No. 851,916. PATENTED APR. 30, 1907.

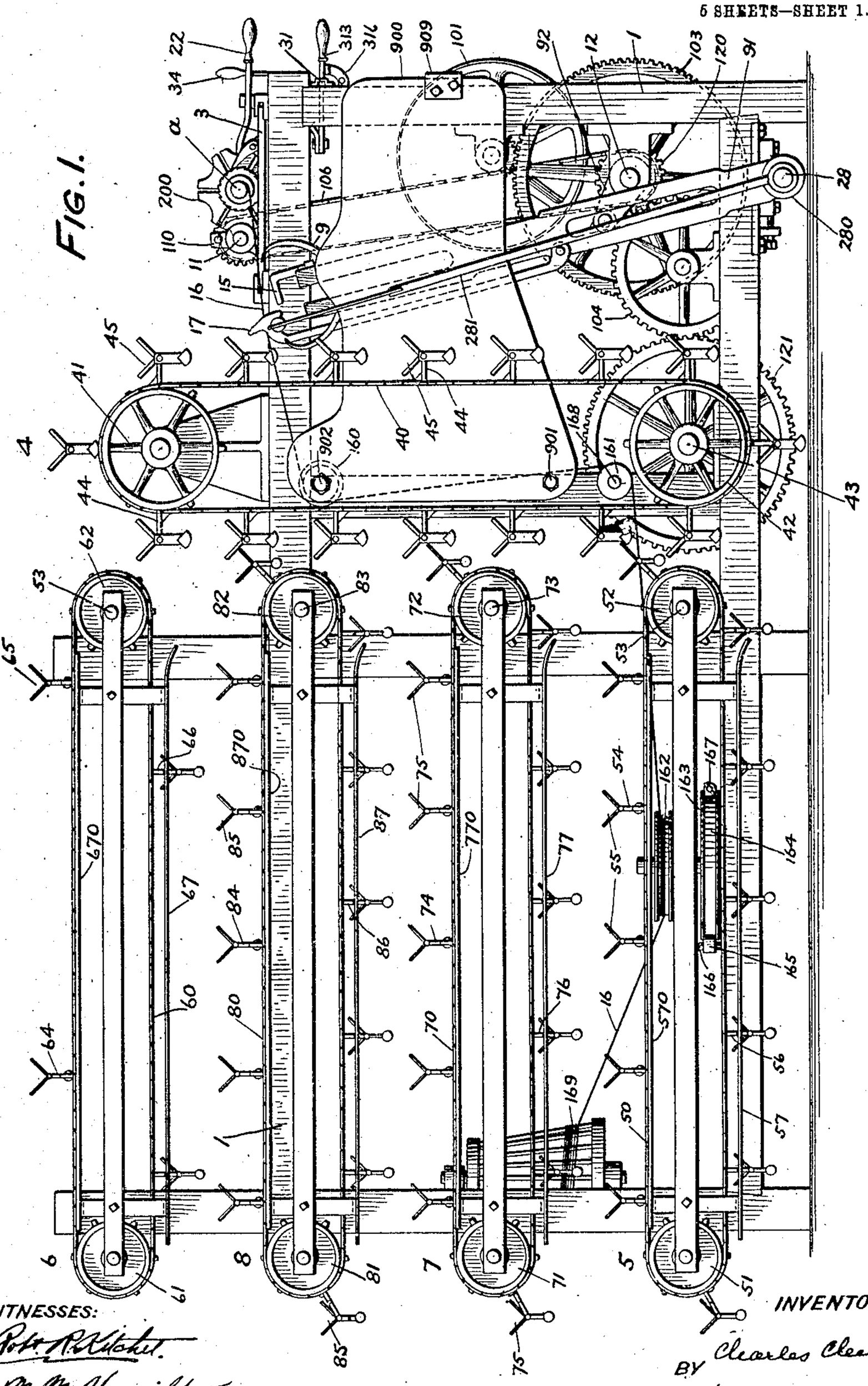
C. CLEMENS.

BROOM MACHINE.

APPLICATION FILED AUG. 7, 1906.

6 SHEETS—SHEET 1.

FIG. 1.



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6 SHEETS—SHEET 2.

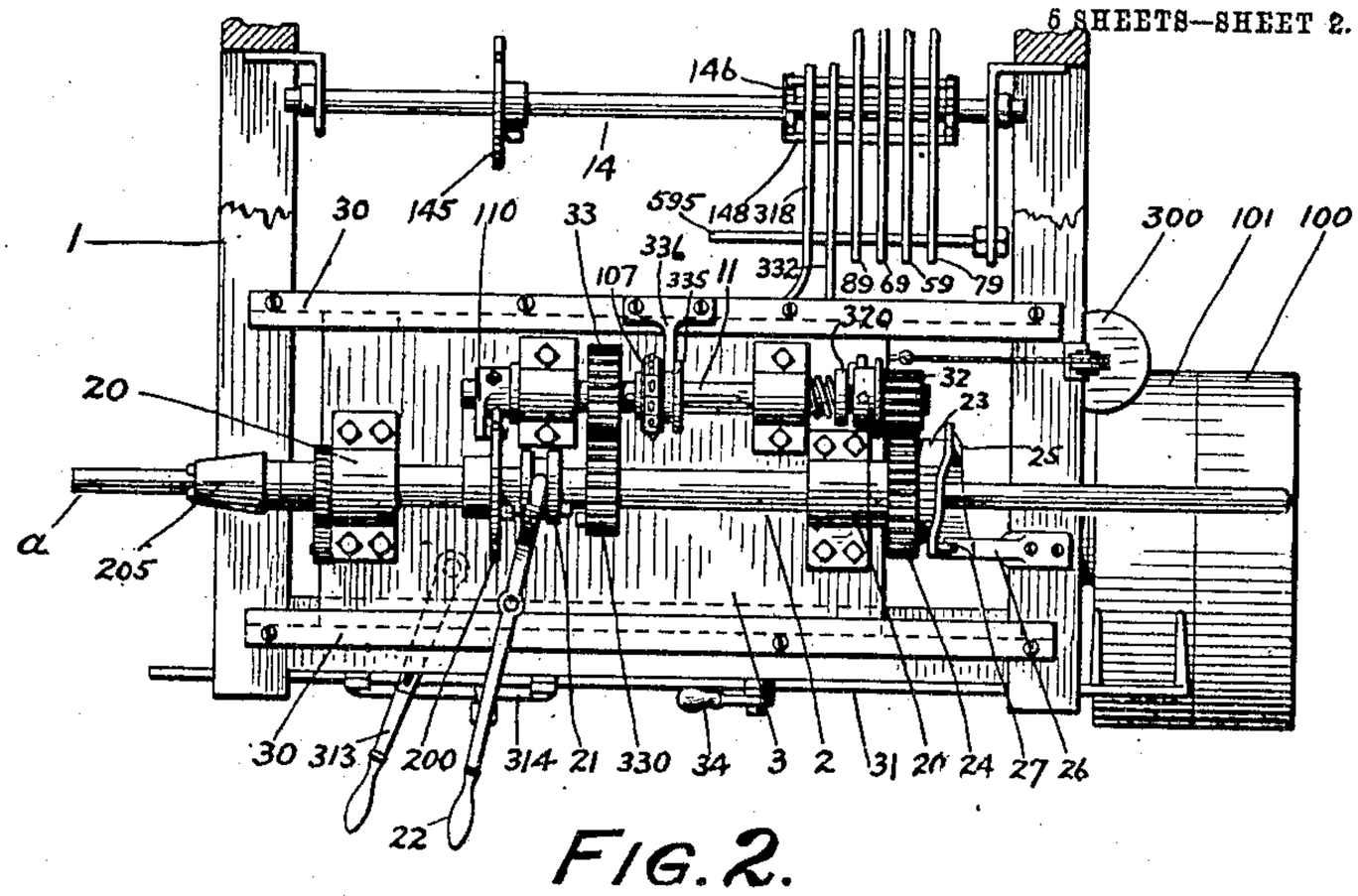

FIG. 2.

