May 12, 1931. E. HUTCHENS 1,804,419

MACHINE AND METHOD FOR REMOVING VALVE STEMS FROM INNER TUBES

Filed Oct. 18, 1926 3 Sheets-Sheet 1

FIG. 1

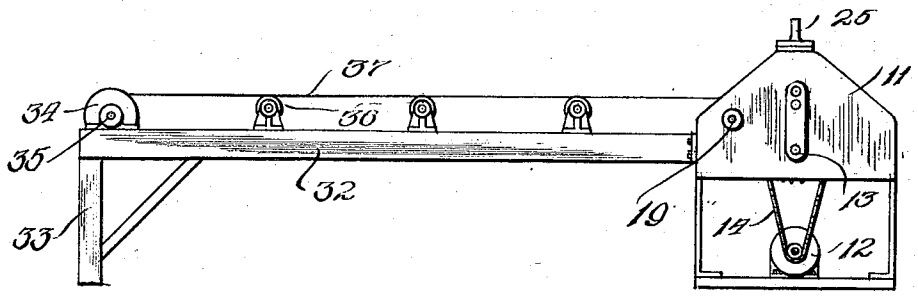
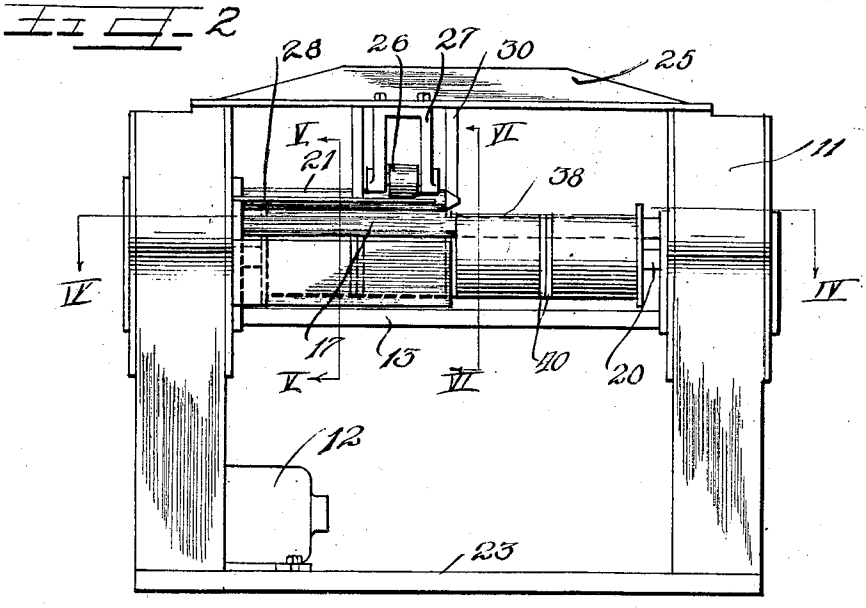


