind of wood, will not withstand the mechanical strain resulting from the frictional contact between the toothed blades and the rags and the centrifugal forces implied to the toothed blades through the quick rotation of the grinding drum.

In order to carry my invention into effect in practice I provide blade holders made of aluminum alloyed with reinforcing metals such as copper, magnesium, etc., known in the trade e. g. as duralumin, electron, Monel-metal which are at the same time strong as to their mechanical strength and light in weight.

As a matter of fact only by the application of blade holders of metal which is strong and light in weight toothed blades can be used as tearing elements which are so closely assembled in juxtaposed position as shown in Figs. 3 and 4.

It should be noted that there is substantially no space left free between the pins at the seam lines where any two of the holding plates touch each other—or in other words there are no boarder sections free of pins as in the case of wooden lags in which no pins can be inserted close to their longitudinal edges.

The specific number of pins or teeth per square foot presented by my improved rag grinding drum and correspondingly the output of the machine is therefore considerably—about 20%—higher than in the case of machines having wooden lags as pin holders.

Another important feature of this invention is the provision of feed and rag supporting rollers of special design. In contradistinction to solid steel rollers used heretofore my improved rollers are provided with a coat of indiarubber, or like elastic material.

In the embodiment of my invention shown in Fig. 5 the feed and rag supporting rollers concerned consist of steel cores 30, 40 having an intermediate layer of hard indiarubber 31, 41, firmly attached by vulcanization, and a coat 32, 42 of a softer kind of indiarubber which should be rather tough and hard enough to well withstand the wear to which it is subjected.

The indiarubber coats 32, 42 are preferably corrugated at their working faces, i. e. provided with longitudinally extending grooves and ridges as in the case of solid steel rollers.

My experiments have shown that no sparks are produced by accidental frictional contact of the grinding drum with my improved feed and rag supporting rollers, and that the danger of the opened up highly inflammable material catching fire from sparks or causing real explosions is eliminated.

Various changes and modification may be made in the construction of the improved rag grinding machines described without substantially departing from the spirit and the salient ideas of my invention.

E. g. the slots 21 provided in the blade holders 20 may be arranged to advantage at a small angle to their equatorial line of symmetry x as seen in Fig. 4.

The keys 22 may be made in two pieces to be inserted from both ends of the blade holders 20.

Means may be provided for locking the keys 22 in their working position; my experiments however have shown that extra locking means for this purpose can be dispensed with and that the keys are in fact self locking, showing no tendency to become displaced even through heavy shocks and vibrations to which the grinding drum is occasionally subjected through rags containing hard articles such as buttons, buckles, hooks and the like.

In case of accidents caused by hard articles and resulting in bending or breaking off a number of teeth of the blades only the damaged blades—no others—need to be exchanged, a manipulation which can be easily and quickly performed in the manner described.

The teeth of the blades may be formed to advantage with rounded corners $10a$ at their lower portion as indicated in Figs. 1 and 2.—I have found that the mechanical strength of the teeth against bending and breaking is thus better preserved and is higher than in the case of sharply pointed corners.

Instead of providing separate blade holders attached to the rotary grinding drum and

being made of an aluminium alloy the blade holders may be made integrally in one piece with the drum and the latter—including the blade holding elements—may be made of any suitable material which is light in weight and has a high factor of strength.

What I claim is:

1. In a rag grinding machine of the type described, i. e. having a rotary grinding drum studded with sharply pointed pins and being cooperatively associated with rag feeding and supporting rollers, a drum presenting at its cylindrical surface slots which extend substantially parallel to the direction of the equatorial line of symmetry of the drum and transverse grooves, which extend substantially parallel to the axis of the drum, toothed blades having holes provided therein and being adapted to be inserted into the said slots in radial direction relatively to the drum, keys adapted to be inserted into the said transverse grooves (key ways), so as to detachably secure the toothed blades in their working position at the drum, and rag feeding and supporting rollers having an inner core of metal and an outer coat of non-metallic elastic material.

2. A rag grinding machine having the features outlined in claim 1, in which the toothed blades are provided with dove-tail shaped holes corresponding as to their size, form and position to the keyways and keys concerned of dove-tail shaped cross section.

3. Rag grinding machine having the features outlined in claim 1, in which the blade holding elements of the rotary drum are made of an aluminium alloy.

4. Rag grinding machine having the features outlined in claim 1, in which the slots for the reception of the toothed blades are arranged at a small angle to the equatorial line of symmetry of the drum.

5. Rag grinding machine having the features outlined in claim 1, in which the toothed blades are formed with rounded corners at the lower part of the teeth.

6. Rag grinding machine having the features outlined in claim 1, in which the rag feeding and supporting rollers are provided with an intermediate layer of hard indiarubber arranged between the inner core of steel and the outer coat of non metallic elastic material.

In testimony whereof I have signed my name to this specification.

EDUARD LANGER.