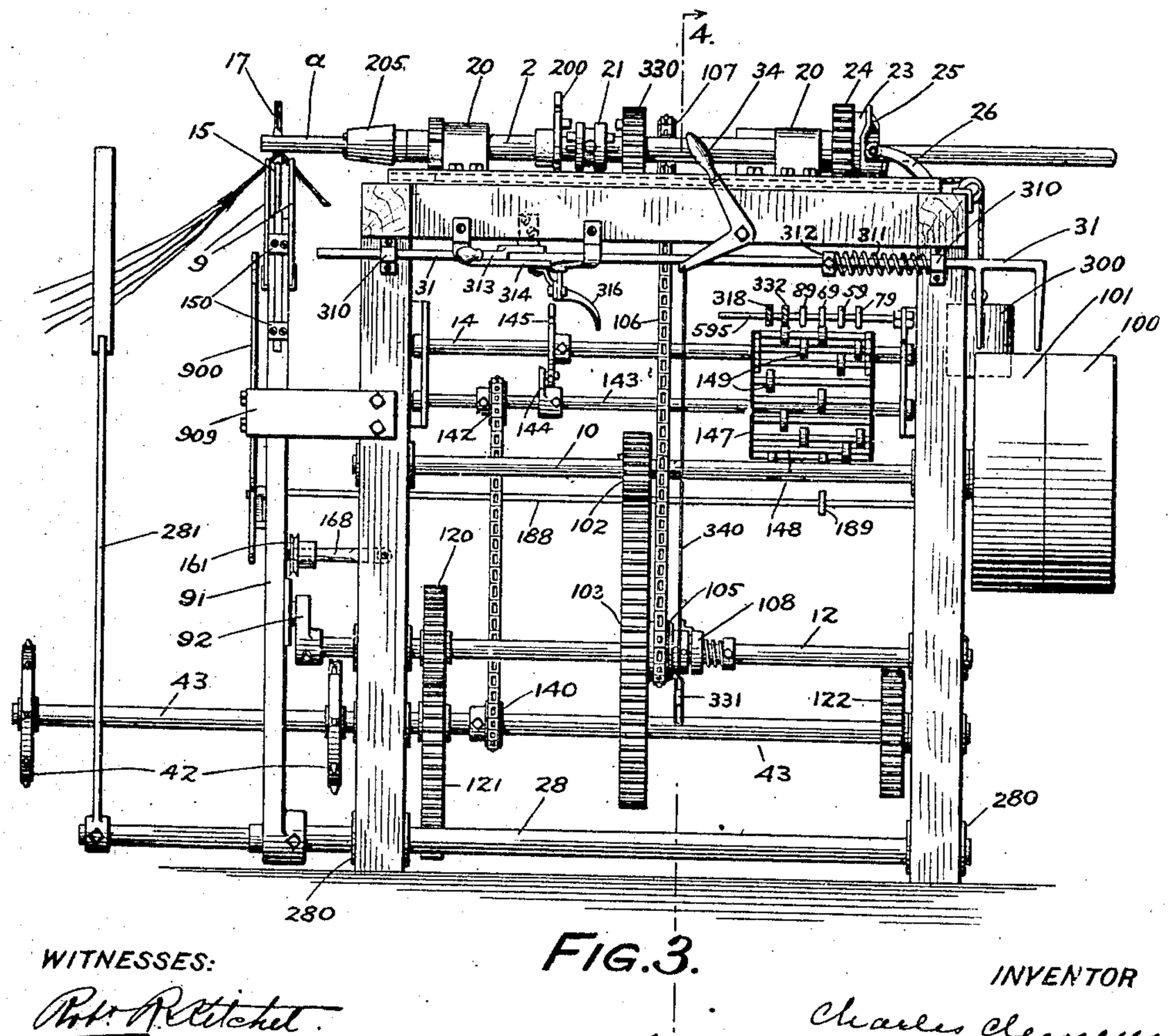

FIG. 3.

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5 SHEETS—SHEET 3.

FIG. 4.

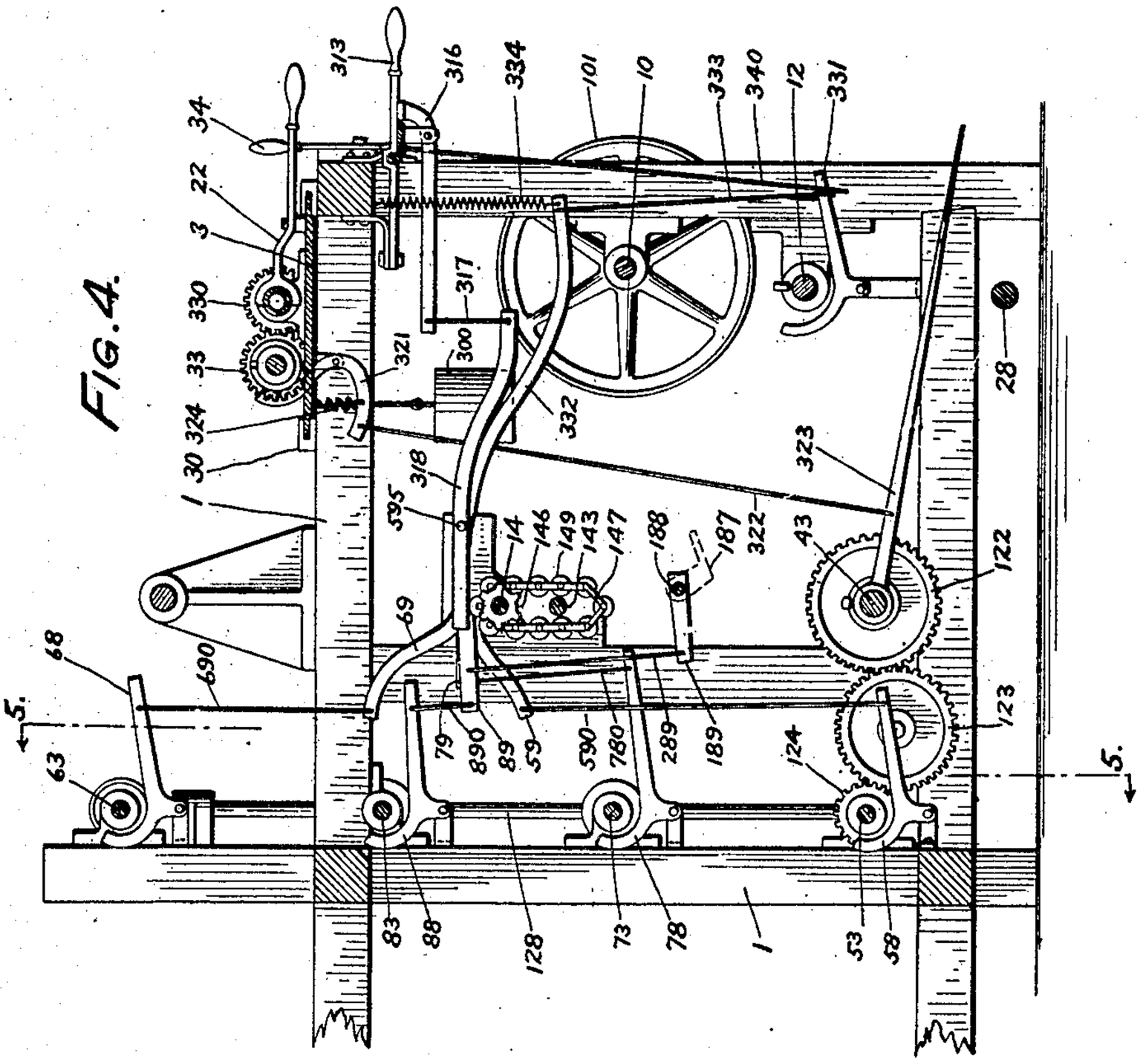
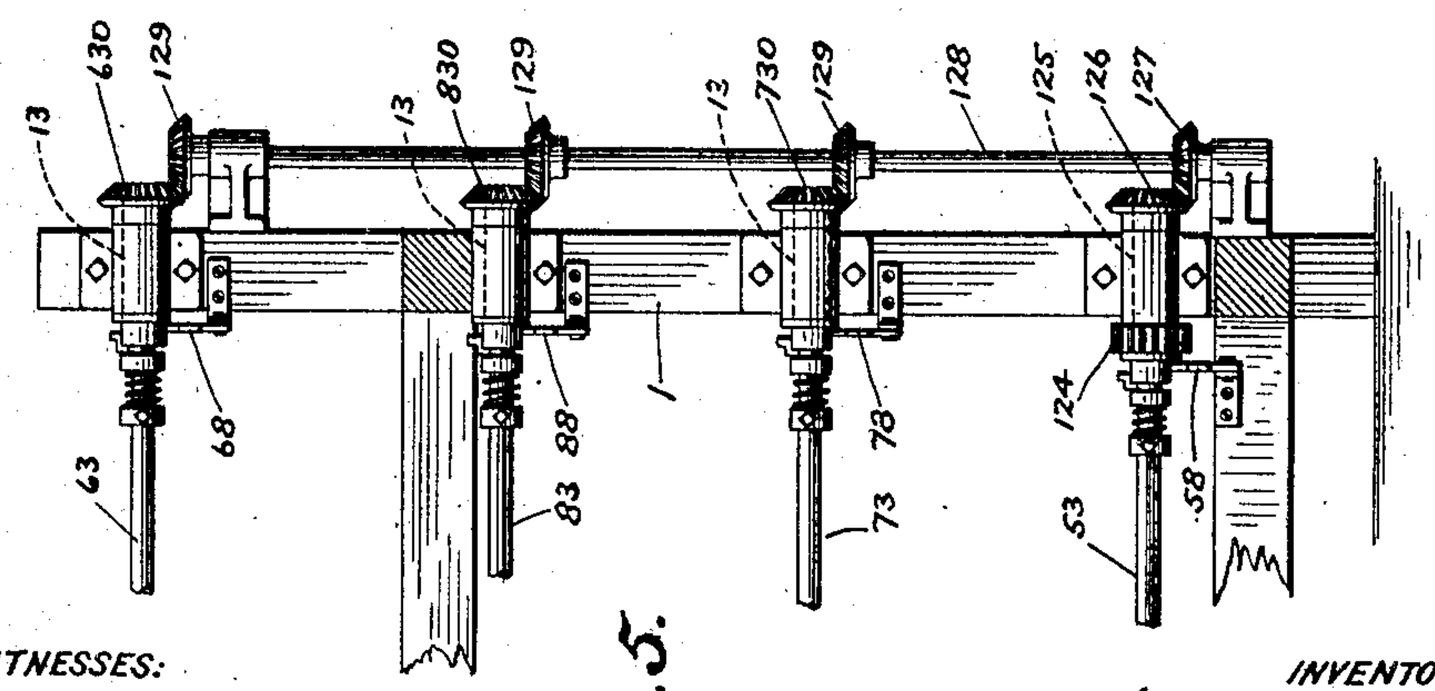


