Feb. 24, 1953

K. KAISER

ROLL MEMBER

2,629,136

Filed Feb. 6, 1946

3 Sheets-Sheet 1

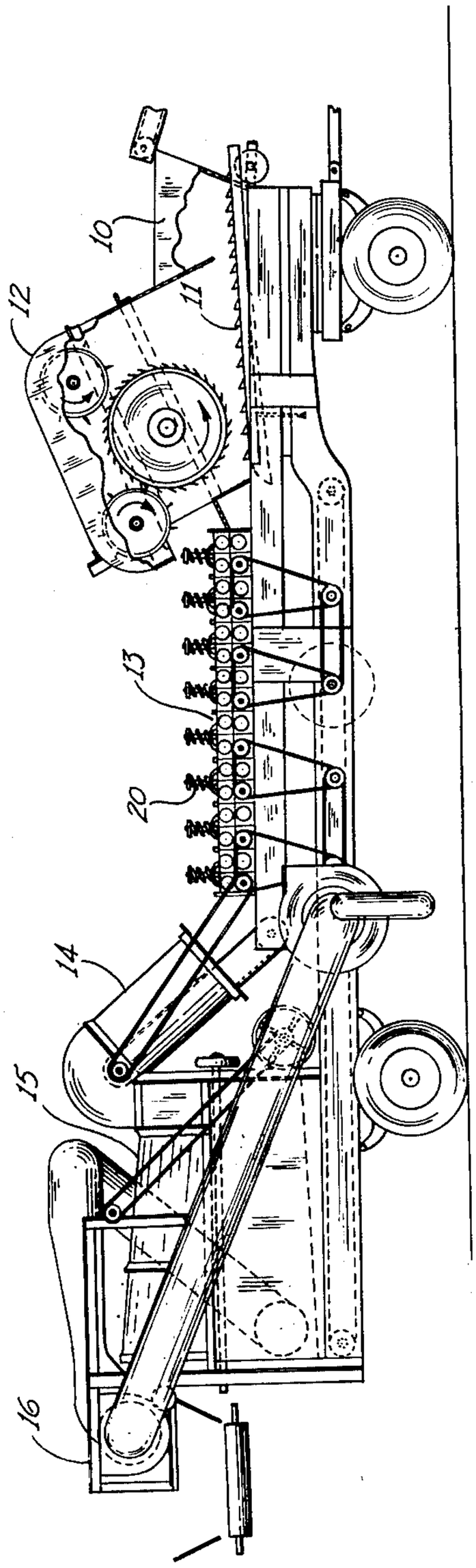


Fig. 1.

INVENTOR.

KARL KAISER

BY Warley L. Parriott

Feb. 24, 1953 K. KAISER 2,629,136

ROLL MEMBER

Filed Feb. 6, 1946 3 Sheets-Sheet 2

Fig. 4.

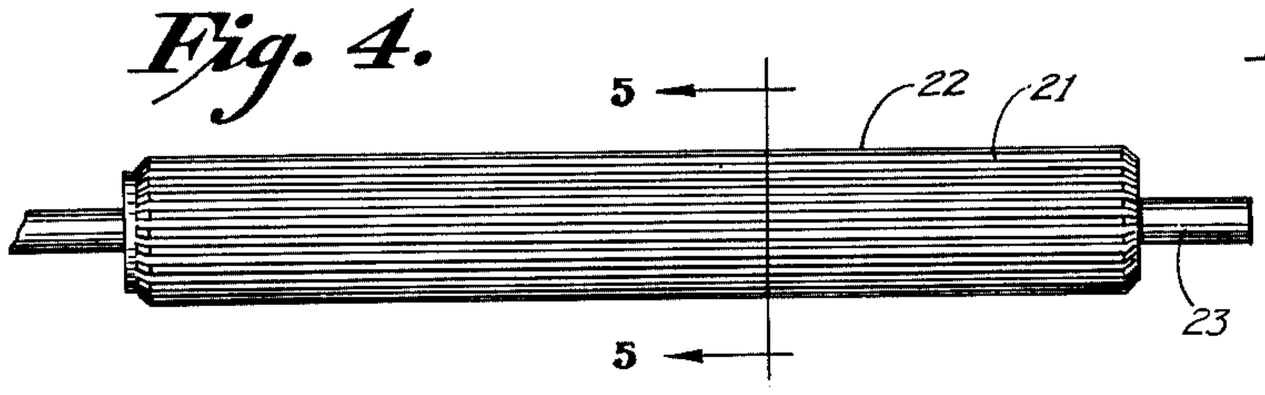


Fig. 5.