FIG. 2



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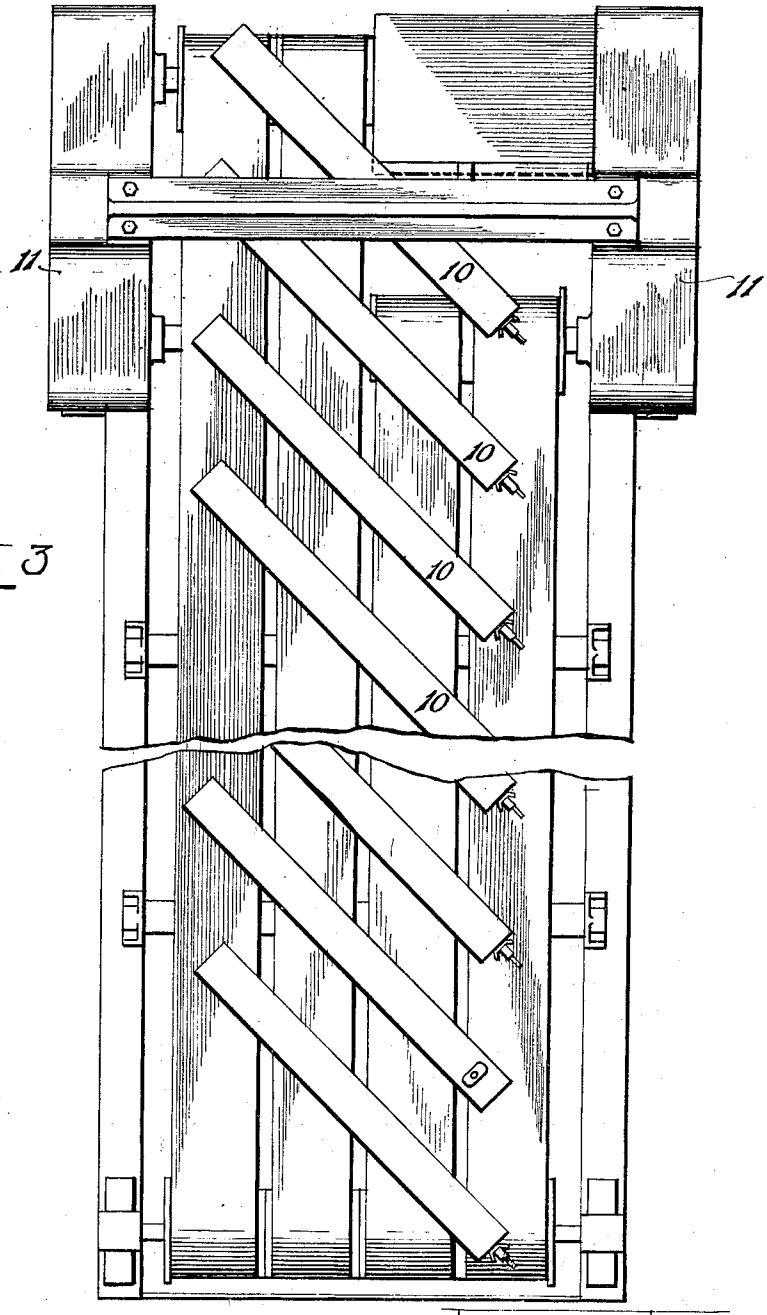