FIG. 5.



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5 SHEETS—SHEET 4.

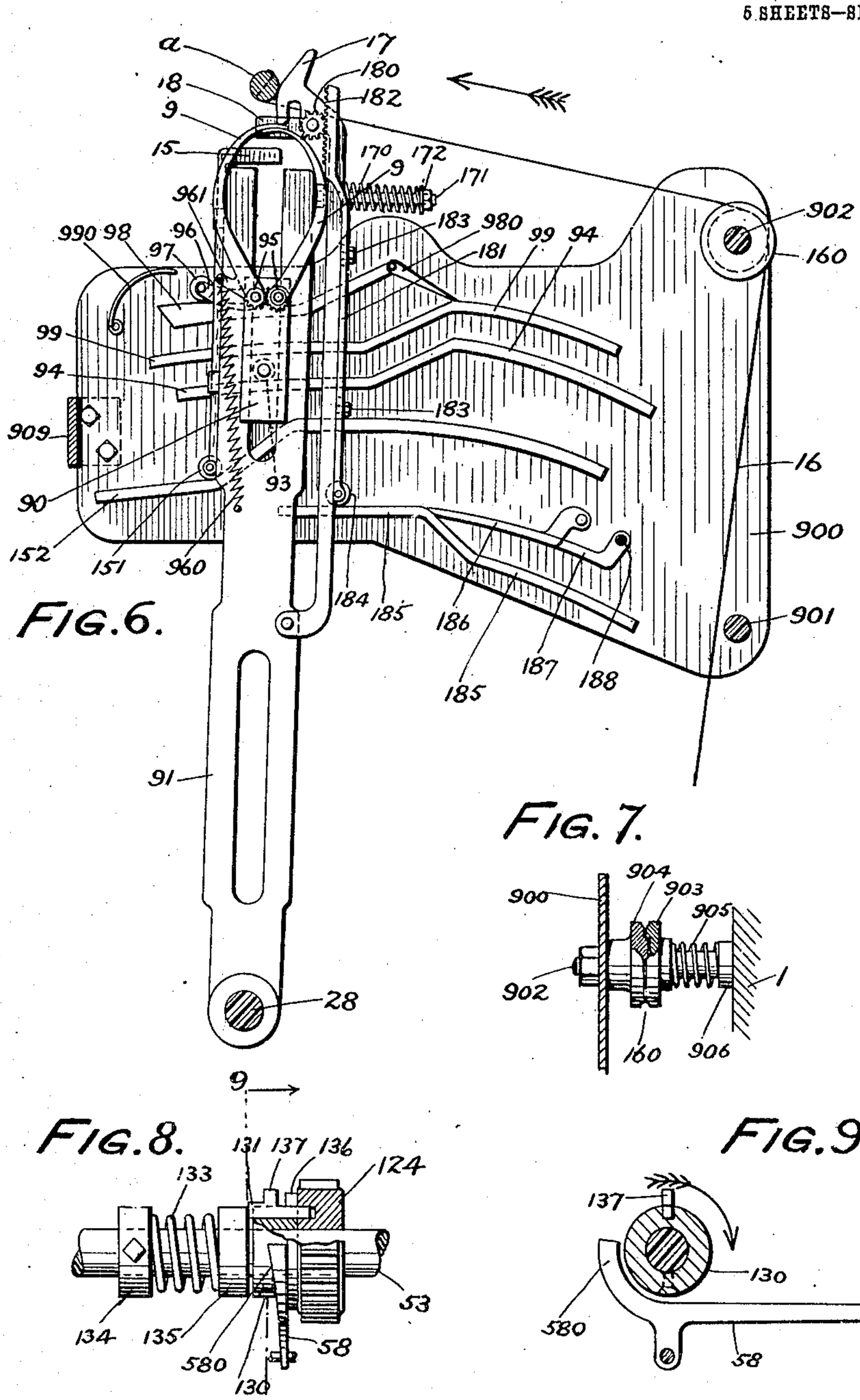

FIG. 6.

FIG. 7.

FIG. 8.

FIG. 9.

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5 SHEETS—SHEET 5.

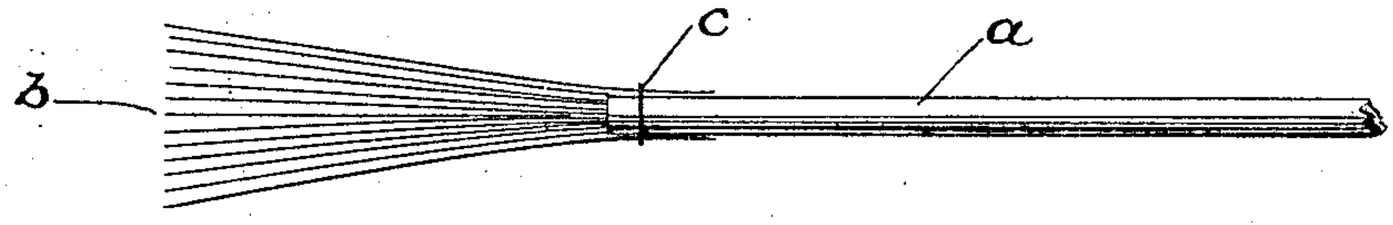

FIG. 10.