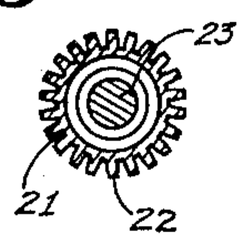


Fig. 6.

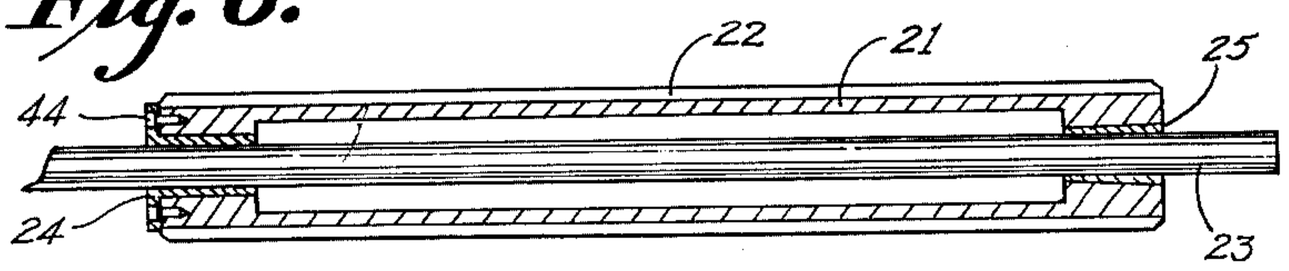


Fig. 7.

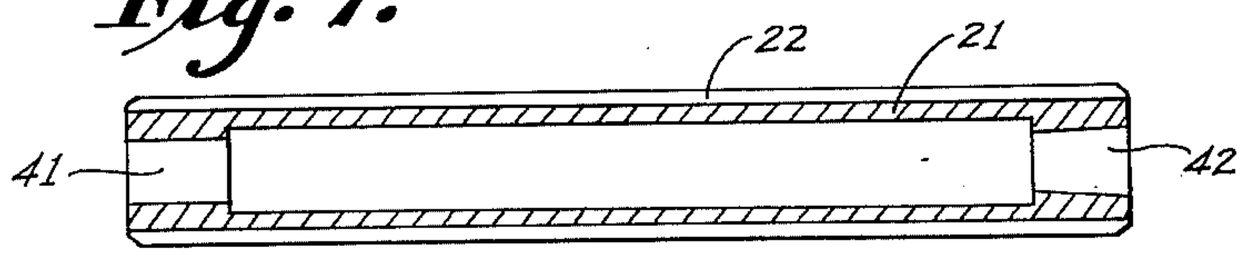


Fig. 12.

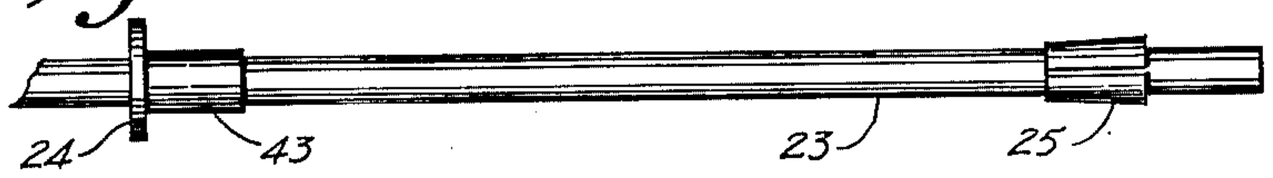


Fig. 2.

