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MACHINE FOR MAKING TWISTED BRUSHES

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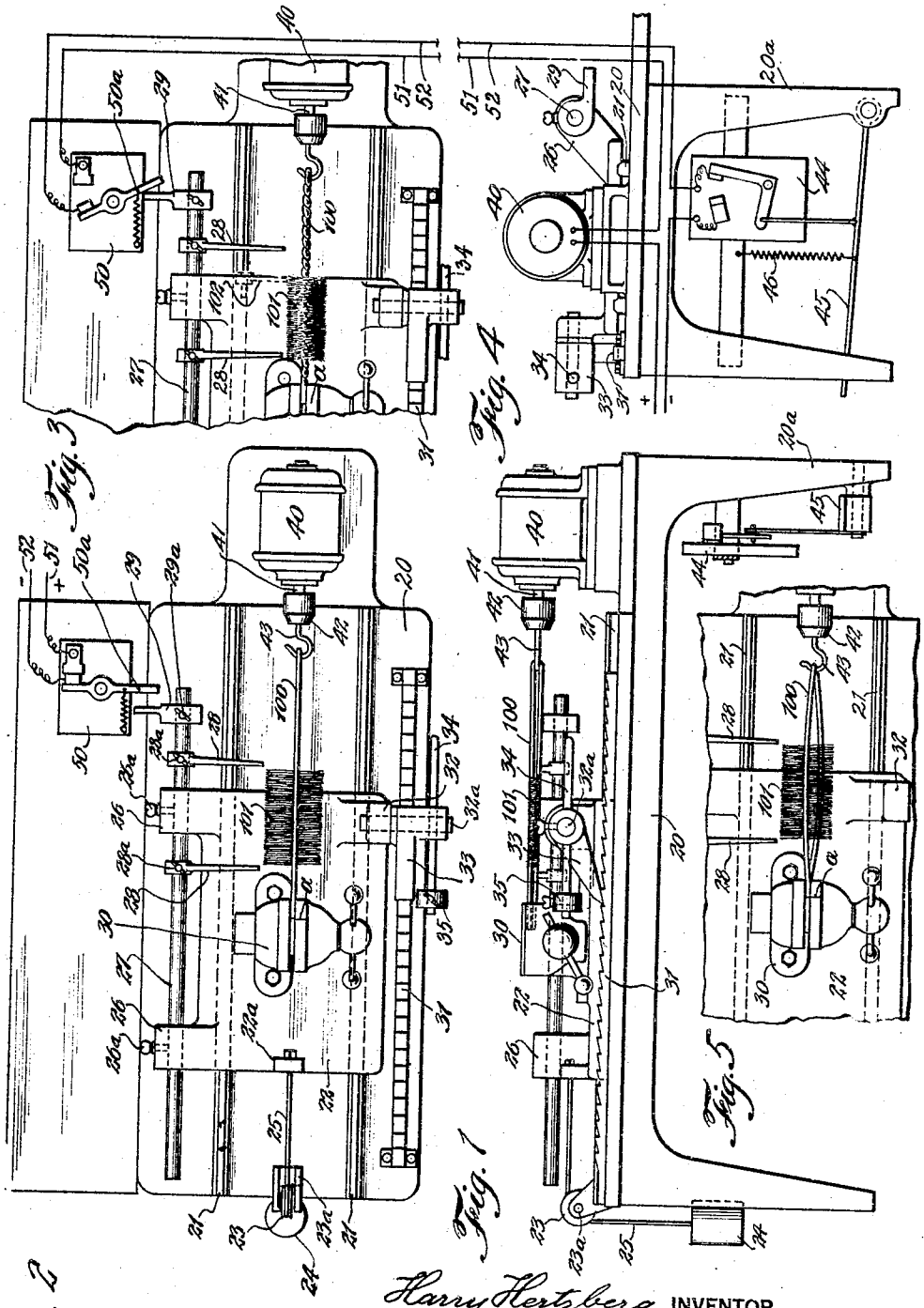