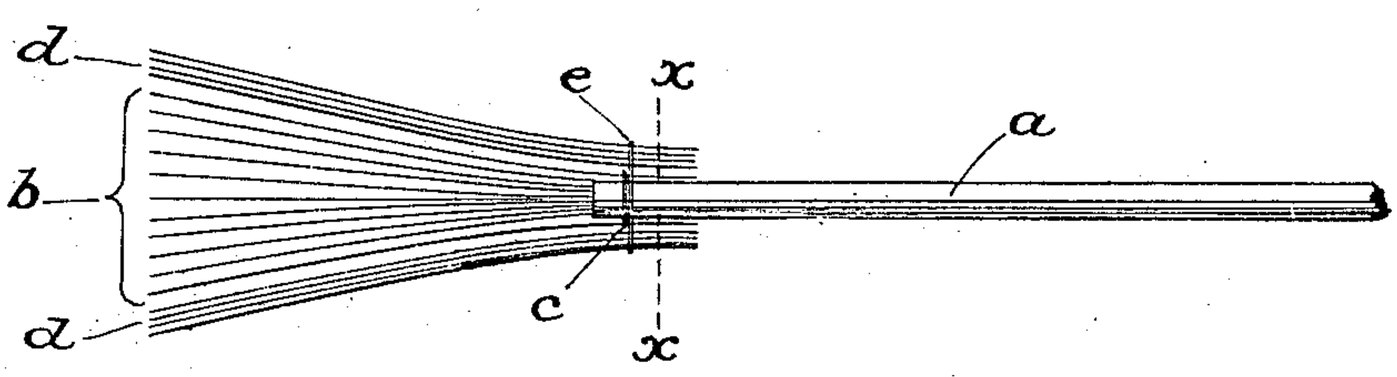

FIG. 11.

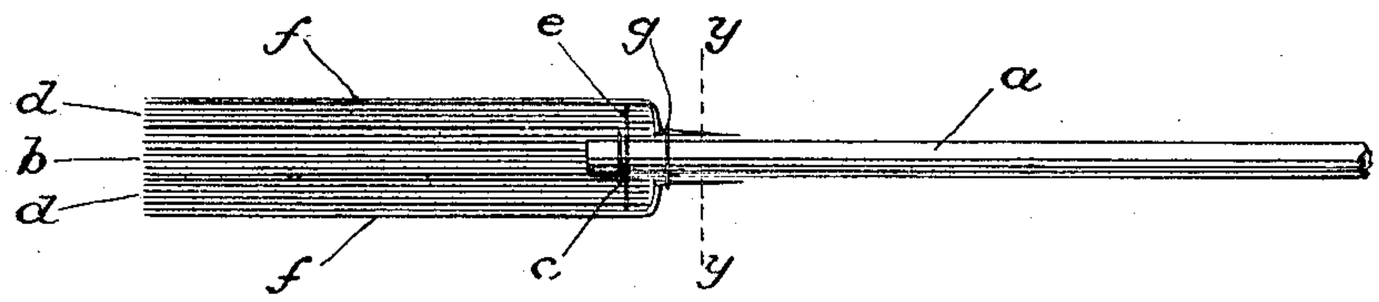

FIG. 12.

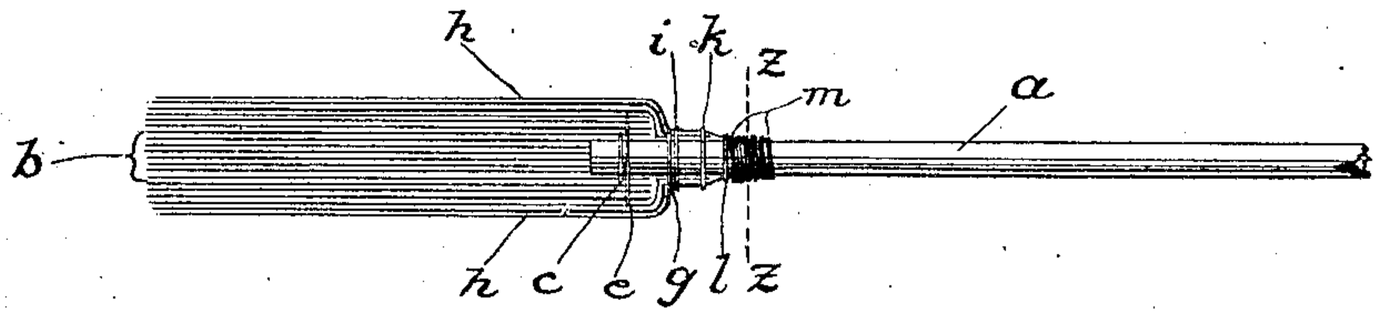

FIG. 13

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UNITED STATES PATENT OFFICE.

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BROOM-MACHINE.

No. 851,916. Specification of Letters Patent. Patented April 30, 1907.

Application filed August 7, 1906. Serial No. 329,530.

To all whom it may concern:

Be it known that I, CHARLES CLEMENS, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Broom-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of my invention is to provide a machine by means of which the broom-corn may be applied to the handle wholly by mechanical means and, to as great an extent as is desirable, by automatic means, thereby forming a broom which shall be complete except for the final finishing operations of shaping, stitching and trimming.

The invention consists in the general and specific construction, arrangement and combination of mechanical instrumentalities hereinafter described and more particularly pointed out in the claims.

In the drawings: Figure 1 is a side elevation of the machine, certain parts being omitted for the purpose of clearness. Fig. 2 is a plan view of the timing mechanism and a part of the driving mechanism. Fig. 3 is a front elevation of the machine with the carriers omitted. Fig. 4 is a cross-section on the line 4—4 of Fig. 3. Fig. 5 is a section on the line 5—5 of Fig. 4. Fig. 6 is an enlarged elevation of the mechanism for applying the corn to the handle. Fig. 7 is a detail view, partly in section, of one of the guide rollers for the binding wire. Fig. 8 is a detail view, partly in section, showing the clutch shifting mechanism for engaging and disengaging the driving sleeve from the shaft of one of the corn carriers. Fig. 9 is a section on the line 9—9 of Fig. 8. Figs. 10, 11, 12 and 13 are diagrammatic views illustrating the series of operations to which a broom is subjected in the course of its manufacture on the machine illustrated in Figs. 1 to 9 inclusive.

The operations diagrammatically illustrated in Figs. 10 to 13 inclusive correspond to those which take place in hand manufacture. It will, however, be understood that this series of operations, which we shall now proceed to describe, are merely illustrative, and that the precise number, character and sequence of operations depend upon the particular construction of broom that is to be made; brooms, of course, varying more or less in detail of construction as well as in size and quality. It will be understood, too, that the machine may have to be somewhat modified in specific details of construction, and operation although not in its main features, in order that it may perform a series of operations differing from that about to be described.

