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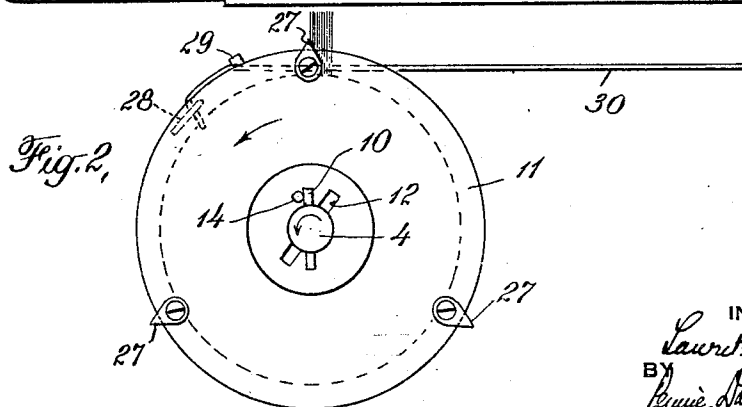
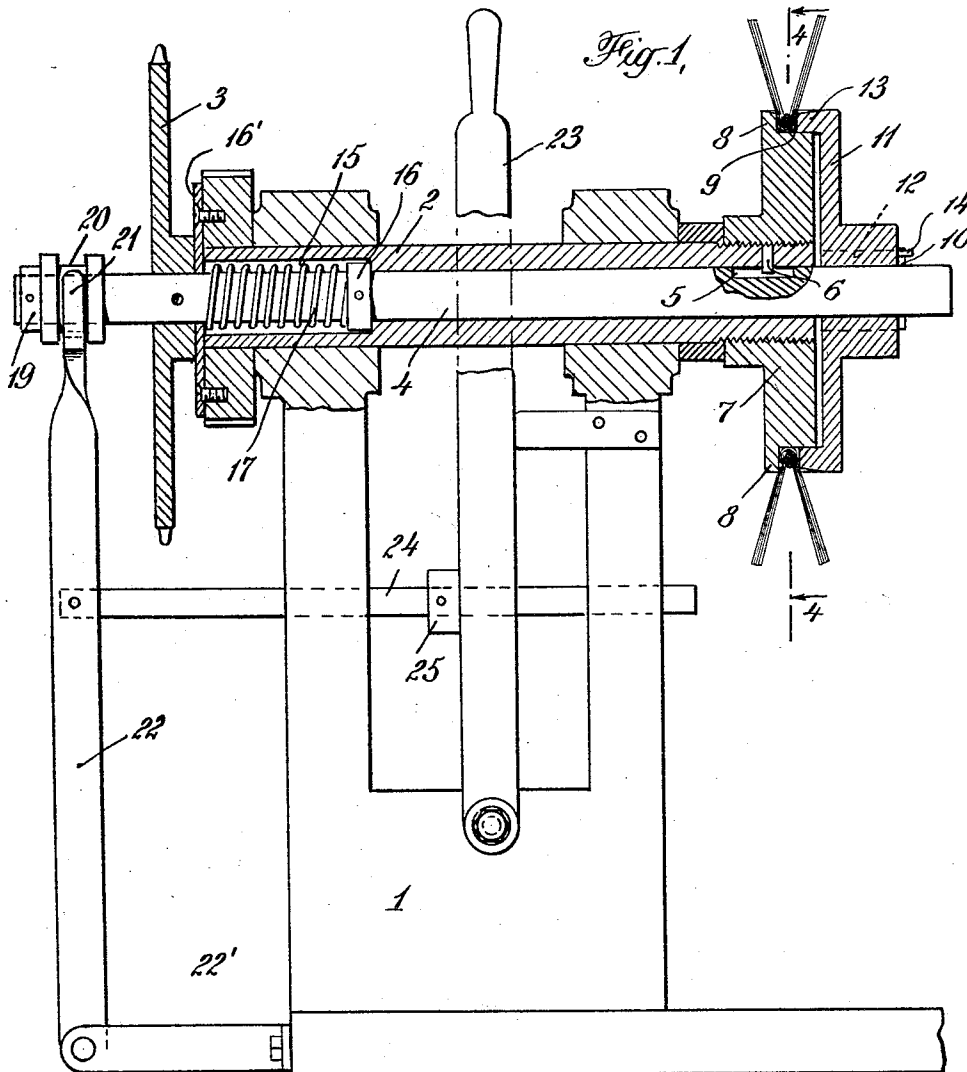
L. H. NIELSEN

