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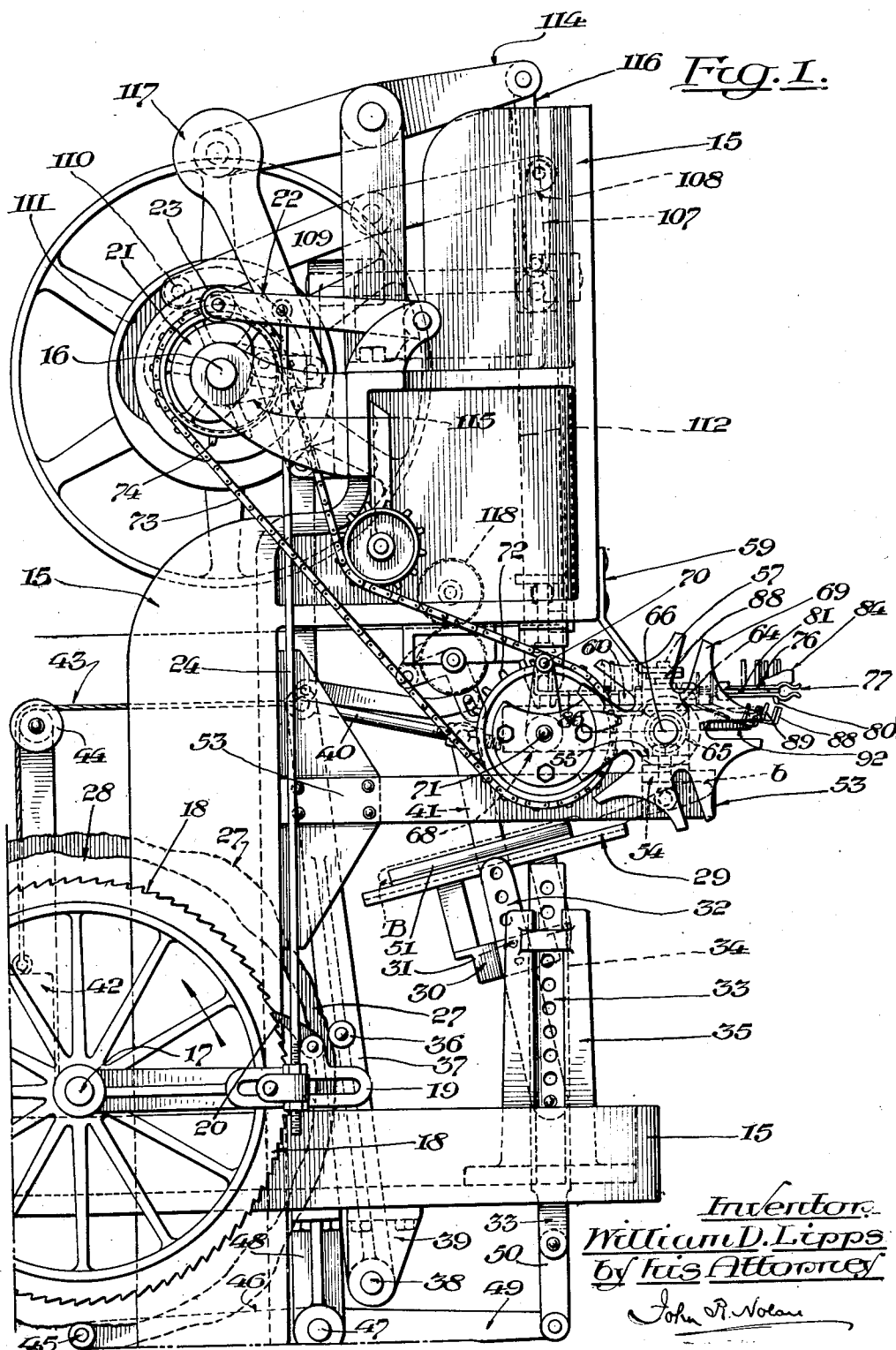
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BRUSH MAKING MACHINE