FIG. 3

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MACHINE AND METHOD FOR REMOVING VALVE STEMS FROM INNER TUBES

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Fig. 4

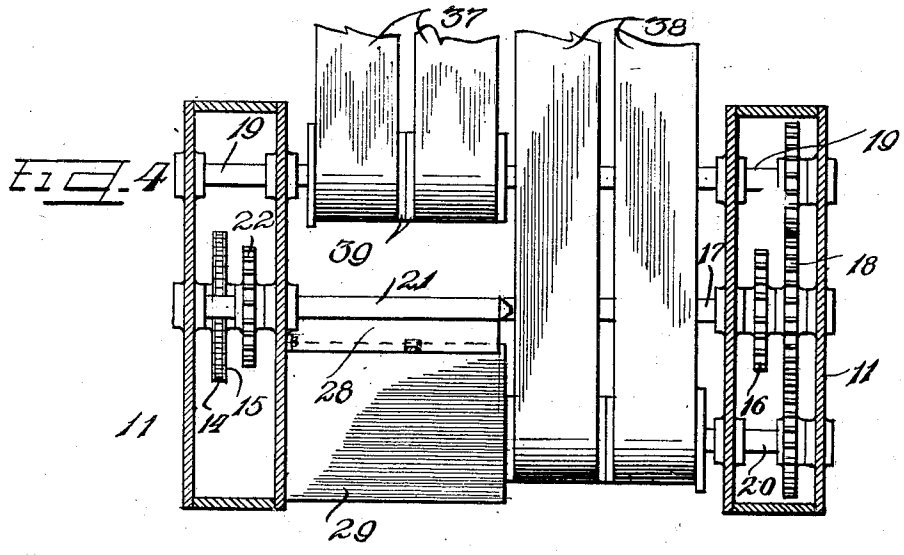


Fig. 5

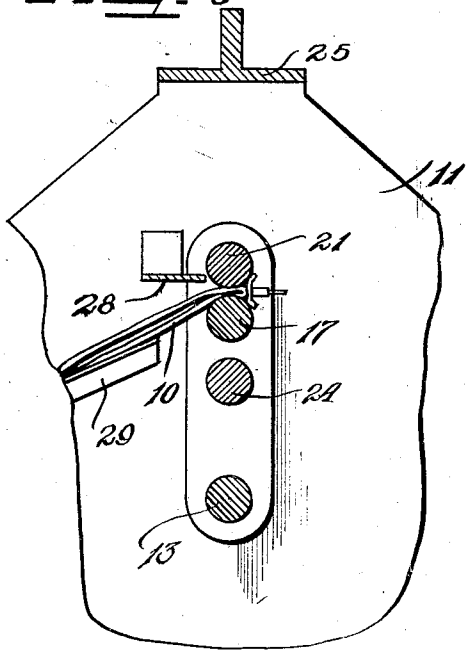
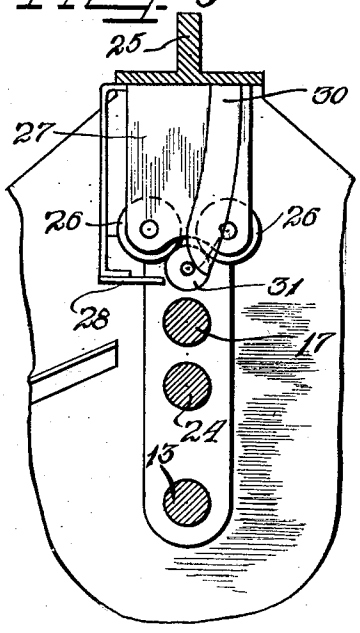


Fig. 6



Inventor

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By Charles Fellows Attys

Patented May 12, 1931 1,804,419

UNITED STATES PATENT OFFICE

EDWARD HUTCHENS, OF CUDAHY, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO H. MUEHLSTEIN & CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

MACHINE AND METHOD FOR REMOVING VALVE STEMS FROM INNER TUBES

Application filed October 18, 1926. Serial No. 142,508.

This invention relates to mechanism for and a method of removing the metal valve stems from old inner tubes used with pneumatic tires in order that the rubber of the tubes may be reclaimed.

Heretofore it has been a difficult and expensive job to attempt to remove the valve stems by hand, as the stems are built into the tubes as strongly as possible to withstand the strains imposed thereon in use, so that removal requires considerable strength and some degree of skill to jerk and twist a stem out with the aid of pliers. It is therefore an object of this invention to provide a machine for automatically pulling or forcing the valve stems out of the tubes and one form of accomplishing this result is to provide a pair of small diameter rolls to draw the tube, the abrupt angle formed by the small rolls serving to force the stem base out of the rubber. I have found that rolls about two inches in diameter will effectively prevent regular valve stems from entering the rolls while larger diameter rolls will sometimes catch onto and draw the stems through the rolls.

It is another object of this invention to provide means for feeding the tubes into the rolls at an angle with one roll shorter than the other and pointed in order that the tube may enter sideways under the point of the shorter roll so that the tube remains flat instead of bunching up and refusing to enter the wide angle formed by the small diameter of the rolls. The sideway entrance is important as the end of the folded tube stands up more or less while the side of the tube lies flat and therefore enters the rolls readily in spite of the wide angle.

It is thought that my novel process of removing valve stems from inner tubes will be fully understood from the following description of an apparatus by which the method may be practiced.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevation of a machine embodying the features of this invention.

Figure 2 is an elevation of the delivery end.

Figure 3 is a top plan view.

Figure 4 is a section on the line IV—IV of Figure 2.

Figure 5 is a section on the line V—V of Figure 2.