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APPARATUS FOR MAKING ROTARY BRUSHES

Filed Feb. 28, 1930

2 Sheets-Sheet 1



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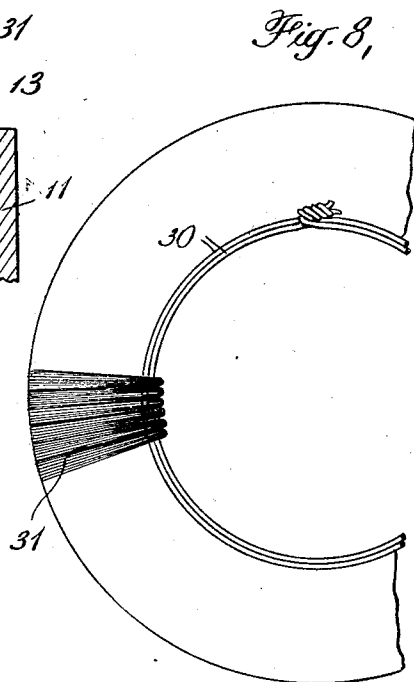
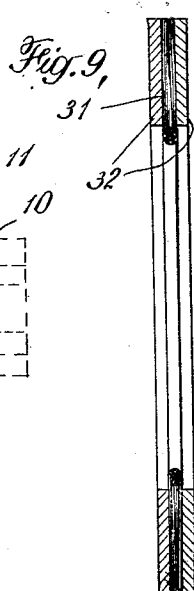
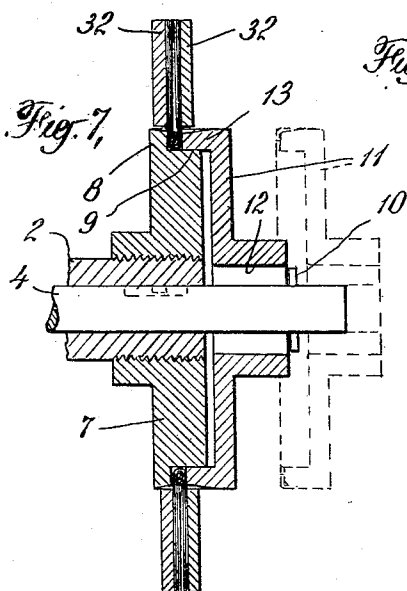
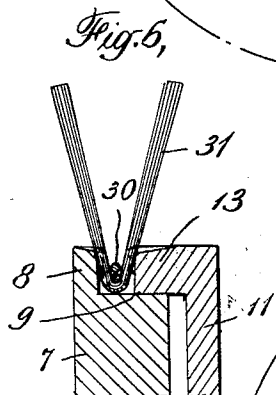
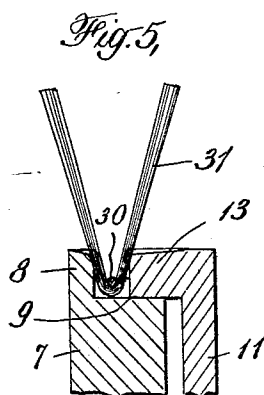
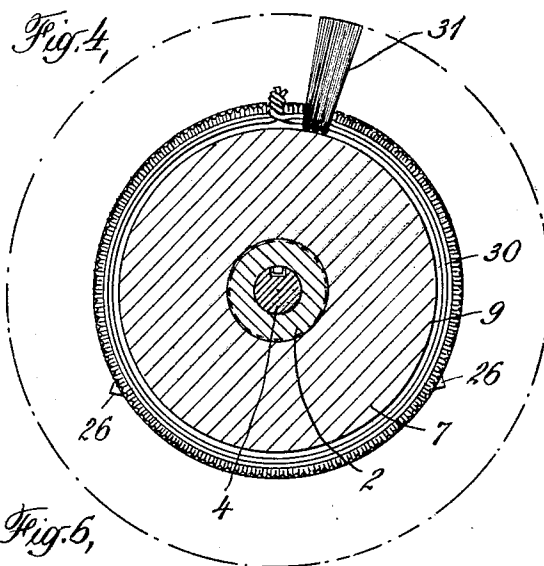
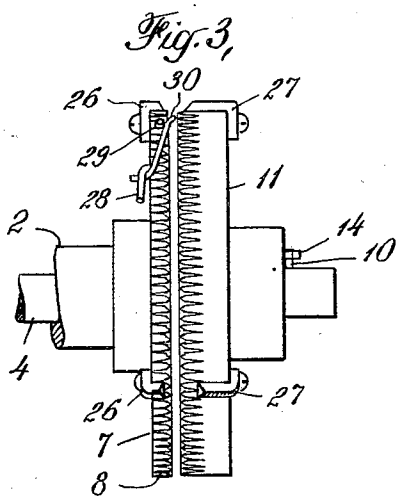
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2 Sheets-Sheet 2



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APPARATUS FOR MAKING ROTARY BRUSHES

Application filed February 28, 1930. Serial No. 432,251.