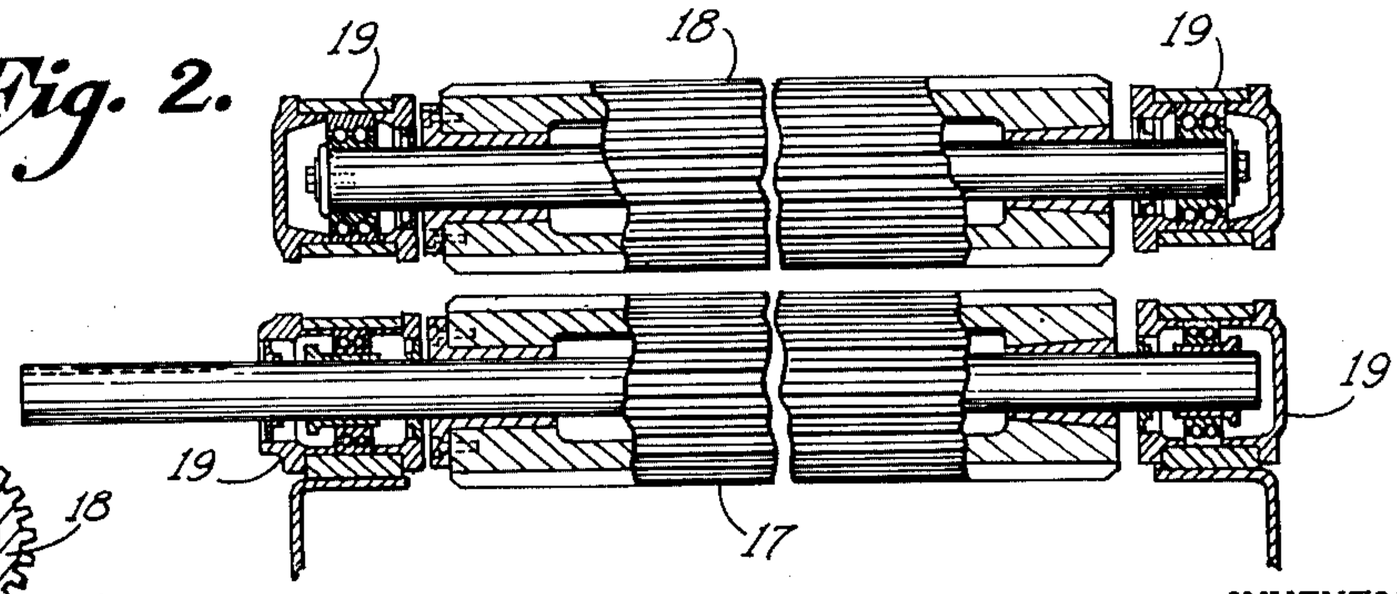


Fig. 3.

INVENTOR.

KARL KAISER

BY Warley L. Parrott

Feb. 24, 1953 K. KAISER 2,629,136

ROLL MEMBER

Filed Feb. 6, 1946 3 Sheets-Sheet 3

Fig. 11.