Figure 6 is a section on the line VI—VI of Figure 2.

As shown on the drawings:

The embodiment chosen for illustration comprises a feeding table, upon which the tubes 10 are placed, and roll standards with suitable driving mechanism. The feeding table is a desirable but not essential element, as it will be evident from what follows that tubes might be fed by hand to the dehorning rolls. The table, however, serves to greatly speed up the operation as well as eliminating the hazzards involved in hand feeding the tubes to the rolls.

The rolls or dehorning mechanism proper are mounted between two similar standards 11 which enclose the driving mechanism, shown in plan in Figure 4. A motor 12 drives a jack shaft 13 by means of a chain 14 and gear 15 on the right end of the shaft, the left end having a gear drive 16 to the lower dehorning roll shaft 17, a gear 18 alongside the gear 16 driving two of the feed table end pulley shafts 19 and 20 as will be described later in more detail. The upper or short dehorning roll 21 is driven by the gear 22 meshing with another gear on the jack shaft 13. The two standards 11 are held in alignment by a base 23, a tie bar 24 and a top brace 25. The brace 25 carries depending double rolls 26 in a support 27 to hold down the free end of the short roll 21, a roll follower 28 being also provided to prevent tubes from bending up and winding around the upper roll. An apron 29 is likewise provided adjacent the lower roll to carry the discharged tubes free from the rolls. A plow or guide 30 extends down from the brace in front of and into contact with the tapered

point 31 of the free end of the short upper roll to prevent the tubes from catching over the point of the roll; the tapered point being adapted to project over and draw in the side of the tube to facilitate entry thereof between the rolls.

The feeding table illustrated comprises a framework 32 supported by the standards 11 at one end and by legs 33 at the other, the table carrying a series of return pulleys 34 on a shaft 35 at the outer end with intermediate rollers 36 supporting a plurality of conveyor belts 37 and 38. The belts 37 feeding in line with the upper short roll terminate short of the roll, passing over pulleys 39 on the shaft 19 supported in the standards and driven by the gear 18 as previously mentioned. This arrangement of the belts 37 leaves a clear space in front of the rolls to permit the ejected valve stems to drop down on the floor. The other belts 38 pass over the lower dehorning roll and are driven by the pulleys 40 on the shaft 20 which is likewise driven by the gear 18. These belts therefore carry the advanced edge of the tubes over the lower dehorning roll and the diagonal position of the tubes on the belts serves to present the nearly flat central edge of the tube to the pointed end of the upper short roll.

In operating the illustrated embodiment of this invention, tubes are laid on the feed table belts in a diagonal position with the valve stems projecting to the right as shown in Figure 3. It is not necessary to carefully pull out and flatten the tubes to have the stem project to the extreme right as the action of the dehorning rolls will pull the tube into this postion if the stem has not been ejected by its first contact with the rolls. As the belts are driven at uniform speed, the tubes are fed sideways under the pointed end of the short upper roll, the point of the roll pushing down any bulging along the edges of the tube. When the tube has been drawn through the rolls up to the valve stem, the wide angle of contact produced by the small roll diameter acts to hold back the stem while the rolls continue to draw the tube so that the stem base or button is snapped out of the tube and the stem falls to the floor between the end of the short belts and the dehorning rolls.

In practice, the upper roll may be made slightly larger in diameter than the lower roll, experience showing that rolls approximately two inches in diameter will remove practically all standard stems while larger rolls are not nearly as efficient. Tests show that two inch rolls will remove 99% of the stems while three inch rolls will remove only 40% because the larger rolls present a smaller entrance angle that catches on the stems and draws them into the rolls along with the tube.

I have also found that at times tubes get into the scrap pile partly inflated and as a result when the tubes are handled by my machine the rolls force the air in each tube to the valve stem end thereof and either burst the tube or shoot the valve stem out. In fact, this action occurs in the case of at least 25% of the tubes handled by my machine.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. In a machine of the class described, a pair of standards, a lower roll supported in both standards, a shorter upper roll supported in one standard, the other end being free, means for preventing distortion of the free end of said shorter roll, a plurality of endless feeder belts of an aggregate width approximating the width of said lower roll, the belts adjacent the length of the shorter upper roll ending clear of said rolls and the remaining belts passing over said lower roll.