This invention relates to the manufacture of rotary brushes and is concerned more particularly with a machine by which the brush units or sections of which such brushes are made up can be produced more rapidly and efficiently than by the machines heretofore used for the purpose.

Rotary brushes as now made commonly include a plurality of circular units or sections laid side by side and mounted on a hub on which they are held by suitable clamping means. Each unit ordinarily includes a base ring of wire or the like on which the brush strands or filaments are looped with their ends extending outwardly from the base ring in radial directions. The strands are anchored in position on the base rings by appropriate means, such as lines of stitching which extend concentrically with the base ring and bind the strands together.

In the manufacture of these units, a machine is employed in which there are a pair of rotary heads which define a groove between them. These heads are mounted on a shaft and one of the heads is provided with means by which an end of the base wire may be secured thereto. With the base wire connected to the head, the machine is placed in operation and as the heads rotate, the base wire is wound in the groove. Brush material in the form of strands of thin wire, for example, is fed into the space between the bottom of the groove and the base wire as the latter is being laid in the grooves. Ordinarily two strands of base wire are laid in the groove to give the base ring the desired strength and upon completion of the winding operation, the base wire is cut and the ends of the wire twisted together and bent flat. Thereafter, the strands of brush material are gripped between a pair of clamping plates and one of the elements detached from the machine to permit the removal of the unit held between the clamping plates.

In the prior machines, the heads have been threaded or otherwise secured on the shaft in such manner that the operation of removing one of the heads requires considerable time and thus the output of a machine is necessarily limited by the time consumed in

taking the head off the machine and replacing it for the formation of a new section or unit.

The present invention is accordingly directed to the provision of an improved machine of this type so constructed that one of the head elements can be quickly detached from its mounting and as quickly replaced, these operations not requiring the use of tools. In the new machine, the heads are rigidly secured in position during the winding operation, but can be quickly removed and replaced whenever occasion requires.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Fig. 1 is a vertical section of the machine; Fig. 2 is an end view of one head on the machine;

Fig. 3 is a side view of the heads;

Fig. 4 is a sectional view along 4—4 of Fig. 1 with a part of the brush material removed;

Figs. 5 and 6 are diagrammatic views illustrating the operation of the machine; and Figs. 7, 8, and 9 are side and sectional views, respectively, illustrating the application of the clamping plates.

As shown in Fig. 1, the machine is supported on a frame 1 on which is journaled a hollow shaft 2 driven by a sprocket wheel 3. Inside shaft 2 is mounted a shaft 4 provided with a key-way 5. A key 6 secured to the shaft 2 enters the groove 5, so that the shafts rotate in unison but are capable of independent axial movement. On the hollow shaft 2 is mounted a head 7 provided with a flange 8 and a cylindrical extension 9.

A second head 11 provided with a flange 13 is adapted to be mounted on the cylindrical extension 9 of head 7. The head 11 has a central opening to receive shaft 4, two grooves 12 being provided for the passage of a pin 10 projecting from opposite sides of the shaft 4. The pin 10 cooperates with a stud 14 on the head 11 to impart the rotary motion of shaft 4 to the head.

The bore of shaft 2 is enlarged at 15 in order to receive a collar 16 fast on the shaft 4. A spring 17 encircles the shaft 4 and bears at one end against the collar 16 and at the

other end against a plate 16' secured to shaft 2. The spring tends to force shaft 4 to the right (Fig. 1).

A sleeve 19 fast on shaft 4 is provided with a groove 20 in which is received the forked end 21 of a lever 22. This lever is pivotally mounted on a bracket 22' and is controlled by a hand lever 23 through the intermediary of a rod 24 passing through convenient apertures in the frame 1 and provided with a collar 25 against which lever 23 bears.

The flanges 8 and 13 of the head elements are serrated on their outer surfaces, as shown by Fig. 3, and are provided with guides 26 and 27 equidistantly spaced. A hook 28 on the head element 7 (see Fig. 3) serves as a means for securing the end of the base wire to the head. A stud 29 is provided on the outer surface of flange 8 for guiding wire 20 into the groove between the heads.