Filed May 7, 1938

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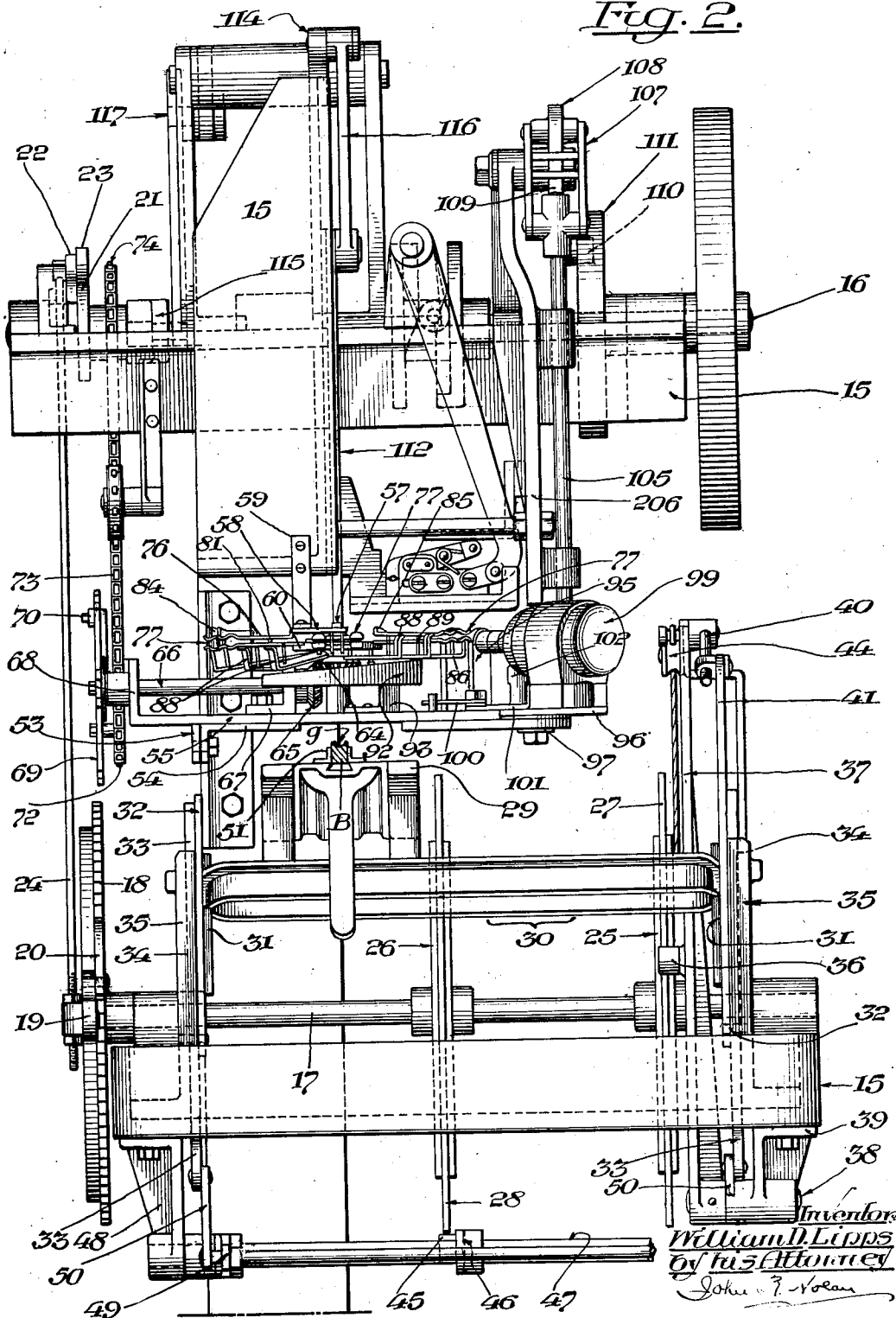
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Fig. 2.



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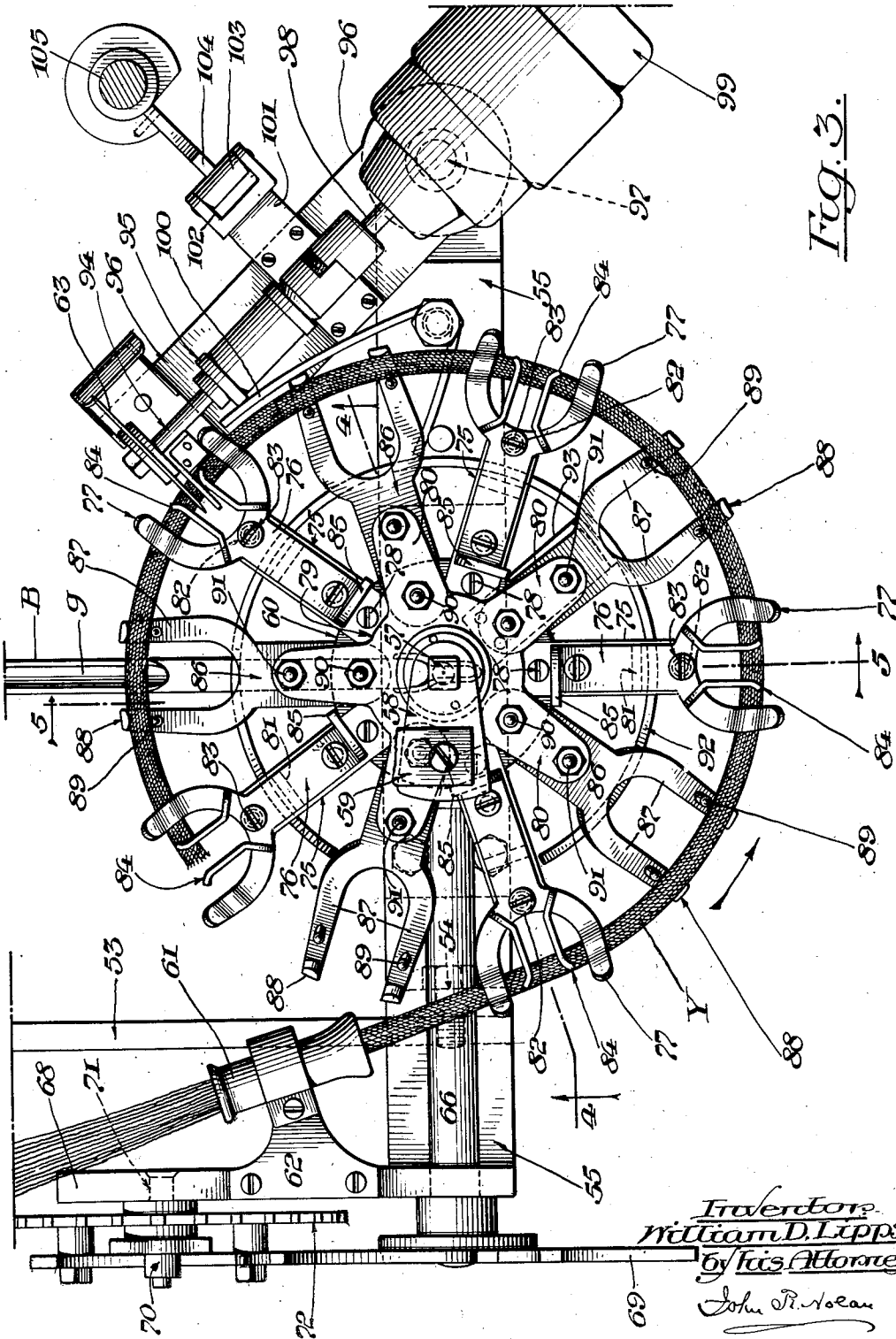
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BRUSH MAKING MACHINE