Fig. 3

Fig. 4

Fig. 2

Fig. 1

Fig. 5

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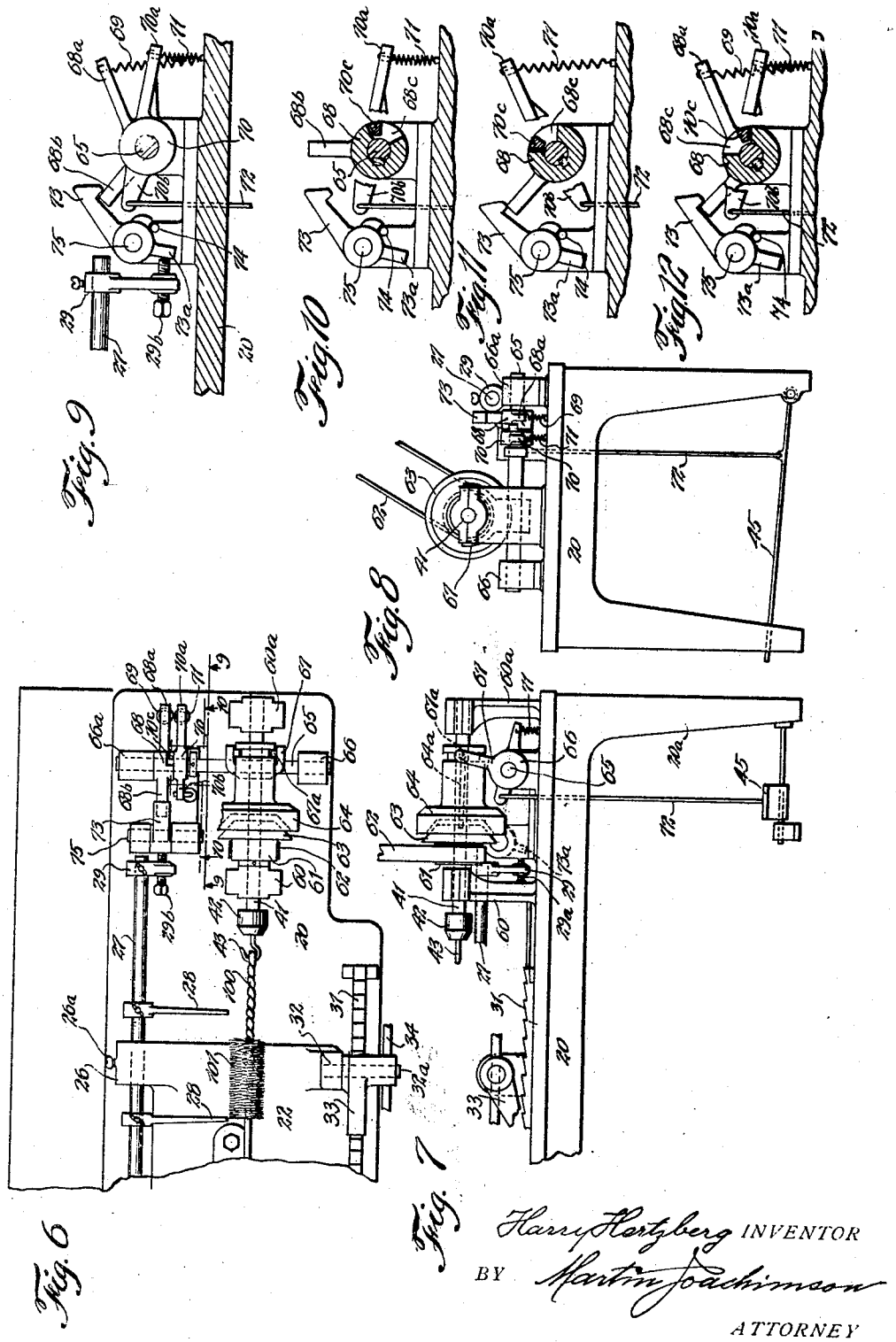


Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 8

Fig. 7

Fig. 6

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UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING TWISTED BRUSHES

Application filed April 28, 1930. Serial No. 447,912.

This invention relates to machines for making brushes of the cylindrical type in which bristles or the like are held intertwisted between strands of wire.

It is the object of the present invention to provide machines of this type with novel means which reduce human labor.

It is a further object of the present invention to provide novel means which make it possible for unskilled labor to produce cylindrical, twisted brushes of better and more uniform quality than could be produced heretofore by highly skilled labor.

It is another object of this invention to provide means which increase the number of brushes produced per unit of time.

With these and other objects in view the invention consists in certain novel combinations of elements and arrangements of parts which will become clearer as the description progresses and will be finally pointed out in the appended claims.

In the drawings which form a material part of this disclosure: Fig. 1 is a front elevation of an electric motor driven machine embodying the invention showing wires holding mop material ready for twisting.

Fig. 2 is a top plan of Fig. 1.

Fig. 3 shows the essential parts of Fig. 2 in their position when the twisting operation is completed.

Fig. 4 is an end elevation of Fig. 1.