The mode of operation of the machine illustrated is as follows:

The parts being in the position shown in Fig. 1, the end of base wire 30 is caught by the hooked member 28, and guided by the stud 29 between the flanges 8 and 13, the initial position of wire 30 being shown in Fig. 2.

As the heads rotate, the operator then feeds the strands of brush material 31 under wire 30 so that the wire engages the mid-points of the strands. The brush material 31 is forced down between wire 30 and flanges 8 and 13, and is thus bent with the ends extending outwardly as shown by Fig. 5. The guides 26 and 27 assist the operator in obtaining an even distribution of the brush material around the base ring.

After the first rotation of the head elements, when the brush material has been distributed around their entire circumference, a second turn of the wire 30 is laid, the rotation of the head elements is then stopped, and the wire is cut and its ends twisted together, and bent flat against the wire ring.

The brush unit is now to be removed from the machine, and for this purpose, the pair of clamping plates 32 are placed on opposite sides of the extending ends of the brush strands, these plates being provided with locking means by which they can be secured together with the strands held firmly between them. The head 11 is now removed. For this purpose, the operator turns the head 11 on the shaft to the extent necessary to bring the pin 10 into alignment with the slot 12 in the head 11. The operator then pushes the lever 23 to the left (Fig. 1), moving the shaft 4 against the force of the spring 17. The movement of the shaft may be sufficient to withdraw it from the head 11 or if not, the head can be readily slipped off the shaft. The brush unit held between the clamping plates is then removed, the head restored to its original position and the sequence of operations completed.

It will be observed that in this machine, one of the heads is rigidly secured in place, while the other is removably mounted. This removable head can be quickly withdrawn without the use of tools whenever that is required during the operation of the machine. When the head is in place, the width of the groove is determined by the position of the pin 10 on the shaft 4, when the shaft is in its normal position, the head 11 being forced against the pin by the base ring and brush material forced into the groove during the production of the brush.

What I claim:

1. In a machine for making rotary brushes, the combination of a rotary support, a head fast on the support, said head including a circumferential flange and a cylindrical extension, a second head mounted on the support, said head fitting over said extension and cooperating with the flange and extension to define a groove, means for driving the support, and means for producing a relative movement of the second head and the support to release said head therefrom.

2. In a machine for making rotary brushes, the combination of a pair of heads mounted for rotation on the same axis, means for supporting and rotating said heads, and means for moving a part of said supporting and rotating means axially relative to one of said heads, such movement freeing said head from said means.

3. In a machine for making rotary brushes, the combination of a pair of shafts disposed one within the other, a rotary head fast on one shaft, a second rotary head loosely mounted on the other shaft, means for connecting said second head to the shaft on which it is mounted, means normally holding said heads in contact and means for effecting a relative movement of said second head and its shaft against the action of said holding means to free said head from said shaft.

4. In a machine for making rotary brushes, the combination of a pair of shafts disposed one within the other, a rotary head fast on one shaft, a second rotary head loosely mounted on the other shaft, means for connecting said second head to its shaft, and means for moving said second shaft axially with respect to said second head.

5. In a machine for making rotary brushes, the combination of a pair of shafts disposed one within the other, means connecting the shafts and preventing relative rotation but permitting relative endwise movement thereof, a rotary head fast on one shaft, a second rotary head on the other shaft, means for connecting the second head to its shaft, and means for moving said second shaft relative to said second head to free said head from said shaft.

6. In a machine for making rotary brushes, a hollow shaft, a second shaft within said

hollow shaft, means connecting said shafts and preventing relative rotation but permitting relative endwise movement thereof, means tending to hold said inner shaft in a fixed position, a head fast on said outer shaft, a head mounted on said inner shaft, means connecting said second head to said inner shaft to prevent relative rotation of said head and shaft while permitting relative endwise movement thereof, and means for producing a relative movement of said inner shaft and the head mounted thereon to free said head from the shaft.

7. In a machine for making rotary brushes, the combination of an outer hollow shaft, an inner shaft within said hollow shaft, means for rotating said shafts in unison, a head fast on said outer shaft, a second head mounted on said inner shaft, means connecting said second head to the inner shaft, and means for effecting relative axial movement of said second head and said inner shaft to free said head from said shaft.