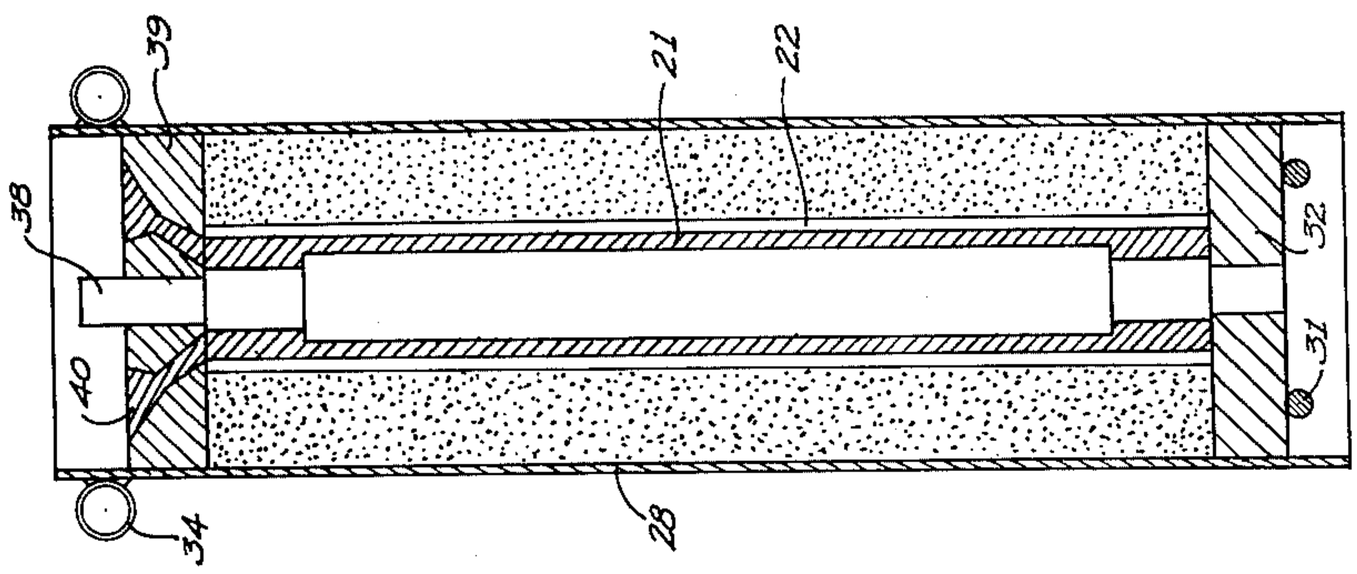


Fig. 9.

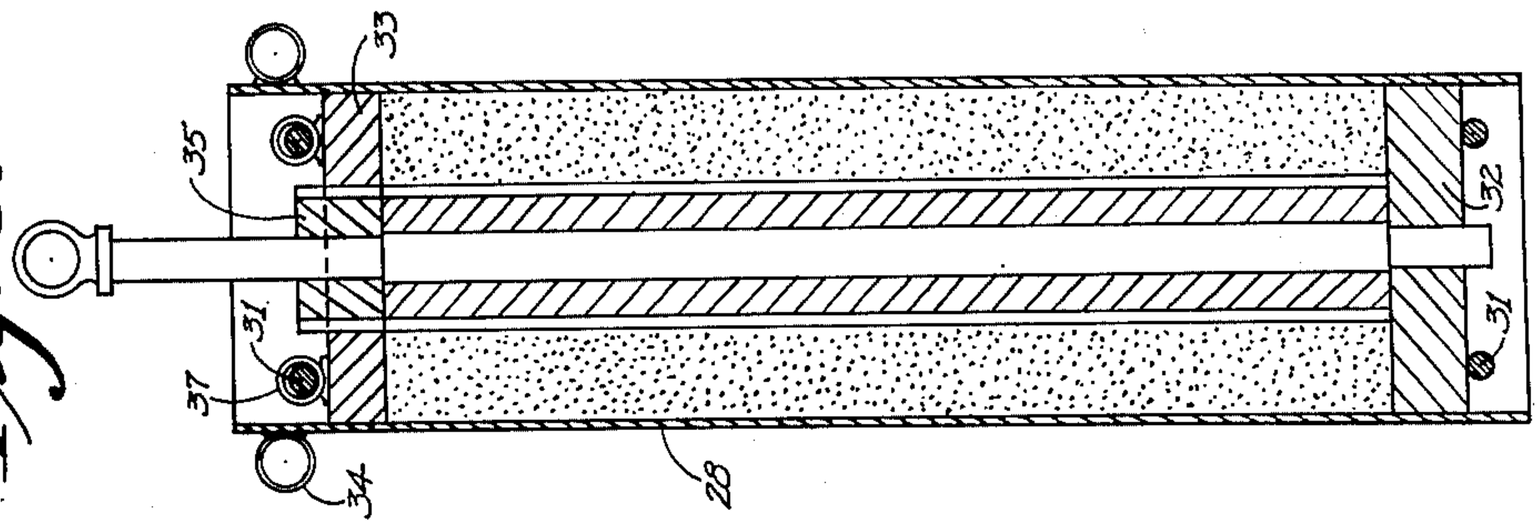


Fig. 8.