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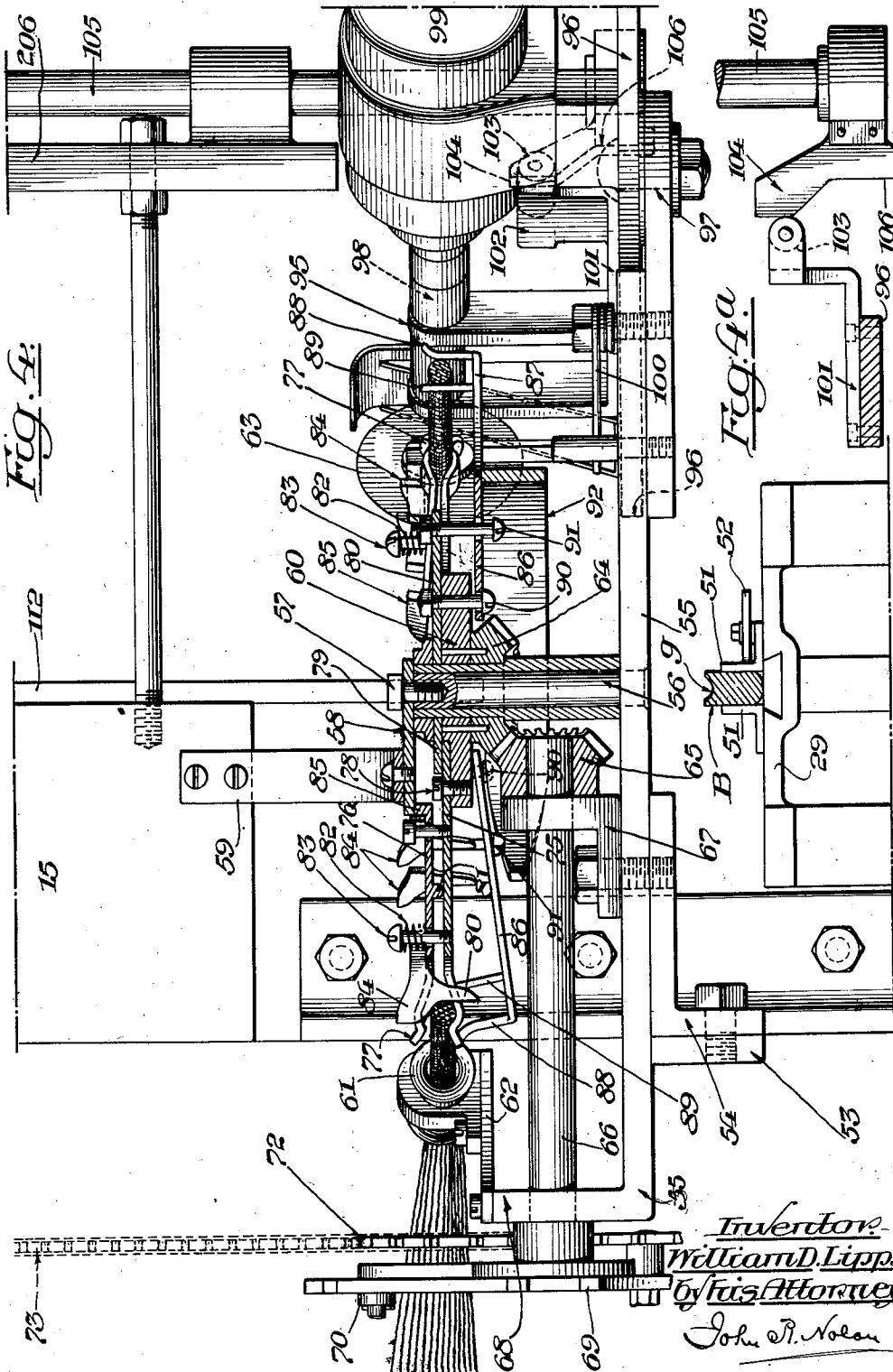
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