Fig. 5 is part of a plan of the machine similar to Fig. 3 at the beginning of the operation before the stem wires are stretched when brush material is inserted between them.

Fig. 6 is a partial plan of a belt driven machine embodying my invention.

Fig. 7 is a front elevation of Fig. 6.

Fig. 8 is an end elevation of Fig. 7.

Fig. 9 is a detail elevation on line 9—9 of Fig. 6.

Fig. 10 is a detail elevation on line 10—10 of Fig. 6 showing the position of the starting mechanism when the machine is at rest.

Fig. 11 is the same elevation as Fig. 10 showing the position of the starting mechanism when the pedal is depressed.

Fig. 12 is the same elevation as Fig. 10 showing the position of the starting mechanism during the twisting operation.

Referring to Figs. 1, 2 and 4 of the drawings, the machine consists of a table-like top 20 provided with suitable legs 20*a*. On top 20 are arranged two parallel guides 21 forming a bed on which a carriage 22 is slidably mounted. Centrally between guides 21 at the left end of frame 20 a grooved pulley 23 is rotatably held by a forked bracket 23*a* on top 20. A wire rope 25 has one end fastened to a lug 22*a* of carriage 22 and extends over pulley 23 and downwardly therefrom. The lower end of rope 25 carries a heavy weight 24 which tends to pull carriage 22 towards the left end of bed 21. On the top face of carriage 22 a vise 30 is so mounted that its jaw-opening is longitudinally in the central vertical plane of the machine and preferably in alinement with rope 25. The rear side of carriage 22 has two tubular brackets 26 in which sliding bar 27 is adjustably mounted parallel to guides 21 and can be clamped to carriage 22 in selected longitudinal positions by means of screws 26*a*. On bar 27 are slidably mounted two gauge fingers 28 which can be clamped thereto in selected positions by means of screws 28*a*. Near the right end of bar 27 a stop finger 29 is slidably mounted thereon and may be clamped thereto in selected position by means of a screw 29*a*. Top plate 20 carries in front of and parallel to carriage 22 a rack 31 which has ratchet teeth inclined towards the left side. A bracket 32 on the front side of carriage 22 holds mounted on a pivot pin 32*a* a pawl 33 which is adapted to engage the teeth of rack 31. A horizontal balance bar 34 fastened in its middle portion to pin 32*a* carries on its left arm a slidable weight 35 which may be clamped thereto in selected position and which tends to press the front end of pawl 33 into engagement with the teeth of rack 31 and holds carriage 22 against movement towards the left side of the machine by the pull of weight 24 on rope 25.

Near the right end of the machine an electric motor 40 is so mounted on top 20 that the motor shaft 41 has its axis in the central plane of the machine, which passes also

between the jaws of vise 30. On the motor shaft at its working end is a chuck 42 and clamped therein a strong hook 43. Below the top 20 and between legs 20*a* (see Fig. 4) a main motor switch 44 is so mounted that it may be closed by depression of a pedal 45 and opened by tension spring 46. Near the rear right hand corner of top 20 a limit switch 50 is mounted and connected in series with the main motor switch 40 (see Figs. 3 and 4). The operating arm of switch lever 50*a* is arranged to lie in the path of stop finger 29 to be operated thereby for breaking the motor circuit while the main switch 50 is closed.

The operation of this machine to manufacture cylindrical twisted brushes is as follows:

The operator has at his disposal a plurality of stem wires 100 bent upon themselves in their middle portion hairpin like and of correct length for the brush to be made. He has also at his disposal bunches of brush material previously divided to be of equal and correct weight for the brush to be made. Assuming that the carriage 22 and vise 30 are in the position of Fig. 5, he places the looped portion of the wires on hook 43 and clamps their free ends a fixed distance between the jaws of vise 30. This distance is preferably indicated by a gauge line "*a*" on the jaws of vise 30. The wires are cut to be longer than the distance between hook 43 and vise 30 they will be loose and bent as shown in Fig. 5.

A bunch of brush material is now inserted transversely into the space between wires 100 and between the two pre-set gauge fingers 28.

The operator now presses upon the right arm of lever 34 (see Fig. 1) thereby releasing pawl 33 from rack 31 whereupon the carriage 22 is pulled towards the left by weight 24 and wires 100 are stretched to be parallel to and slightly spaced from each other clamping the brush material between them, as shown in Fig. 1.

The brush material is then adjusted to extend exactly from one gauge finger 28 to the other. The machine is then in the position illustrated in Fig. 2 and the twisting operation can begin.