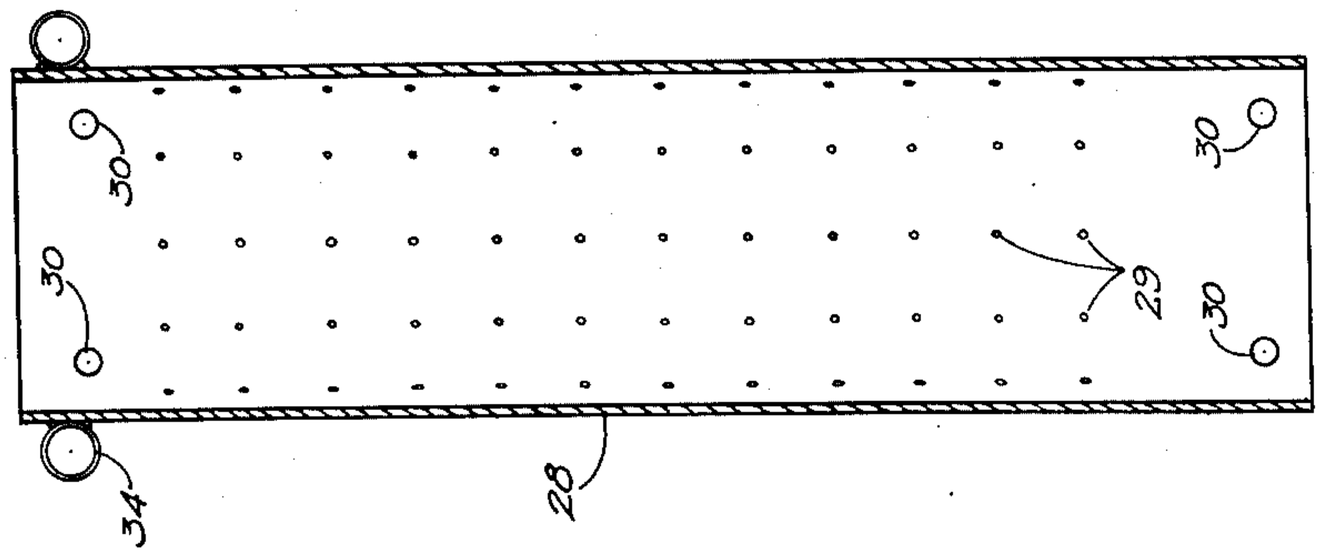
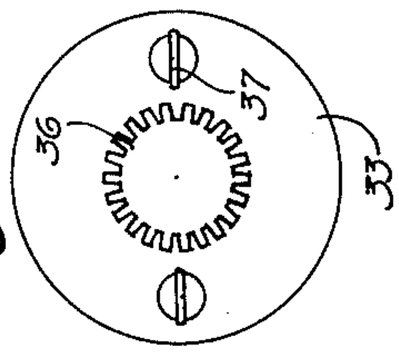


Fig. 10.



INVENTOR.
KARL KAISER
BY Warley L. Parrott

Patented Feb. 24, 1953 2,629,136

UNITED STATES PATENT OFFICE

2,629,136

ROLL MEMBER

Karl Kaiser, Fresno, Calif., assignor to California Central Fibre Corporation, a corporation of California

Application February 6, 1946, Serial No. 645,840

1 Claim. (Cl. 19—31)

1

This invention relates to roll members, and more particularly to roll members adapted for use as brake rolls on decorticating machines and to a method of forming these rolls. This is a continuation-in-part of my copending application Ser. No. 394,048, filed May 19, 1941, now Patent No. 2,399,809.

As is well known, decorticating equipment is used to treat various fibers, such as flax, ramie, hemp, jute, crotalaria and other bast fiber producing plants, so as to liberate at least partially the bast fiber from the other components principally, the woody center portion of the plant stalk, commonly referred to as shive. During the decorticating treatment the material being processed is passed between a series of rotating brake rolls and there subjected to a braking and compressing action with the result that a substantial amount of the shive component is loosened and separated from the outer bast fiber.