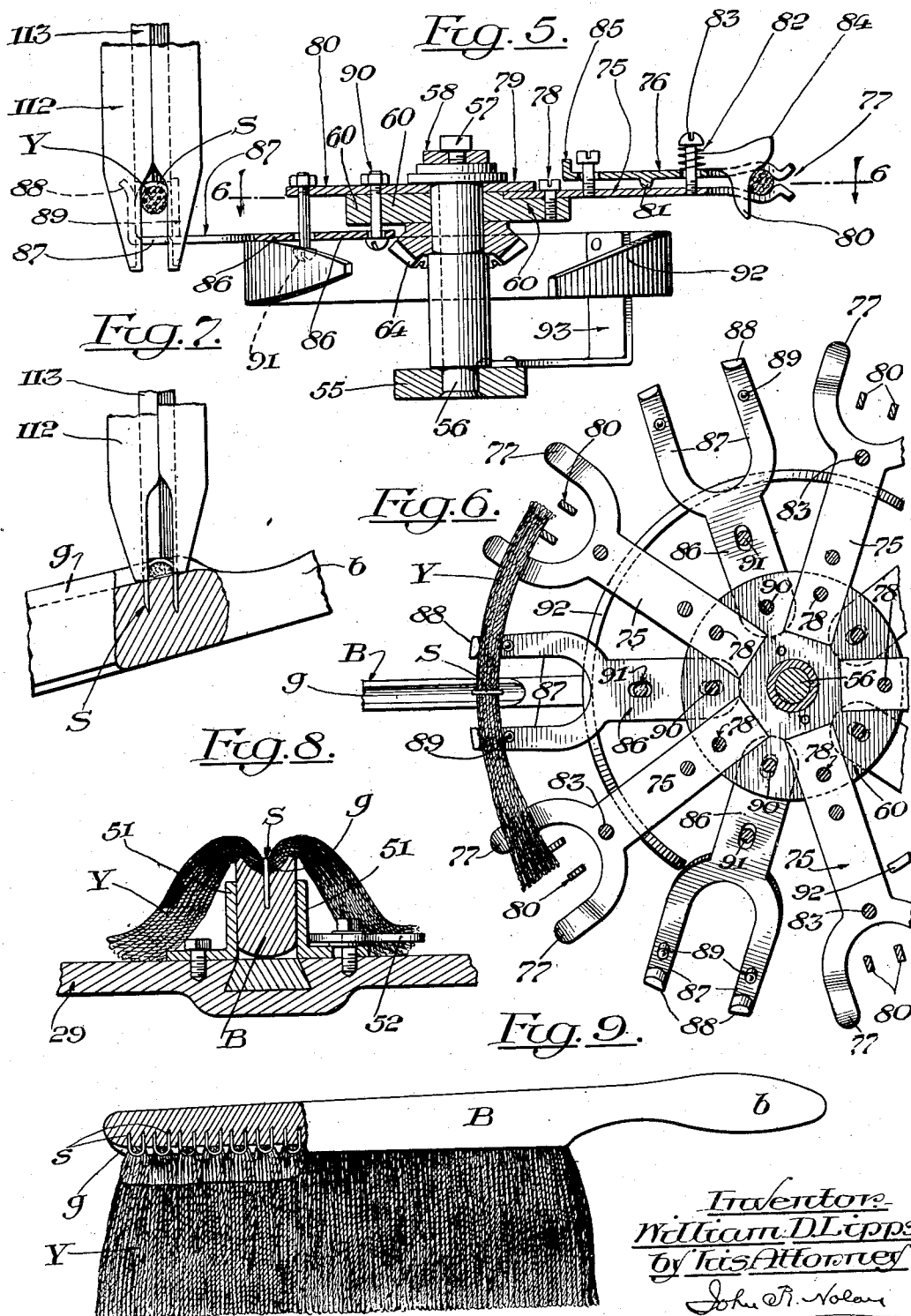
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UNITED STATES PATENT OFFICE