It should be noted that twisting of the wires 100 reduces their whole length proportionally according to the number of turns given the wires and one turn more or less makes a noticeable difference in the length of brush. It should also be noted that at the high speed of twisting, particularly by motor driven machines of the type shown, generally 600 R. P. M., considerable attention and a sharp eye are required of the operator to promptly stop the twisting operation for obtaining brushes of equal length although for this purpose a third gauge finger was hereotofore provided at the normal right end of the brush to be made as indicated in dotted lines in Fig. 3 by 102.

For twisting the brush the operator steps on pedal 45, which closes switch 44 and as switch 50 remains closed starts motor 40 and twisting-spindle 41 which twists the wires 100 about each other and the brush material. As the length of the wires is reduced by the twisting operation the carriage 22 is gradually pulled towards the right against weight 24. The stop finger 29 being fastened to carriage 22 moves with the same and approaches towards switch lever 50*a*, which lies in its path and it is so set that it opens this switch lever and thereby stops motor 40 at the instant when the brush 101 has attained its correct length.

The brush can now be removed from the machine by opening the jaws of vice 30 and slipping the ring which has been formed by the twisting operation from hook 43. The pawl 33 which has moved with carriage 22 being pressed into rack 31 prevents the carriage from moving backward when vise 30 is opened and as the carriage 22 at the end of the operation is in the position shown in Figs. 3 and 5 a new operation may be begun immediately. In machines of the old type no means are provided to hold the carriage at any place and at the start of the operation the operator must pull the carriage into position and lift weight 24 for clamping wires 100 into vise 30 which requires time and strength.

Brushes produced by this improved machine have exactly the same number of twisted turns and are of equal length as long as the setting and wire thickness are not altered. As the free length of the wires 100 between vise 30 and hook 43 is equal and the distance traveled by the carriage is fixed and proportional to the number of twisting turns, all brushes must have an equal number of turns. This equality in the number of turns assures equal density of all brushes while in brushes made by the old type of machines in which the travel of the carriage is stopped by the operator the brush material is denser when the brush is shorter than normal, and looser when the brush is longer than normal.

It is thought that it will also be clear from the foregoing description that unskilled labor can produce brushes on this machine faster than skilled labor previously could produce them. In fact previously only skilled men should do this work by reason of constantly lifting the weight 24 while now unskilled women can do it and produce more and better brushes.

In Figs. 6 to 10 I have shown the application of the present invention to a belt driven machine without the use of electricity. All parts not shown in these figures and their operations are the same as in Figs. 1 to 5.

Twisting spindle 41 which holds chuck 42 and twisting hook 43 is mounted in bearings 60 and 60*a*. A pulley 61 driven by belt 62 and the cone 63 for a friction clutch 64 are loosely mounted on spindle 41. Friction clutch 64 is slidably mounted on spindle 41 but held in rotary engagement therewith by a feather key 64*a* and adapted to engage cone 63. Transversely to spindle 41 below the same a shaft 65 is mounted in bearings 66 and 66*a*. On shaft 65 is fixed a forked lever 67 provided with transverse pins 67*a* near the end of the fork, which pins engage an annular groove in the hub of clutch 64 to shift it on spindle 41 into engagement with cone 63 by an angular movement of shaft 65. Near the rear bearing 66*a* lever 68 is fixed on shaft 65. This lever has two arms of which the right one 68*a* is pulled downward by tension spring 69 which turns the left arm 68*b* clockwise and upward. Adjacent to lever 68 another two armed lever 70 is loosely mounted on shaft 65 which also has its right arm 70*a* pulled down by a tension spring 71 and its left arm 70*b* connected by a rod 72 to pedal 45. The hub of lever 70 has a horizontal pin-like projection 70*c* which is capable of angular movement within a segmental notch 68*c* in the hub of lever 68. Parallel to shaft 65 a pivot pin 75 is suitably mounted which carries a hooked pawl 73 rotatably thereon. This pawl tends to move clockwise through an arc limited by stop-pin 74 and which is adapted to engage and hold arm 68*b*. A tail extension 73*a* of this pawl lies in the path of stop finger 29 which in this case is provided with an adjusting screw 29*b*. This driving and tripping device operates as follows:—