The roll members of the present invention provide an improved form of brake roll for use on decorticating machines as described above. The brake rolls of my invention are characterized by light weight which permits high speed operation, but are nevertheless adapted for heavy duty use. A further feature of the invention is a method of forming the rolls with integrally cast flutes which require no machining and which consequently retain the tough casting skin so that the rolls have substantially improved wear resistance. The method of constructing the rolls according to the present invention also make it possible to employ a hollow cast shell or body member detachably assembled on a center or mounting shaft so that either the body member or the shaft may be replaced conveniently and economically if either becomes damaged.

My invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of a decorticating machine showing the general arrangement of the brake rolls of the present invention in use;

Fig. 2 is a detail, mainly in section, showing two of the brake rolls and the manner in which they are mounted;

Fig. 3 is a transverse sectional detail of the pair of brake rolls in Fig. 2, illustrating their disposition in operation;

Fig. 4 is a side elevation of a brake roll constructed in accordance with the present invention;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a transverse section of the brake roll shown in Fig. 5;

2

Fig. 7 is a corresponding transverse section of the body member of the brake roll;

Fig. 8 is a longitudinal section of a flask used for casting body members for the brake rolls of the present invention;

Fig. 9 is a corresponding longitudinal section illustrating the method of forming a mold in the flask shown in Fig. 8;

Fig. 10 is a plan view of the strip plate used in removing the roll pattern from the mold;

Fig. 11 is a longitudinal section of the disposition of the mold during the casting operation; and

Fig. 12 is a detail of the mounting shaft showing the bushings used for assembling the roll body member on the shaft.

Referring first to Fig. 1 of the drawing, the decorticating apparatus shown is of the portable type adapted for field decortication to which the brake rolls of the present invention find particular application because of their light weight, although as pointed out more in detail below my improved brake rolls may also be adapted advantageously for use in decorticating equipment generally.

The decorticating apparatus shown in Fig. 1 comprises generally: a feed hopper 10 for receiving the material, such as flax straw, to be decorticated; straw walkers 11 for advancing the material from hopper 10 to a feeding device indicated generally at 12, which regulates the amount of material passing through the machine; and a brake roll assembly 13, which receives the material being processed from the feeding device 12 for decortication. Beyond the brake roll assembly 13, the decorticated material is received by a fiber transfer device 14, which leads the material to a conical cleaner 15 and a fiber condenser 16 for further separation of the shive component. For further details of the arrangement and operation of these elements of the decorticating apparatus as a whole reference is made to my above identified copending application.

The arrangement of the brake roll assembly 13 is illustrated in Figs. 2 and 3. This assembly comprises a series of fluted bottom rolls 17 and a corresponding series of fluted top rolls 18. The bottom rolls are driven, as described in my copending application, and since they mesh with the top rolls (see Fig. 3), they cause corresponding rotation of the top rolls. The brake rolls 17 and 18 are mounted in bearings, as shown at 19, positioned on the machine, and the top rolls 18 are resiliently held by springs 20 (see Fig. 1).

As previously mentioned, the material being processed is passed through the brake roll assembly 13 to loosen and separate the shive from the bast fiber. The brake rolls are formed with longitudinal flutes in their exterior surface, as shown in Figs. 2 and 3, and as the rolls are disposed so that these flutes mesh, the fiber material being treated is subjected to a bending or braking and compressing action as it passes through the roll assembly 13.

The brake rolls heretofore commonly available have been formed either by machining the rolls from a solid piece of metal or by casting a cylindrical body member on a steel shaft and then machining flutes in the cast body member. Besides the obvious cost disadvantage of the machining operations necessary with rolls of these types, such rolls are also relatively heavy, a standard roll weighing about 150 pounds. This excessive weight has two important disadvantages. In the first place, it renders the total weight of an effective brake roll assembly impractical for portable decorticating equipment; and secondly, it restricts the operating speed of the rolls in decorticating equipment generally due to difficulty in arranging adequate bearing supports.