In Fig. 10 there is shown attached to the handle *a* the "handle-corn" *b*, which entirely surrounds the end of the handle and usually consists of corn of inferior quality, as it is entirely hidden from view in the finished broom. The handle corn is secured to the handle by means of the wire band *c*. In Fig. 11, the next step is illustrated, which consists in applying two bunches of "shoulder corn" *d* on opposite sides of the "handle corn." This corn is also usually of inferior quality, as it, too, is concealed in the finished article. As the shoulder corn does not surround the handle corn, but forms "shoulders" on opposite sides thereof, the body or base of the broom formed at the end of this operation is thus considerably wider in one dimension than in the other, so that the broom, in the final operation of shaping, may be readily shaped into the well known substantially flat form. The shoulder corn is held in place by means of a wire band *e*. Both the shoulder corn and the handle corn are then trimmed off on the line *x*—*x*. In Fig. 12, the next step is illustrated, which consists in applying the "stalk cover" *f*. The stalk cover overlaps and surrounds the handle corn and shoulder corn and is wired to the handle by means of the wire band *g*, and after wiring is trimmed on the line *y*—*y*. The stalk cover should consist of corn from which the stalks have not been detached, which stalks, when the stalk cover is in place, are of course at the inner end of the corn and overlap the handle corn and shoulder corn. To prevent the formation of a thick bunch of corn around the handle, the ends of the individual stalks are first sliced approximately through their longitudinal center, the cut sides thereof being placed on the inside when applying the stalks to the broom body. The stalk corn is then trimmed on the line *y*—*y*. The next operation, shown in Fig. 13, consists in applying

the "hurl corn" *h*, which should be of a finer and longer grade of corn devoid of stalks. This corn surrounds the stalk cover and is bound by the wire bands *i*, *k* and *l*. The hurl-corn is then trimmed on the line *z*—*z*. Finally, a number of turns of wire *m* are applied to the handle around and beyond the end of the hurl corn. The broom is now ready for the final operations of shaping, stitching and trimming, but these operations need not be further referred to, as the machine embodying my invention is not designed to effect them.

The support for the broom handle *a* is a barrel or hollow shaft 2 (Fig. 2 and 3) turning in bearings 20 on the carriage 3, which is slidable in grooves in the side bars 30 secured to the machine frame 1. The chuck 205, on the end of the shaft 2, holds the broom from turning independently of the shaft. The end of the wire 16 is inserted into a hole in the handle, which is provided for that purpose. By mechanism to be hereinafter described, the shaft 2 is given a series of turns—each turn being one-sixth of a complete rotation, and at each turn (in the case of all the corn except the shoulder corn, and in the case of the shoulder corn, at each third turn) a bunch of corn is carried, on top of the wire 16, to the handle *a* by means of a reciprocating conveyer (the fingers 9) and coacting mechanism to be hereinafter more particularly described, and lodged in the angle between the handle and the wire. These fingers take the corn from the intermediate transfer carrier 4, which consists of sprocket chains 40, extending around the upper and lower sprocket wheels 41 and 42, and carrying brackets 44, to which are pivoted receptacles 45, weighted at their lower ends so as to constantly maintain an upright position. The driving shaft 43, to which the sprocket wheels 42 are secured, is turned step by step synchronously with the turning of the handle shaft 2, so as to bring a new receptacle in line of travel, of the reciprocating fingers at each reciprocation of the latter and at each turn of the handle shaft.

The intermediate transfer carrier 4 is supplied with corn from the supply carriers 5, 6, 7 and 8. These supply carriers carry respectively the handle corn, the shoulder corn, the stalk cover and the hurl corn, and are operated one at a time and synchronously with the transfer carrier 4, so that, when any one carrier is in operation, it is moved so as to bring successively its receptacles in line of travel of successive receptacles of the transfer carrier, which, in its movement, removes the corn from such supply carrier receptacles.

The carrier 5 carrying the receptacles for the handle corn comprises the sprocket chains 50 extending around the sprocket wheels 51 and 52, the latter being on the shaft 53, which constitutes the immediate driving shaft for the carrier. The carrier also comprises the brackets 54 carried by the sprocket chain, the receptacles 55, pivoted to the bracket and weighted so as to maintain constantly an upright position and shoulders 56 extending transversely from the bracket and adapted, in passing along the lower run of the carrier, to travel upon the guides 57 secured to the machine frame and thereby prevent the chain from sagging, due to the weight of the receptacles.

570 are guides, secured to the machine frame, and supporting the upper run of the sprocket chains.

The carrier 6 for the shoulder corn comprises sprocket chains 60, sprocket wheels 61 and 62, the immediate driving shaft 63, brackets 64, receptacles 65, shoulders 66, and guides 67 and 670, corresponding in construction and operation to similar parts composing the carrier 5, but differing therefrom in that there are but one third the number of receptacles.

The carrier 7 for the stalk cover comprises sprocket chains 70, sprocket wheels 71, and 72, the immediate driving shaft 73, brackets 74, receptacles 75, shoulders 76, and guides 77 and 770 corresponding in construction and operation to similar parts composing the carrier 5.

The carrier 8 for the hurl cover comprises sprocket chains 80, sprocket wheels 81 and 82, the immediate driving shaft 83, brackets 84, receptacles 85, shoulders 86, and guides 87 and 870, corresponding in construction and operation to similar parts composing the carrier 5.

Before starting the machine, in six adjacent receptacles of each of the carriers 5, 7 and 8 are placed as many bunches of the proper corn, and in two of the receptacles of the carrier 6 are placed as many bunches of shoulder corn. After the machine is started, the mechanism hereinbefore described is put into operation, except that only the carrier 5 of the supply carriers is operated. One by one the bunches of handle corn are transferred from the carrier 5 to the carrier 4, from which, in the subsequent operation of the machine, they are taken, one by one, by the fingers 9 and coacting mechanism and transferred to the handle, which, when it has made six turns, is entirely surrounded by the handle-corn. After each bunch of corn is placed against the handle it is confined in position by the wire 16.

After the carrier 5 is rendered inoperative, the carrier 6 is rendered operative. The two bunches of shoulder corn are transferred from carrier 6 to carrier 4. Owing to the number and arrangement of receptacles comprised in carrier 6, only two receptacles of the transfer carrier will be supplied with shoulder corn, and between these two receptacles will be two vacant receptacles. Consequently, the

fingers 9, and coacting mechanism will, in the subsequent operation of the machine, convey but two bunches of shoulder corn to the handle and at such times in the rotation of the handle as to apply the two bunches of shoulder corn to precisely opposite sides of the handle. During this operation, the shoulder corn is automatically wired as before described. The whole machine is then temporarily stopped as hereinafter described to enable the corn on the handle to be trimmed as before described.

After the carrier 6 is rendered inoperative, the carrier 7 is rendered operative. One by one the bunches of stalk cover are transferred from the carrier 7 to the carrier 4, from which, one by one, in the subsequent operation of the machine, they are transferred by the fingers 9 and coacting devices to the handle, which, when it has made six turns, is, together with the handle corn and shoulder corn, entirely surrounded by the stalk cover. During this operation the stalk cover is wired to the handle automatically as before described. The whole machine is then stopped to enable the stalk cover to be trimmed as before described.

After the carrier 7 is rendered inoperative, the carrier 8 is rendered operative. One by one the bunches of hurl corn are transferred from the carrier 8 to the carrier 4, from which, in the subsequent operation of the machine, they are taken, by the fingers 9 and coacting devices and transferred to the handle, which, when it has made six turns, is, together with the previously applied corn, entirely surrounded by the hurl corn. The hurl corn is wired to the handle automatically as before described.

It will be understood that while, for example, the shoulder corn is being transferred from the carrier 6 to the carrier 4, the fingers 9 are removing the previously deposited handle corn from the carrier 4, so that the described operations do not take piace in the precise order described; the fingers 9, in fact, always taking one set of corn from the carrier 4 while the next set of corn is being received by the carrier 4.

After the hurl corn is wired to the handle, as before described, the carriers are stopped, and the broom rotated and fed forwardly to wind the wire spirally along over the inner end of the hurl corn. The machine is then stopped, the hurl corn trimmed, the wire cut off, and the broom removed from the machine.

The foregoing description will enable the general operation to be understood. The means for actuating the parts described, and the construction and operation of parts hereinbefore referred to and their actuating means, will now be described.