2. In a machine of the class described, a pair of standards, a lower roll supported in both standards, a shorter upper roll supported in one standard, the other end being free, means for preventing distortion of the free end of said shorter roll, the free end of said shorter roll being beveled and means for feeding tubes angularily under said beveled end.

3. In a machine of the class described, a pair of standards, a lower roll supported in both standards, a shorter upper roll supported in one standard, the other end being free, means for preventing distortion of the free end of said shorter roll, conveyer belts passing over the lower roll beyond the shorter upper roll and similar belts stopping clear of the rolls adjacent the shorter upper roll.

4. In a machine for forcibly removing an element from an article, a plurality of cooperable rolls one being shorter than the other so as to allow the article to be angularly introduced between the rolls thereby allowing the rolls to have a wider area of contact with the portion of the article therebetween, and means for actuating said rolls to cause the article to be fed forward and to thereby forcibly bring said element into contact with said rolls so as to stretch or break the article, said rolls being arranged with their peripheries close enough together so as to prevent the passage of the element therebetween and so that said element upon engaging the rolls will be forcibly ejected from the article due to said stretching or breaking of the article.

5. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls one being shorter than the other so as to allow the tube to be angularly introduced between

the rolls thereby allowing the rolls to have a wider area of contact with the portion of the article therebetween, means for actuating said rolls to cause the tube to be fed forward and thereby forcibly bring the valve stem into contact with said rolls to stretch or break the tube, and means for supporting the rolls with their peripheries close enough together so as to prevent the passage of the valve stem therebetween and so that said valve stem upon engaging the rolls will be forcibly ejected from the tube due to said stretching or breaking of the tube.

6. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls one being shorter than the other so as to allow the tube to be angularly introduced between the rolls, means for actuating said rolls to cause the tube to be fed forward and to thereby forcibly bring the valve stem into contact with said rolls so as to stretch or break the tube and thus eject the valve stem from the tube, and means for conveying diagonally arranged tubes to the roll.

7. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls one being shorter than the other so as to allow the tube to be angularly introduced between the rolls, means for actuating the rolls to cause the tube to be fed forward and to thereby forcibly bring said valve stem into contact with said rolls so as to stretch or break the tube and thus eject the valve stem from the tube, and means for holding the free end of the shorter roll in cooperation with the other roll.

8. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls one being shorter than the other and having its free end positioned so as to have the tube introduced between it and the other roll, means for actuating said rolls to cause the tube to be fed forward and thereby forcibly bring the valve stem into contact with said rolls so as to stretch or break the tube and thus eject the valve stem from the tube, and means for preventing the tube from winding up over the free end of the shorter roll.

9. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls arranged to have a tube inserted therebetween, means for actuating the rolls to cause the tube to be fed forward and to thereby forcibly bring said valve stem into contact with said rolls so as to stretch or break the tube and thus eject the valve stem from the tube, and feed belts for conveying spaced tubes to said rolls, the uppermost of said rolls having a slightly larger diameter than the lower roll so as to facilitate the removal of the valve stem from the tube.

10. In a machine for removing a valve stem from a tube, a plurality of cooperable rolls one being shorter than the other so as to allow the tube to be introduced therebetween, means for actuating said rolls to cause the tube to be fed forward and to thereby forcibly bring the valve stem into contact with said rolls so as to stretch or break the tube and thus eject the valve stem from the tube, and means for guiding the tube as it leaves the rolls.

11. The method of removing valve stems from tubes which consists in feeding the tubes forward diagonally in spaced relation to a dehorning position and automatically removing the valve stems from the tubes at the dehorning position.