To start the twisting operation the operator presses pedal 45 which turns lever 70, counter-clockwise and projection 70*c* on this lever within segmental notch 68*c* until the position shown in Fig. 10 is reached and lever 68 is engaged and also turns counter-clockwise with shaft 65 to which it is fixed. Pawl 73 is then lifted by arm 68*b* as shown in Fig. 11 and simultaneously fork 67 pushes clutch 64 into engagement with cone 63 which starts the twisting operation. By further downward movement of pedal 45 and lever 70 pawl 73 falls into the position shown in Figs. 9 and 12, locks lever 68 against the pull of spring 69 and holds shaft 65 and clutch 64 tightly pressed against cone 63. Upon the release of pedal 45 spring 71 returns lever 70 with pin 70*c* to its initial position but clutch 64 remains in engagement with cone 63 and the twisting operation continues until screw 29*b* on stop finger 29 presses against the tail extension 73*a* of pawl 73, turns this pawl counter-clockwise and releases its engagement with arm 68*b*. Spring 69 becomes active hereby and turns lever 68 with shaft 65 and fork 67 clockwise, whereby friction clutch 64 is released from cone 63 and the rotation of twisting spindle 41 is stopped.

The result thus obtained by mechanical means is exactly the same as before described by cutting the current of the electric motor 40 by means of the limit switch 50. It is also quite evident that the friction clutch 64 can be replaced by a magnetic clutch the current of which may be controlled in the same manner as the current for motor 40.

While I have thus described a preferred and a modified form of my invention it shall be understood that such other modifications may be made in the arrangement of parts and in the construction as come within the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine for making twisted brushes a bed, a carriage movable longitudinally of said bed, a twisting spindle near one end of said bed, wire-holding means at one end of said spindle and other wire-holding means fixed to said carriage, said wire holding means being in axial alinement with each other and with said spindle, said carriage being adapted to approach said spindle when a pair of wires held by said holding means are twisted about each other by the rotation of said spindle, electric means controlled by the operator to start rotation of said spindle and other electric means actuated by said carriage to stop said rotation independently of the operator when the carriage has travelled a predetermined distance.

2. In a machine for making twisted brushes having a twisting spindle and a carriage movable towards and away from said spindle, wire holding means on said spindle and on said carriage, means to rotate said spindle for twisting wires between said carriage and said spindle, said carriage being drawn towards said spindle by the twisting operation, brush material interposed between said wires, a tripping device operated by said carriage for stopping the rotation of said spindle instantly, and an adjustable gauge movable with said carriage to indicate the position of the brush material relative to the ends of said wires.

3. In a machine for making twisted brushes in combination, a bed, a carriage movable longitudinally of said bed, an electric motor at one end of said bed, wire holding means at one end of the motor axis and other wire holding means on said carriage for twisting wires therebetween, a motor-starting switch controlled by the operator and a limit switch adapted to stop said motor after a predetermined number of twisting turns.

4. In a machine for making twisted brushes in combination, a bed, a wire support movable longitudinally of said bed, a twisting

spindle at one end of said bed, electromagnetic means for rotating said spindle, wire holding means on said support and on said spindle for twisting wires therebetween, a switch for passing current through said electromagnetic means to start rotation of said spindle, and a second switch operated by said carriage for stopping said current.

5. In a machine for making twisted brushes having a bed, a twisting spindle, means to rotate said spindle, a carriage on said bed, wire holding means on said spindle and on said carriage for twisting wires about each other between said holding means by the rotation of said spindle, said carriage being moved towards said spindle by the twisting of said wires, brush material between said wires, means drawing said carriage normally away from said spindle and means to hold said carriage stationary when twisted wires are removed from said holding means and a gauge to indicate the initial position of said brush material from each of said wire holding means.

6. In a machine of the kind described a pair of parallel guides a wire support movably mounted on said guides, a twisting spindle parallel to said guides at one end thereof electrically operated means for rotating said spindle, means for holding a wire loop on said spindle and means for clamping wires on said support in alinement with each other for twisting wires between said clamping means and said spindle, means for locking said wire support to said guides, tension means for stretching the wires during the twisting operation permitting said carriage to travel towards said spindle, means holding said carriage against reversal of its movement, an operator's switch for starting said electric operation and a limit switch for stopping said operation independently of the operator.

7. In a machine of the kind described a bed, a twisting spindle at one end of said bed, electric means to rotate said spindle, a carriage mounted on said bed to travel towards said spindle by twisting wires fastened to said carriage and rotated by said spindle, a switch controlled by the operator to start rotation of said spindle and a second switch to stop said rotation and means on said carriage to operate said second switch when said carriage has travelled a predetermined distance.

Signed at Brooklyn, in the county of Kings and State of New York this 24th day of April A. D. 1930.

HARRY HERTZBERG.