10 is the main driving shaft having the fast and loose pulleys 100 and 101. 102 is a gear on the driving shaft engaging the gear 103 to which is secured the sprocket wheel 105, which is connected, by means of the chain 106, with the sprocket wheel 107 secured to a sleeve 335 feathered on the secondary shaft 11, which turns in bearings on the carriage 3. The shaft 11 carries the single tooth wheel 110 which, in its revolution, intermittently engages the star-wheel 200. The star-wheel 200 is loose on the shaft 2, but is adapted to be clutched thereto by means of the clutch 21 feathered on the shaft and operated by means of the clutch lever 22. When the star-wheel 200 is clutched to the shaft 2, the shaft, through the medium of the described driving mechanism, will be given the one-sixth turns herein before mentioned.

The gear 103 and sprocket wheel 105 are loose on the shaft 12, but are normally clutched thereto by means of the clutch mechanism 108, whose construction is hereinafter described. The shaft 12 carries the gear 120, which, through the gear 104, meshes with the gear 121 on the shaft 43, which, as before described, is the driving shaft for the intermediate transfer carrier 4. On the shaft 43 is also the gear 122 which through the medium of an intermediate gear 123, drives the pinion 124 on the sleeve 125. The sleeve 125, which is loose on the shaft 53 of the supply carrier 5, carries the bevel gear 126, which meshes with the bevel gear 127 on the upright shaft 128. The shaft 128 also carries the three bevel gears 129, which mesh with three bevel wheels 630, 730 and 830, secured respectively to the three sleeves 13 loose on the shafts 63, 73 and 83 respectively, which, as before stated, are the respective driving shafts for the remaining supply carriers 6, 7 and 8. Thus, during the normal operation of the machine, the four sleeves 125, 13, 13, 13, are in operation, but their respective shafts are operated only when the sleeves are clutched thereto.

The sleeve 125 is adapted to be clutched to the shaft 53 by means of the clutch mechanism illustrated in detail in Figs. 8 and 9. This mechanism comprises a collar 130, which is fixed to the driving shaft 53 of the carrier and has a longitudinal groove in its periphery in which is inserted a clutch pin 131 adapted to enter a recess in the gear 124. A spring 133 surrounds the shaft and is confined between a collar 134 fixed to the shaft and a collar 135 loose on the shaft and engaging the pin and, under the action of the spring, holding the pin in its recess. To withdraw the clutch pin, the following mechanism is provided. 136 is an annular flange on the collar 130. 137 is a projection on the pin 131. 58 is an unclutching lever pivoted between its ends, its short end being curved on an arc substantially concentric to the arcs described by the parts turning with the gear 124. The short end of the lever 58 increases in thick-

ness toward its extremity, forming the cam face 580. When the lever 58 is moved into the position shown in Fig. 9, it is moved directly in front of, and substantially against, the flange 136, and in the rotation of the sleeve 125 and its driving parts, the projection 137 rides over the cam face 580 of the lever 58, thereby withdrawing the pin from its recess, and the sleeve 125 no longer drives the collar 130 and the rotation of the carrier driving shaft is stopped.

The clutch mechanism for each of the shafts 63, 73, and 83 of the respective carriers 6, 7, and 8, is the same as that described for the shaft 53 of the carrier 5, the unclutching levers for these shafts being, however, for convenience of description, lettered respectively 68, 78 and 88.

Before the machine is started, the unclutching levers are all in their operative position. After the machine is started, the first unclutching lever to be moved into its inoperative position is the lever 58, thereby causing the shaft 53 to be clutched to its corresponding driving sleeve 125 and causing the carrier 5 to be operated. After the contents of six of its receptacles have been delivered to the carrier 4 and the broom handle has made one complete rotation as before described, the lever 58 is moved into its operative position, thereby unclutching the shaft 53 from its driving sleeve and stopping the carrier 5, and the lever 68 is moved into its inoperative position, causing the shaft 63 to be clutched to its corresponding driving sleeve 13 and causing the carrier 6 to be operated. After the operation of the carrier 6 is completed, the lever 68 is moved into operative position, causing the carrier 6 to stop, and the lever 78 is moved into its inoperative position, causing the carrier 7 to be operated. After the operation of the carrier 7 is completed, the lever 78 is moved into operative position, causing the carrier 7 to stop, and the lever 88 is moved into its inoperative position, causing the carrier 8 to be operated.

The several unclutching levers are given the several movements described automatically by means of timing mechanism, which will now be described (see Fig. 3).

140 is a sprocket on the shaft 43.

142 is a sprocket wheel on the shaft 143.

141 is a sprocket chain connecting wheels 140 and 142.

On the shaft 143 is a single tooth wheel 144 adapted to actuate intermittently the star-wheel 145 on the timing shaft 14. The timing shaft 14 carries the sprocket wheels 146 over which extend the sprocket chains 147 carrying between them bars 148 to which are secured rollers 149; the sprocket chains, bars and rollers constituting a timing chain for operating, in predetermined order, the four timing levers 59, 69, 79 and 89, which are pivoted on the shaft 595 attached to the frame of the machine and are in line of travel of said chain. These levers are connected, by means of rods 590, 690, 790 and 890, respectively with the four unclutching levers 58, 68, 78 and 88, whose operations, in the manner and in the sequence hereinbefore described, are thus controlled automatically.

The fingers 9 are reciprocated as before described by being carried on a slide 90 (see Fig. 6) slidable in a recess in the oscillating lever 91 secured to the shaft 28. This lever and shaft are oscillated by means of a crank 92 on the shaft 12, the pin of the crank working in a slot in the lever 91, the arrangement being such as to give a quick return movement. The lever 91, besides carrying the fingers, carries other coacting devices for manipulating the corn. The desired operation, in general, of these devices will first be referred to, after which the mechanism for imparting to them their desired operation will be described. It is necessary, when the fingers reach the carrier 4, that they should be open, so that one finger may sweep the corn from the receptacle and deposit it upon the wire 16 between the fingers. As the fingers approach the handle they close and move downwardly so as to draw down the ends of the corn, as indicated in Fig. 3, thereby preventing the wire from slipping longitudinally of the handle away from the position that it is designed to occupy. Without thus bending down the ends of the corn, the objectionable slipping of the wire would always occur, especially during the application of the stalk cover and hurl corn, and prevent the formation of the sharp shoulder shown in Fig. 12 in front of the wire-band *g*. During this operation the breaker 15 is brought under the wire, so that, while the ends of the corn are being bent downwardly, the wire is relieved of the strain which would otherwise be imposed upon it, and tend to break it. As the fingers move forwardly the pusher 17 is moved forwardly, moving the corn along the wire into the angle between the wire and the handle and is held in that position while the handle makes its next one-sixth turn and draws the wire over the corn.

To impart to the fingers 9 the described downward movement the following means are provided. The slide 90, which carries the fingers, also carries the roller 93, which rolls on a cam 94 secured to the cam plate 900, which is secured to the machine frame by means of the studs 901 and 902, and the bracket 909. As the lever 91 swings toward the carrier 4, the roller 93 rides up the inclined part of the cam 94, raising the slide 90 and with it the fingers 9. As the lever moves toward the handle, the roller 93 rides down the inclined part of the cam 94, lowering the slide 90 and the fingers 9.

The fingers 9 are opened and closed by means of the following mechanism. 95, 95,

are intermeshing segmental pinions at the lower ends of the fingers, the studs of the pinions turning in the slide 90. Secured to the stud of one of the segmental pinions 95 is an arm 96 having at its end the roller 97. In Fig. 6, the roller 97 is riding on the cam 98, the lever 91 moving forwardly in the direction of the arrow and the fingers are held closed. When the lever 91 reaches the end of its travel in this direction, the roller 97 rides beyond the end of the cam 98, strikes the guard 990, and drops onto the cam 99 immediately beneath it. This causes the pinions 95 to turn and open the fingers, which are held open during the backward movement of the lever 91, the gate cam 980 being moved up as the roller 97 passes beneath it and dropping into position to receive the roller in the forward movement of the lever 91. As the roller 97, during the forward movement of the lever 91, rides up the gate cam 980, the pinions 95 are turned to cause the fingers to close and they remain closed until the lever 91 again reaches the end of its forward movement. The spring 960, secured at one end to an arm 961 (secured to the stud of one of the pinions 95) and at the other end to the lever 91, tends to draw down the arm 96 and insures its dropping down when the roller over-rides the cam 98 as described.