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BRUSH MAKING MACHINE

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Application May 7, 1938, Serial No. 206,574

8 Claims. (Cl. 300-4)

This invention relates to brush making machines, having reference more especially to mechanism for the production of an elongated mop-like brush, or a "duster", of the type wherein a succession of bunches of relatively long strands of yarn or other suitable soft fibrous material are attached midway of their ends to, and transversely of, the lower edge of an elongated brush back so as to depend in close folded relation throughout the length of the back, or substantially so.

Mechanism embodying my invention is especially, though not exclusively, adapted to be used in connection with or as an attachment to brush machines of the kind illustrated in Letters Patent of the United States No. 578,907, dated March 16, 1897, and No. 664,989, dated January 1, 1901, to which reference may be had.

In the preferred embodiment of my invention, the mechanism herein illustrated comprises means whereby plural strands of yarn, drawn from spools or the like, are laid in parallelism, advanced step-by-step and progressively severed in uniform lengths, and means whereby each succeeding length is fastened intermediate its ends to and transversely of a suitably supported brush back.

The invention also comprises novel features of construction and combinations of parts which will be hereinafter described; the scope of the invention being expressed in the appended claims.

In the drawings—

Figure 1 is a side elevation of a portion of a brush machine embodying the principle of my invention.

Fig. 2 is a front elevation of the same.

Fig. 3 is a plan of an intermittently rotatable yarn clamping and guiding reel, and cutting mechanism in cooperative relation thereto, the cutter being shown in severing position preparatory to the fastening of a measured length of yarn to an underlying brush back.

Fig. 4 is a transverse vertical section through the reel and adjuncts, as on the line 4-4 of Fig. 3.

Fig. 4a is a sectional detail of a cam and contacting roll for actuating the cutter supporting bed.

Fig. 5 is a vertical section, partly in elevation, through the reel adjacent the staple former and driver, as on the line 5-5 of Fig. 3.

Fig. 6 is a horizontal section through the reel, as on the line 6-6 of Fig. 5, showing a measured

quantity of yarn as positioned above a brush back.

Fig. 7 is a sectional detail of the brush back and the acting portion of the staple former and driver, showing the yarn as stapled to the brush back.

Fig. 8 is a transverse vertical section through the brush back and its support, showing the stapled yarn.

Fig. 9 is a side elevation, partly in section, of a yarn brush or "duster" such as produced by the machine.

Referring to the drawings, 15 designates the main supporting frame, and 16 the drive shaft of a brush machine. 17 designates a lower transverse shaft which is intermittently driven through suitable connections with the main shaft, substantially as shown and described in Patent No. 664,989 aforesaid. Such connections as herein shown include a ratchet wheel 18 fast on the shaft 17, a rock arm 19 bearing a pawl 20 in engagement with the teeth of the ratchet wheel, a cam 21 on the shaft 16, an adjacent rock arm 22 having a roll 23 in contact with the cam, and a rod 24 connecting the two rock arms. The shaft 17 has fast thereon spaced wheels 25 and 26 having peripheral pattern cams 27 and 28, respectively, which determine the succeeding movements of the mechanism for controlling the operating positions of the table 29 on which the brush back B is removably supported.

In the machine disclosed in Patent No. 664,989, two juxtaposed tables are employed, one of which is adapted to support a brush back and present it at different angles to a vertically reciprocative boring tool which is effective to form suitably arranged tuft-receiving holes in and throughout the upper surface of the back, and the other of which tables is adapted to receive the bored back and similarly present it to the effective path of staple forming and driving mechanism which is operative to insert bunches of fibre, in tuft form, in the respective holes of the back and staple the tufts therein.

In the present machine a single table 29, which is arranged below and in cooperative relation to the staple forming and driving mechanism, is employed, since the pre-boring of the brush back is not required in the production of the present brush. This table is supported on a rectangular frame 30 which is fixed, as at 31, to a depending frame 32, pivoted at its lower end to two vertical slides 33 which are mounted in guides 34 in two stationary standards 35. Thus the table is movable forward and back about the axis of the

pivoted frame, and is also vertically movable with the slides, in order that a brush back on the table may be properly positioned to receive the yarn and the staples.

- 5 The mechanism for imparting the longitudinal and vertical movements to the table and the brush back thereon is generally similar to the mechanism for that purpose described in Patent No. 664,989, it being noted that in the latter, 10 mechanism is provided to impart a to and fro sidewise motion to the table or back, which mechanism is absent from and is not necessary in the present machine.

- In the construction illustrated herein the cams 15 27 of wheel 25 control the forward and back motion of the table. These cams act on the roll 36 of an upstanding lever 37 which is fulcrumed on a stud 38 that is supported in a depending bracket 39 on the main frame. The upper 20 end of the lever 37 is connected by means of a link 40 with an up-standing arm 41 which is secured at its lower end to the pivoted frame 32. The lever 37 is held in operative contact with the cams 27 by means of a weight 42 which is 25 suspended from a cable 43 that runs over a suitably supported sheave 44 and is connected with the upper end of the lever 37. During the rotation of the cam wheel 25 its cams intermittently move the table 29 forward or backward 30 step-by-step corresponding with the succeeding longitudinal movements to be imparted to the brush back.