Moreover, the brake rolls previously used have had the further disadvantage of requiring complete replacement in the event of damage to any part of the roll. One of the problems encountered in the operation of decorticating equipment is that of dealing with tramp metal or stones which may be included in the material being processed and thus fed through the machine. This tramp material often results in breaking of the flutes on the brake rolls so as to render them ineffective. Also, with the previous rolls formed of a body cast on a steel shaft, the body often works loose from the shaft rendering the whole roll useless. These and other common operating failures make it highly desirable to have a brake roll which may be easily repaired when damaged and which is adapted for reuse of undamaged parts.

The roll members of the present invention are adapted to overcome the above mentioned difficulties by a construction incorporating a hollow cast outer shell or body which may be assembled on a steel mounting shaft. The roll members are shown in Figs. 4 and 5, as being of the usual operating form in that a body member 21, having integral longitudinal flutes 22 on its exterior surface, is associated with a shaft 23 extending through the body member 21 and providing journal portions for mounting the body member. As shown more in detail in Figs. 6 and 7, however, the body member 21 is hollow and is secured on mounting shaft 23 by means of a flange 24 and taper bushing 25, as described more in detail below.

The body member 21 is shown separately in Fig. 7 in its finished form. The manner in which the body member 21 is formed is illustrated in Figs. 8 to 11, inclusive. Previous practice has been to cast the brake roll bodies in horizontal molds split along the axis of the roll. With this method, the pressure of the hot metal, which determines the density of the casting, is at a minimum, and also slag is apt to be trapped in the mold at the upper portion of the cast roll body. Furthermore trouble is experienced with the gases generated during the casting operation bubbling through the metal as it is poured and forming "blowholes."

According to the present invention these difficulties are avoided by casting the body member 21 in a cylindrical mold which is positioned vertically during the casting operation. Also, the casting operation is carried out so that the flutes 22 are cast integrally with the body member 21 and the machining operations heretofore necessary in forming the flutes 22 are entirely eliminated. The mold for the body member 21 is formed in a cylindrical flask 28 which may consist of steel tubing as shown in Fig. 8. Vent holes 29 are formed in the wall of flask 28 to allow the gases generated during casting operation to escape freely, apertures 30 are provided to form seats for pins 31 to hold a bottom core cover 32 and a strip plate 33 for the mold in place, and the flask 28 is further fitted as shown with eyelets 34 for use in handling the mold.

The mold is formed by positioning a brake roll pattern 35 in the flask 28 by means of the bottom core cover 32, as shown in Fig. 9, and then filling the intervening space between the roll pattern 35 and flask 28 with molding sand. The roll pattern 35 used for this purpose is formed according to the exterior fluted configurations of the body member 21, and accordingly conditions the interior surface of the mold formed in flask 28 with impressions corresponding to the flutes 22. In order to preserve the impression for the flutes 22 in the mold formed in this manner the roll pattern 35 is withdrawn longitudinally through the strip plate 33. This strip plate 33 is formed with an aperture 36 having the general form of an interior gear providing a sliding fit with the above mentioned fluted configuration of the roll pattern 35. The outside diameter of strip plate 33 is adapted to fit inside flask 28, as shown in Fig. 9, and be positioned by the previously mentioned pins 31 which engage eyelets 37 to wedge the strip plate 33 in place.

After the intervening space between the roll pattern 35 and flask 28 has been filled with molding sand and this sand has been tamped down to the proper level, the strip plate 33 is positioned as just described and the roll pattern 35 is withdrawn through the strip plate so that the mold formed in flask 28 is supported during this step and the impressions in the mold for the flutes 22 are protected against damage as the pattern is withdrawn.

After withdrawal of the pattern roll 35, the strip plate 33 may then be removed and the resulting mold may be further conditioned by graphite spraying of the interior surface and baking, and the like. When the mold has thus been prepared for the casting operation a center core 38 and a core cover 39, formed with the usual sprue holes as at 40, are arranged in place, with the mold positioned vertically, as illustrated in Fig. 11, and the body member 21 is then cast in the usual manner. The vertical positioning of the mold obtains the maximum effect of the pressure of the hot metal and thus increases the density of the casting formed. Also, the vent holes 29 in flask 28 combined with the vertical positioning of the mold allow the gases generated during the casting operation to escape without any tendency to bubble through the casting being formed. Further provision may be made in this latter respect by using a center core 38 formed with internal vent channels (not shown).