The breaker 15 slides in guides 150 on the lever 91 and has at its lower end the roller 151, which rides on the cam 152. The cam 152 is shaped so as to move the breaker up into operative position, and draw it down, at the proper times.

The pusher 17, which, it should be stated, is recessed to allow the wire to pass through it, is pivoted to the lever 91. It is held in the position shown in Fig. 6 by means of a spring 170, which surrounds a rod 171 secured to the lever 91 and abuts against a nut 172 on the end of the rod. As the lever 91 continues its forward movement in the direction of the arrow, Fig. 6, and beyond the position at which it is there shown, the pusher remains stationary, its movement being stopped by the broom, and it is pushed, by reason of the increasing tension of the spring 170, with constantly increasing force against the corn which it has just moved into position until after the lever 91 has again started to move backwardly. While the pusher is thus held against the broom, the latter is given its one-sixth turn and the straw just deposited by the pusher is drawn partly around the handle and between it and the wire.

It has already been stated that before the stalk cover is applied, the inner ends of the stalks are sliced longitudinally. This operation is effected by means of the cutter 18 secured to the shaft of the pinion 180, which turns in the pusher 17.

181 is a bar having at its upper end the rack 182 meshing with the pinion 180. The bar is provided with slots through which extend the pins 183 secured to the pusher, thereby permitting the bar to move vertically.

184 is a roller on the lower end of the bar 181.

185 is a cam over which the roller is adapted to ride, said cam having a downwardly inclined section up which the roller 184 is adapted to ride.

186 is a gate cam pivoted at one end, its free end resting upon the cam 185 at the top of the latter's inclined section and preventing the roller 184 from riding down the same, and constituting, in effect, a continuation of the cam 185.

187 is a gate cam constituting, when in the position illustrated, a continuation of the cam 186.

In the normal operations of the lever 91, the roller 184 of the rack-bar 181 rides backwardly successively upon the cams 185, 186 and 187 and forwardly upon the same cams, and the cutter 18 remains stationary with respect to the lever 91 and pusher 17 and remains inoperative. Just prior to the delivery, from the carrier 4 to the handle, of the stalk cover, the gate cam 187 is dropped on its pivot so that the roller 184, in the backward movement of the lever 91, over-rides the cam 186 and drops down upon the rear end of the cam 185. The rack-bar, in its downward movement, turns the pinion 180 and moves the cutter 18 upwardly. During the forward movement of the lever 91, the roller 184 rides up the inclined section of the cam 185 and the elevation of the rack-bar turns the pinion 180 and moves the cutter downwardly into its normal position. This movement of the cutter causes it to engage the overhanging stalks and split them longitudinally.

The lowering of the gate cam 187 is effected automatically by the following mechanism. The gate cam 187 is secured to the shaft 188 to which is also secured the arm 189 (see Fig. 4) connected by rod 289 with the unclutching lever 88 controlling the operation of the carrier 8 for the hurl cover. When the unclutching lever 88 is operated to render operative the carrier 8, it at the same time lifts the arm 189 and opens the gate cam 187. It will be understood, as before stated, that while the carrier 8 is being operated and corn is being transferred therefrom to the carrier 4, the fingers 9 are taking from carrier 4 the stalk cover that has been previously delivered to the latter. Therefore, while stalk corn is being carried to the broom-handle, the gate cam is in its open position; and the roller 184, at each oscillation of the lever 91, drops down over the end of the gate cam 186 and the cutter 18 oper-

ates as before described. When carrier 8 is rendered inoperative, the gate cam is restored to its closed position.

The shaft 28 is supported in bearings 280, which are laterally adjustable on the machine frame.

To the outer end of the shaft 28 is secured the beater 281, which oscillates in union with the lever 91 and carries forward the outer ends of the corn.

It has been hereinbefore stated that after the shoulder corn is wired to the handle, the machine is stopped to enable the handle corn and shoulder corn to be trimmed on the line *x*—*x*, Fig. 11. The stopping of the machine is effected by the following means: 31 is a belt shifter (see Fig. 3) extending through guides 310 on the machine frame. 311 is a spring confined between a collar 312 on the belt shifter and one of the guides 310. This spring tends to shift the belt from the driving pulley to the idle pulley. 313 is a belt shifting lever pivoted to the machine frame and connected to the belt shifter by a pin and slot connection. 314 is a notched hanger secured to the machine frame. By means of the lever 313, the belt shifter is moved, against the action of the spring 311, to shift the belt to the driving pulley, and the lever is then dropped back of the notch in the hanger 314, holding the belt shifter in the position to which it has been moved. When the lever 313 is lifted out of the notch in the hanger, 315, the spring 311 returns the belt shifter and the driving belt is shifted to the loose pulley. The belt-shifting lever 313 is lifted automatically, at the proper time in the operation of the machine, by means of a lever 316, which is actuated by a timing lever 318 connected to the lever 316 by a rod 317. The timing lever 318 is actuated by suitably disposed rollers on the timing chain. The machine is again stopped, in the same way, after the stalk cover is secured to the handle, to enable the stalk cover to be trimmed on the line *y*—*y*, Fig. 12.

Before wiring the stalk cover to the handle, the handle should be moved forwardly to cause the corn to be wired at the proper point (*g*, Fig. 13.) The handle should again be moved forwardly, before wiring at the point *k*, Fig. 13, and again before wiring at the point *l*, Fig. 13. The handle should then be given a continuous slow forward movement to enable the coil *m*, Fig. 13, to be applied. This is effected by the following means. 23 is a sleeve loose on the handle-shaft 2 (see Figs. 2 and 3). To this sleeve is secured the gear 24 and the cam 25. This cam comprises four flat sections of different height, their relatively abrupt inclines connecting adjacent flat sections, and a relatively long and gradual incline beyond the last or highest flat section. 26 is an arm secured to the machine frame and having a roller 27 engaging the cam. The hub of the gear 24 abuts against one of the bearings 20 on the sliding carriage 3. During the wiring of the handle corn and shoulder corn, the roller 27 is on the low point of the cam, but before the handle-shaft receives the stalk cover, the sleeve 23 is given a partial turn, causing the roller 27 to ride along the cam from the lowest to the next highest point. This operation forces the sleeve 23 forwardly, and the gear 24, abutting against the bearing 20, pushes the carriage 3, and all the mechanism carried thereby, forwardly to permit the wire to thereafter bind the stalk-cover to the handle, at *g*, Fig. 13. Similarly, the sleeve 23 is given two additional partial turns to cause the roller to ride successively up the next two highest points to permit the wire to bind the hurl corn at *k* and *l*. Similarly, the sleeve 23 is given a final partial turn to cause the roller to ride up the last, or long, incline, thereby moving the carriage forwardly slowly to cause the wire to be applied as a coil. To return the cam to its initial position, the sleeve 23 is given another turn, causing the roller to override the end of the last incline. The carriage is then returned to its initial position by the action of the weight 300.