- The cams 28 of wheel 26 control the vertical 35 movement of the table. These cams act on the roll 45 of a rearwardly extending lever arm 46 fast on a transverse shaft 47 having its bearings in brackets 48 depending from the main frame. The shaft 47 has secured thereto, adjacent its 40 respective ends, forwardly extending lever arms 49 which are connected by means of links 50 with the respective slides 33. During the rotation of the cam wheel 26 its cams intermittently raise the table in timed relation to its forward or back motion.

- In pursuance of my invention the table 29 is 45 provided with a pair of spaced flanged plates 51, one of which is fixed and the other is laterally movable relatively thereto, a suitable locking lever 52 for the latter being provided. These 50 plates constitute an elongated holder or gripper adapted to support a relatively long and narrow brush back, B, having at one end an outwardly extending handle portion b. The back has formed in its upper edge a longitudinal groove or recess 55 g across which are adapted to be arranged in close relation to each other succeeding bunches of yarn Y of uniform length, each bunch being then medially seated in the recess and secured to the base by means of a single staple, S, whereof 60 the legs straddle the yarn and are driven down into the back, as will presently appear.

- The purpose of raising the brush back B is to position directly in the vertical path of the staple 65 each succeeding part of the back on which a length of yarn is to be seated and secured, and the purpose of inclining the back during its intermittent movement is to ensure the proper insertion of the staple thereinto, astride the yarn length, 70 without obstruction by the next previously applied length of yarn, in that the loose ends of the latter depend in angular relation to the inclined back.

- Fixed to the standard of the main frame 15 is a horizontal frame structure comprising a rear- 75 wardly extending bar 53 to the free end of which

is bolted a bracket 54 upon which is supported one end portion of a transversely extending bar 55. The latter bar has affixed thereto a post 56 to the top of which is secured, as by a screw 57, a radially extending bar 58, which constitutes a cam member, as will presently appear. This member is supported at its outer end by a suitably located angle piece 59 which is fastened to an adjacent part of the main frame.

Upon the post 56 is mounted the hub or base 60 of an intermittently rotatable yarn clamping and releasing reel to which a plurality of closely associated strands of yarn Y, taken from suitable spools or other source of supply, are tangentially directed by means of a tubular guide 61 that is conveniently supported by a bracket 62 on the cross-bar 55 of the frame structure. The reel in its intermittent movement advances and guides the yarn a measured distance beyond the path of a swinging rotary cutter element 63 2 and transversely across the underlying brush back B, so that when the leading portion of the yarn is severed by the cutter a determined length of material is in proper position to be medially 2 stapled directly to the brush back.

Any suitable means for intermittently actuating the reel may be employed. The means herein illustrated includes a bevel gear 64 fast on the hub or base 60 of the reel and in mesh with a similar gear 65 fast on the inner end of a horizontal shaft 66 having its bearings in a bracket 67 on the cross-bar 55 and in the angular member 68 of the latter. Fast on the outer end of this shaft 66 is the driven member 69 of a Geneva stop motion, the driver 70 therefor being fast on a stud shaft 71 projecting from the angular frame member 68. The stud shaft 71 is provided with a sprocket wheel 72 which is connected by means of a chain 73 with a similar wheel 74 on the main drive shaft 16. Thus motion is transmitted from the latter shaft to the Geneva element, thence through the shaft 66 and bevel gearing 64, 65 to the reel.

In the present instance the reel includes a series of spaced radial clamping elements and a series of similarly spaced radial guiding elements alternating with those of the other series, the whole being mounted on and turnable with the base 60, as seen in Figs. 3 and 4.

Each of the clamping elements includes two 50 arms 75 and 76, one being superposed on the other and each arm being similarly bifurcated and shaped at its outer end to provide complementary gripping jaws 77 for the associated fibrous strands delivered therebetween as previously mentioned. The inner end of the lower arm 75 is seated in recesses in the base or hub 60 and is secured in place, as by screws 78. A cap plate 79 having radial projections 80 alternating with the guiding elements is fixed to the base so as to overlie the inner ends of the arms 75. Each of the upper arms 76 is provided between its ends with a bottom projection 81 which is rockably seated on the companion fixed arm 75. The outer end of the arm 76 is urged normally to clamping position by the action of a suitably-disposed spring 82 against the head of a screw 83, which, rising from the lower arm, extends freely through an opening in the upper arm. The outer bifurcated portion of the arm 76 is provided with a pair of spaced vertically-disposed fingers 84, the lower portions 80 of which depend between the outer members of the adjacent arm 75. These fingers are shaped and positioned to afford an efficient backing for the 75

yarn which is interposed between the respective gripping jaws. The inner end of each arm 76 is provided with an upstanding angular flange 85 which in the intermittent rotation of the reel, impinges against and rides under the stationary cam 58 hereinbefore referred to, thus depressing the flanged end and raising the outer end of the arm 76 in a manner to open the gripping jaws. When the flange escapes the presser cam 58 the jaws are closed by the action of the spring 82 on the upper jaw. This cam is so disposed in respect to the path of rotation of the reel that the jaws are first opened for the entry of the yarn therebetween, and then closed to grip the yarn upon the initial step of the reel.