8. In a machine for making rotary brushes, the combination of a pair of shafts disposed one within the other and connected for rotation in unison but capable of limited relative axial movement, means for rotating said shaft, a head fast on one of said shafts, a second head mounted on the other shaft, means connecting said second head and its shaft for rotational movement in unison, and means for effecting relative axial movement of said second head and its shaft to free said head from said shaft.

9. In a machine for making rotary brushes, the combination of a hollow shaft, a second shaft within said hollow shaft, a head fast on said hollow shaft, a second head mounted on said inner shaft, means connecting said second head and its shaft for rotation in unison, said means permitting relative endwise movement of said shaft and head, means for rotating said shafts with their heads in unison, and means for moving said inner shaft relative to its head to free said head therefrom.

10. In a machine for making rotary brushes, the combination of a hollow shaft, a second shaft within said hollow shaft, a spring acting on said inner shaft and tending to hold it in one position, a head fast on said outer shaft, a head mounted on said inner shaft, means connecting said second head to its shaft for rotational movement in unison, and means for moving said inner shaft relative to said head and against the action of said spring to free said head from said shaft.

11. A machine for making rotary brushes comprising a supporting frame, a shaft axially movable with respect to said frame, means for driving said shaft, a rotary head element located in a fixed position with respect to the frame, means for driving said element, a co-

operating rotary head element mounted on said shaft, means for driving said cooperating head element by the shaft, and means for separating said cooperating head element from the shaft.

12. A machine for making rotary brushes comprising a supporting frame, a shaft axially movable with respect to said frame, means for driving said shaft, a rotary head element located in a fixed position with respect to the frame, means for driving said element, a cooperating rotary head element mounted on the shaft and axially movable with it, means for driving said cooperative head element by the shaft, and means for separating said cooperating head element from the shaft.

13. A machine for making rotary brushes comprising a supporting frame, a hollow shaft journaled on said frame, means for driving said hollow shaft, a rotary head element secured to said hollow shaft, an inner shaft axially movable within said hollow shaft, means for driving said inner shaft by the hollow shaft, a cooperating head element mounted on said inner shaft and axially movable with it, means for driving said cooperating head element by the inner shaft, and means for moving said cooperating head element and its shaft relatively to effect separation thereof.

14. A machine for making rotary brushes comprising a supporting frame, a hollow shaft journaled on said frame, means for driving said hollow shaft, a rotary head element fast on said hollow shaft, an inner shaft axially movable within said hollow shaft, means for driving said inner shaft by the hollow shaft, a projecting arm on said inner shaft, a second head element mounted on the inner shaft, and a stud on said second head element adapted to cooperate with the projecting arm of the inner shaft.

15. A machine for making rotary brushes, comprising a supporting frame, a hollow shaft journaled on said frame, means for driving said hollow shaft, a rotary head element secured to said hollow shaft, an inner shaft within said hollow shaft, a key connection between the hollow shaft and the inner shaft, means for controlling the axial motion of the inner shaft, a projecting arm on the inner shaft, a second head element mounted on the inner shaft, and a stud on said head element adapted to cooperate with the projecting arm of the inner shaft.

16. A machine for making rotary brushes, comprising a supporting frame, a hollow shaft journaled on said frame, means for driving said hollow shaft, a rotary head element secured to said hollow shaft, and provided with a flange and a cylindrical extension, an inner shaft within said hollow shaft, a key connection between the hollow shaft and the inner shaft, means for controlling the axial motion of the inner shaft, a pro-

jecting arm on the inner shaft, a second head element mounted on the inner shaft and provided with a flange adapted to engage the cylindrical extension of the first head element, and a stud on said head element adapted to cooperate with the projecting arm of the inner shaft.

17. In a machine for making rotary brushes, the combination of a shaft, a head rigidly secured thereto, a second head loosely mounted on the shaft, said heads having peripheral parts cooperating to define a groove, and means for effecting relative movement of said shaft and second head to remove said head from said shaft.

18. In a machine for making rotary brushes, the combination of a shaft, a head rigidly secured thereto, a second head loosely mounted on the shaft, said heads having parts cooperating to define a circumferential groove, means tending to cause said heads to approach each other, and means for effecting separation of said heads against the action of said means.

19. In a machine for making rotary brushes, the combination of a shaft, a head rigidly secured thereto, a second head loosely mounted on the shaft, said heads having parts cooperating to define a circumferential groove, means tending to force said heads toward each other, and means for effecting relative movement of said shaft and second head to remove said head from the shaft.

In testimony whereof I affix my signature.

LAURITS HENRIK NIELSEN.