12. The method of removing a valve stem from a tube which consists in feeding the tube forward and utilizing the forward movement of the tube to stretch or break the tube and remove the valve stem therefrom.

13. The method of removing a valve stem from a tube which consists in feeding the tube forward to a dehorning position, arresting forward movement of the valve stem when it reaches the dehorning position and utilizing the additional forward movement of the tube to stretch or break the tube and separate the valve stem from the tube.

14. The method of removing a valve stem from a tube which consists in feeding the tube forward to a dehorning position arresting forward movement of the valve stem when it reaches the dehorning position, utilizing the additional forward movement of the tube to stretch or break the tube and thus separate the valve stem from the tube, causing the ejected valve stem to gravitate onto a support below the dehorning position, and conveying the tube acted on to a discharge position.

15. The method of removing a valve stem from a tube which consists in feeding the tube forward to a dehorning position, utilizing the forward movement of the tube to stretch or break the tube and to thus remove the valve stem therefrom and preventing the tube from rolling up at the dehorning position.

16. In a machine for removing a valve stem from a tube, means for feeding the tubes forward in spaced relationship to a dehorning position and a plurality of elements at the dehorning position spaced a sufficient distance to allow a tube to pass therethrough but not enough to permit the passage of the stem so that upon the valve stem coming into proximity with said elements the tube is stretched or broken to forcibly eject the valve stem from the tube.

17. In a machine for removing a valve stem from a tube, a plurality of rolls spaced a sufficient distance apart to allow the passage of a tube therebetween and means for feeding a tube through said rolls to stretch or break the tube and to thus cause the valve stem to be forcibly ejected from the tube.

18. In a machine for removing a valve stem from a tube, a plurality of elements spaced a sufficient distance to allow a tube to pass

therethrough and arranged to engage the valve stem, and means for causing the tube to be fed forward between said elements to bring the valve stem into proximity with said elements so as to stretch or break the valve stem end of the tube to forcibly eject the valve stem from said tube.

19. In a machine for removing a valve stem from a tube, means for engaging a tube, and means for causing a relative movement between said engaging means and the tube to bring the valve stem into proximity with said engaging means so as to stretch or break the valve stem end of the tube to forcibly eject the valve stem from said tube.

20. In a machine for removing a valve stem from a tube, means for feeding the tube forward to a dehorning position, and means at said position for pressing the tube to force the air therein to the valve stem end of the tube and to thus break or stretch the said end of the tube whereby said steam is forcibly ejected from the tube.

21. In a machine for removing a valve stem from a tube, a plurality of elements spaced a sufficient distance to allow a tube to pass therethrough and arranged to engage the valve stem, and means for causing the tube to be fed forwardly between said elements to force any air in said tube to the valve stem end thereof and to thus break or stretch said end of the tube whereby said stem is forcibly ejected from the tube thereby.

22. In a machine for removing a valve stem from a tube, means for engaging a tube, and means for causing a relative movement between said engaging means and the tube to force any air in said tube to the valve stem end thereof and to thus break or stretch said end of the tube whereby said stem may be forcibly ejected from the tube thereby.

23. The method of removing a valve stem from a tube which consists in creating a relative movement between the tube and a dehorning position, and utilizing said movement to stretch or break the tube at said position and thus separate the valve stem from the tube.

24. The method of removing a valve stem from a tube which consists in creating a relative movement between the tube and a dehorning position and utilizing said movement to force any air in said tube to the valve stem end thereof and to thus break or stretch said end of the tube whereby said stem is separated from the tube thereby.

25. The method of removing a valve stem from a tube which consists in feeding the tube forward to a dehorning position and utilizing said movement to compress any air in said tube and to thus break or stretch said end of the tube so as to forcibly eject the valve stem from the tube.

26. In a machine for removing a valve stem from an inner tube, means for gripping the tube and means for creating a relative movement between the tube and valve stem to stretch or break the valve stem end of the tube so as to eject the stem from the tube.

In testimony whereof I have hereunto subscribed by name.

EDWARD HUTCHENS.