Each of the guide elements alternating with the clamping elements comprises an arm 86 which is bifurcated at its outer end to provide a pair of spaced members 87, whereof the free ends are formed with up-standing fingers 88 outwardly flared at their upper ends. Parallel pins 89 are affixed to the members 87 in spaced relation to the respective fingers 88. The companion fingers and pins perform the function of guides for the associated strands of yarn as they pass about the reel from gripper to gripper. The intermittent travel of the reel is such that at the end of each step thereof, one of the gripper elements is positioned to receive and grasp the yarn which has been directed thereto by the tubular guide 61. The yarn thus gripped is advanced step by step by the reel until the leading portion of the yarn overlies the brush back which is supported on the table 29, the trailing portion of the yarn being held and guided at spaced intervals by the alternating grippers and guides, respectively. Each step of the reel advances the yarn a determined distance corresponding with the length of yarn to be applied to the brush back. When at the end of each step the leading portion of the yarn is properly positioned across the brush back, such portion is severed from the body of the yarn by the cutter 63 as will presently appear.

The arm 86 of each guide element is loosely supported at its inner end, for limited vertical movement, on the lower end of a bolt 90 which depends from the base 60 of the reel. An adjacent bolt 91, depending from the proximate projection 80 of the cap plate 79, extends freely through an opening in the arm 86 thus serving to steady and guide the arm in its vertical movement. This arm is maintained in down position, with its guide members free from the yarn, during and for a short interval of time after the delivery of the yarn through the guide tube 61 to each succeeding gripper and guide element. The arm is then elevated to its guiding position and retained therein until such gripper and guide elements have progressed to the yarn receiving position. The periodical raising and lowering of the guide elements is effected and controlled by a stationary segmental cam 92 which is located below and concentric with the reel. This cam 92 is affixed to an angular bracket 93 on the cross-bar 55 of the frame structure. The upper or acting edge of the cam is so disposed that in each rotation of the reel the cam intercepts the successive arms 86 and raises them to active position, maintaining the arms thus raised until they progress to and enter the gap between the ends of the cam. Thereupon the arms 86, sinking, withdraw the guide members to idle position in order to ensure the unobstructed delivery of the yarn to the gripper jaws of the reel.

The space between the centers of the guide

fingers 84 of the adjacent gripping jaws 77 determines the length of the leading portion of the yarn to be severed, and hence when one of the bifurcated guide members overlies the brush back, it supports the midportion of the length of yarn, 5 while the ends of the length are held by the adjacent grippers, as seen in Fig. 3. The center of the gripper at the right or rear side of the brush back is in line with the path of the cutter 63, and, therefore, when the cutter is swung radially inward it passes between the backer fingers of such gripper and efficiently severs the determined length from the leading end of the yarn.

In the present instance a rotary discal cutter is employed. This cutter is fast on one end of a 15 horizontal spindle 94 which is mounted in a bearing 95 supported on a bed plate 96 that is pivoted, as at 97, to the cross-bar 55 of the frame structure. The spindle 94 is in axial alinement with and is coupled to the shaft 98 of an electric 20 motor 99 which is supported on the pivoted bed plate, thus rapidly and constantly rotating the cutter. The plate 96 and its appurtenances, including the cutter, are held normally outward and away from the reel by means of a suitably-disposed spring 100 which is secured to the bar 55.

Fast on the bed plate is an angular arm 101 having a bifurcated end portion 102 on which is mounted a roll 103 which is held in contact with a stationary inclined cam 104 fast on the 30 foot of a vertically movable rod 105, whereby when the rod is lowered the bed plate is forced inward by the action of the cam 104 against the roll 103, thereby causing the cutter to sever the yarn. When the rod 105 is thereafter raised the 35 spring retracts the bed plate and its appurtenances, including the cutter, the outward movement of the whole being limited by the contact of the roll 103 with the lower vertical face 106 of the cam.

The rod 105, which is mounted in suitable guides on a supporting bar 206 bolted to the upper portion of the main frame, is vertically reciprocated in timed relation to the movements 45 of the brush table 29 similarly to the boring spindle in the machine disclosed in Patent No. 578,907; that is to say, the upper end of the rod 105 is connected by means of a link 107 with one arm 108 of a lever which is pivoted to the main frame, the other arm 109 of the lever being provided with a roll 110 which runs in the race of a 50 face cam 111 on the main shaft.