The resulting hollow cast body member 21 is removed from the mold and the ends are faced and internal bores are machined as at 41

and 42 in Fig. 7 to receive the previously mentioned flange member 24 and taper bushing 25 used to mount the body member 21 on mounting shaft 23. The flange 24 is fixed on the shaft 23 by welding, or in any other convenient manner, and is formed with a bushing portion 43 extending along shaft 23 and providing a snug fit with the body member 21 at the internal bore 41. The body member 21 is positioned on shaft 23 over this bushing portion 43 against flange 24 and is fastened in place with bolts 44 extending through flange 24 and engaging body member 21. These bolts 44 provide a secure engagement between the body member 21 and mounting shaft 23 so that the torque applied to the roll during operation is effectively transmitted between shaft 23 and body member 21. At the other end, body member 21 is centered rigidly on shaft 23 through the taper sleeve or bushing 25. This taper bushing 25 is of a conventional split sleeve type and is driven into place on shaft 23 in the bore 42 of body member 21 to provide a friction fit insuring a tight, lasting connection between the body member and shaft, which renders the mounting of body member 21 on shaft 23 rattle-proof and centers the body member rigidly in place on the shaft.

Brake rolls formed in accordance with the present invention weigh only a little more than one-half as much as the standard brake rolls heretofore in use, and it has been found in actual use that they may be satisfactorily operated at considerably higher speeds. Practical limitations as mentioned above have previously limited the speed at which brake rolls might be operated to about 200 to 225 R. P. M. With the brake rolls of the present invention speeds of 300 R. P. M. and higher have proved feasible. This increased speed of the brake rolls produces a snap action on the material being decorticated that is conducive to efficient removal and separation of shive and this high speed operation is substantially superior to the results obtained with the relatively slow speed rotation of the conventional heavy brake rolls formerly used. Also, as previously mentioned the manner of forming the brake rolls with integrally cast flutes which require no machining retains the tough metal skin on the working surfaces of the cast flutes and thereby makes the flutes stronger and more durable and thus better equipped for high speed operation. The tough metal skin on the cast flutes has the properties of chilled cast iron. The flutes accordingly become highly polished during use which reduces friction and further facilitates high speed operation.

A further feature of the brake rolls of this invention is the manner in which the body member and mounting shaft are assembled so that either of them may be replaced easily and conveniently in the event of damage. In replacing either part, it is only necessary to remove the bolts 44 securing body member 21 to flange 24 and then strip the body member from shaft 23. The undamaged part may then be salvaged and assembled with a replacement for the damaged part. When the advantage of this feature is added to the savings effected in manufacturing a hollow cast body member and separate mounting shaft, the comparative advantage over the unitary construction of the brake rolls previously in use is even more substantial.

I claim:

A brake roll for decorticating machines and the like comprising a tubular outer shell forming the body member of said roll, said tubular outer shell being formed of cast iron and having a fluted exterior surface cast directly therein, whereby the flutes on said exterior surface are encased by the tough skin characteristic of said cast metal outer shell, a shaft extending entirely through said tubular outer shell and providing journal portions for mounting said roll, a flange bushing fixed on said shaft adjacent one end and associated fastening means for securing said shell at one end to said flange in assembled relation with said shaft, and a split taper sleeve pressed between said shell and said shaft at the other end thereof for centering said shell on said shaft at said other end.

KARL KAISER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
131,486	Wheeldon	Sept. 17, 1872
945,726	De Montlord	Jan. 4, 1910
1,132,122	Roberts	Mar. 16, 1915
1,382,606	Norton	June 21, 1921
1,405,004	Roberts	Jan. 31, 1922
1,976,625	Norman	Oct. 9, 1934
2,018,675	Hyde	Oct. 29, 1935
2,186,695	Harris	Jan. 9, 1940

FOREIGN PATENTS

Number	Country	Date
28,823	Germany	Sept. 22, 1884
420,859	Great Britain	Dec. 10, 1934