The staple forming and driving mechanism herein illustrated is similar to the mechanism for that purpose disclosed in Patent No. 578,907, and 55 therefore need not be herein particularly described. Such mechanism includes vertically movable slides 112 and 113 one within the other, which in each successive downward stroke are relatively operated to form a wire staple, S, and in conjunction therewith to straddle the underlying length of yarn directly above the grooved surface g of the brush back and thereby staple the yarn in the back, as previously mentioned. 60 See Figs. 5, 7 and 8. The mechanism for operating the slides includes a rock lever 114 which is connected at its ends with the slides and with a crank-arm 115 on the shaft 16 by means of links 116 and 117, respectively. The means for feeding the wire to the staple forming and driving 70 mechanism may be of any conventional form, such, for example, as a pair of intermittently actuated feed wheels 118 of the character described in Patent No. 578,907, aforesaid.

It is to be understood that my invention is not 75

limited to the particular construction disclosed, as the mechanism may be modified within the principle of the invention and the scope of the appended claims.

5 I claim—

1. In a brush making machine, means for supporting an elongated brush back, means including a reel having spaced peripheral clamps for successively advancing yarn a determined distance
10 and positioning each succeeding leading length of yarn upon and across the said brush back in spaced relation, means for supplying the yarn tangentially to the reel, means for severing from the body of the yarn each succeeding length when it is clamped on the reel and positioned across the brush back, and means for fastening each length intermediate its ends to the brush back and with the ends extending beyond the respective sides of the brush back.
- 20 2. In a brush making machine, means for supporting an elongated brush back, means comprising a rotatable element having peripheral clamping and guiding members for grasping and advancing yarn in measured lengths and positioning each succeeding leading length across a brush back in spaced relation, means for severing from the body of the yarn each succeeding leading length, and means for fastening each length intermediate its ends to the brush back.
- 25 3. In a brush making machine having a longitudinally and vertically-movable brush-back supporting table, means comprising a rotatable element having peripheral clamping and guiding members arranged in alternation for grasping and advancing yarn in measured lengths and positioning each succeeding leading length across a brush back on the table in spaced relation, means for severing from the body of the yarn each succeeding leading length, and means for fastening each length intermediate its ends to the brush back.
- 30 4. In a brush making machine having a longitudinally and vertically-movable brush back supporting table, means for actuating said table, means comprising a rotatable element having peripheral clamping and guiding members arranged in alternation for grasping and advancing yarn in measured lengths and positioning each succeeding leading length across a brush back on the table in spaced relation, means for intermittently rotating said element and for actuating its clamping and guiding members in timed relation to the table, means for severing from the body of the yarn each succeeding leading length when it is positioned across the brush back, and means for fastening each length intermediate its ends to the brush back.
- 35 5. In a brush making machine, a measuring reel including peripheral yarn clamping and guiding elements arranged in alternation, means for supplying yarn tangentially to said elements, means for intermittently rotating said reel whereby the yarn supplied thereto is successively advanced a determined distance, means for severing from the body of the yarn each succeeding lead-

ing length thereof which is held by two adjacent clamping elements and supported by the intervening guiding element, and means for periodically opening and closing the clamping elements during the rotation of the reel.

6. In a brush making machine, a measuring reel including radial yarn clamping and guiding elements arranged in alternation, each of the clamping elements including relatively movable jaws, and each of said guiding elements including an upstanding fixed guide member and a relatively movable guide member spaced therefrom, means for intermittently rotating the said reel, means for feeding yarn to the clamping and guiding elements, means for severing each succeeding leading portion of the yarn while it is held between the jaws of two clamping elements and supported by and between the guide members of the intervening guiding element, and means for periodically opening and closing the said jaws and for actuating the movable guide member in timed relation to the severing means during the rotation of the reel.

7. In a brush making machine, a measuring reel including equally-spaced peripheral clamping elements, each including two pairs of complementary gripper jaws and a pair of spaced backer members therebetween, means for intermittently rotating said reel, means for progressively supplying yarn to the clamping elements, means for severing each succeeding leading portion of the yarn while it is held between the jaws of two clamping elements, said severing means including a cutter movable across the path of the yarn and between the backer members of the clamping element which holds the trailing end of such leading portion, and means for periodically opening and closing the gripper jaws in timed relation to the cutter during the rotation of the reel.

8. In a brush making machine, a measuring reel including equally-spaced peripheral clamping and guiding elements arranged in alternation, each of the clamping elements including two pairs of relatively movable complementary jaws and a pair of spaced backer members therebetween, and each of said guiding elements including a pair of spaced supporting members having fixed and relatively movable guide members, means for intermittently rotating the said reel, means for feeding yarn to the clamping and guiding elements, means for severing each succeeding leading portion of the yarn while it is held between the jaws of two clamping elements and supported by and between the guide members of the intervening guide element, said severing means including a cutter movable across the path of the yarn and between the backer members of the clamping element which holds the trailing end of such leading portion, and means for periodically opening and closing the said jaws and for actuating the movable guide members in timed relation to the cutter during the rotation of the reel.

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