The gear 24 on the sleeve 23 is given the required partial turns by means of a gear 32 on the auxiliary shaft 11. The gear 32 is clutched to the shaft 11 by means of clutch mechanism 320, which is the same in construction as the clutch mechanism for engaging and disengaging the sleeve 125 and shaft 53 and the sleeves 13 and shafts 63, 73 and 83 and which need not, therefore, be particularly described. The clutch mechanism includes an unclutching lever 321 (see Fig. 4) operating in the same manner as the unclutching levers 58, 68, 78 and 88. The unclutching lever 321 is pivoted between its ends and is connected, by means of a rod 322, with a treadle 323 pivoted on the shaft 43. Normally the unclutching lever 321 is in its operative position to disengage the gear 32 from the shaft 11. By depressing the treadle 323, the unclutching lever 321 is withdrawn from operative position, permitting the spring of the clutch mechanism 320 to act to clutch the gear 32 to the shaft 11 and thereby operate the cam 25 to shift the carriage 3 as before described. The gears 32 and 24 are so proportioned in size that successive revolution of the former impart the required successive partial turns to the latter. When the treadle 323 is released, the spring 324, connecting the lever 321 and the carriage 3, restores the lever 321, rod 322 and treadle 323 to their normal positions and unclutches the gear 32 from the shaft 11, thereby stopping the rotation of the cam 25 and the forward movement of the carriage 3.

In the final operation, during the application of the coil *m*, the broom-handle should be continuously rotated, and the whole machine, except the mechanism for rotating the handle, should be stopped.

The stoppage of the machine, except the actuating mechanism for the shaft 11, is effected by actuating the clutch mechanism 108 to disengage the gear 103 and sprocket wheel 105, from the shaft 12, which, as before described, is the driving shaft for the carriers, the timing chain, and the lever 91. This clutch mechanism is the same in construction as the clutch mechanism for engaging and disengaging the sleeve 125 and shaft 53 and the sleeve 13 and shafts 63, 73 and 83 and need not, therefore, be particularly described.

The clutch mechanism includes an unclutching lever 331 operating in the same manner as the unclutching levers 58, 68, 78 and 88. Normally, the unclutching lever 331 is inoperative and the gear 103 drives the shaft 12. When, however, after all the corn has been placed on the handle, it is desired to stop the further operation of the carriers, the timing chain and the lever 91, the lever 331 is moved to its operative position, disengageing the gear 103 from the shaft 12 and stopping the latter. The unclutching lever 331 is automatically moved to its inoperative position by means of the timing lever 332 pivoted on the shaft 595. A rod 333, slotted at its lower end, connects the timing lever 332 and unclutching lever 331, the latter lever resting in the bottom of the slot. When the timing lever 332 is lifted by the timing chain, the rod 333 is lowered, and the corresponding end of the unclutching lever 331 drops of its own weight. As this operation of the unclutching lever 331 stops the rotation of the shaft 12, the travel of the timing chain is also stopped. To return the unclutching lever to its normal position preparatory to operating the entire machine, means independent of the timing chain must be provided. To this end a bell-crank lever 34 is pivoted on the machine frame, and the upper end of the rod 340 is connected to one of its arms, the lower end of the rod being slotted and receiving the end of the unclutching lever 331. When, as before described, the rod 333 is lowered by the timing lever 332 to permit the corresponding end of the unclutching lever 331 to drop, it drops into the bottom of the slot in the rod 340. When it is desired to withdraw from operative position the unclutching lever 331 (which will ordinarily be after the final stoppage of the machine), the lever 34 is turned to raise the rod 340, thereby elevating the corresponding end of the unclutching lever and withdrawing it from operative position, the slot in the rod 333 permitting this to be done.

The spring 334, connecting the machine frame and the timing lever 332, is relied upon to hold the unclutching lever 331 in its inoperative position except when the timing chain causes it to be moved and held in its operative position.

The change from intermittent to continuous rotation of the handle-shaft, to permit the wire to coil spirally about the inner end of the hurl corn, is effected, as soon as the operation of the carriers and lever 91 is stopped as just described, by shifting the clutch 21, by means of the shifting lever 22, from the star-wheel 200 to the gear-wheel 330, which meshes with the gear-wheel 33 on the auxiliary shaft 11. During the forward movement of the carriage 3, the sleeve 335 carrying the driving sprocket wheel 107, is held from movement by means of the bracket 336 which encircles an annular groove in the sleeve. The carriage is returned to its original position by means of the weight 300.

When the desired number of turns of wire are coiled about the hurl corn and handle in the final operation, the machine is stopped by manually operating the belt shifting lever 313.

The wire 16 extends over a roller 160, thence down under the roller 161, thence around the pulley 162 a number of turns, and thence to the feed spool 169. The pulley 162 is on the shaft of a brake wheel 163, which is surrounded by a fixed split brake-band 164 having a projection 165 abutting against a pin 166 secured to the machine frame. By means of a screw 167 engaging the opposing ends of the brake-band, the resistance to rotation of the pulleys 163 and 162 may be regulated and a suitable tension maintained upon the wire 16.

The roller 161 is sustained on a weighted lever 168 pivoted on the machine frame, whereby any slack between the pulley 162 and the broom-handle will be taken up.

After the machine is stopped, the wire is cut and the broom removed from the machine and another handle inserted. To prevent the wire 16, after it is cut, from springing back over the roller 160, the latter is constructed and arranged as shown in Fig. 7. The roller is made in two parts or halves, the part 903 having a projection overlapping a shoulder on the other part 904, the wire extending between the halves around the shoulder. The roller is loose on the stud 902 supporting the cam plate 90, as hereinbefore mentioned. A spring 905 encircles the stud and is confined between a collar 906 on the stud and the part 903 of the roller. The spring holds the roller against the cam plate and confines the wire between the two halves of the roller, but its tension is not sufficiently strong to prevent the roller from turning, or to prevent the wire from passing beyond the roller, either forwardly, due to the rotation

of the handle shaft, or backwardly, due to the action of the roller 161. The tension of the spring 905 is, however, sufficient to hold the wire from slipping back over the roller the wire from slipping back over the roller due to the cutting of the wire at the end of the operation of the machine.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire extends to the under part of the handle, means to deliver corn to the wire and convey it along the top thereof to the handle, and means to turn said support, thereby causing the corn to be bound between the handle and wire.

2. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a traveling carrier, conveying mechanism adapted to take the corn from the carrier and deliver it to the part of the wire contiguous to the handle, and means to turn said support and actuate the carrier.

3. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a plurality of supply carriers, an intermediate transfer carrier, conveying mechanism adapted to take the corn from the transfer carrier and deliver it to the part of the wire contiguous to the handle and means to turn said support and actuate the carriers.

4. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, and a plurality of supply carriers, an intermediate transfer carrier, conveying mechanism adapted to take the corn from the transfer carrier and deliver it to the part of the wire contiguous to the handle, means to turn said support step by step, means to move each of the carriers, and timing mechanism adapted to cause the successive operation of the several supply carriers.

5. In a broom machine, the combination with a broom-handle support, of a carrier for the corn, and mechanism to convey the corn from the carrier directly to the handle to permit the attachment of the corn to the handle.

6. In a broom machine, the combination with a plurality of supply carriers, of a broom handle support, an intermediate transfer carrier adapted to receive the corn from the supply carriers, means to operate the supply carriers successively, means to operate the transfer carrier, and conveying mechanism adapted to convey the corn from the transfer carrier to a point contiguous to the handle-support to permit the attachment of the corn to the handle.

7. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a conveyer adapted to carry the corn toward the handle, a pusher adapted to engage the corn and push it against the handle, means to turn the handle-support, thereby causing the wire to bind the corn upon the handle, and means to actuate the conveyer and pusher.

8. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a pair of fingers adapted to take the corn and convey it toward the handle, means to open and close said fingers and move them up and down, a pusher adapted to engage the corn and push and hold it against the handle, means to actuate the pusher, and means to turn the handle-support, thereby causing the wire to bind the corn upon the handle.

9. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, means to deliver corn to the part of the wire contiguous to the handle, a breaker adapted to underride the wire and relieve it of strain, and actuating means for the breaker.

10. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, means to deliver stalk cover to the part of the wire contiguous to the handle, a cutter adapted to slice the stalks longitudinally, a breaker adapted to underride the wire during the slicing operation, and actuating means for the cutter and breaker.

11. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a conveyer adapted to carry the corn toward the handle, a pusher, extending above and on each side of said wire, adapted to engage the corn and push and hold it against the handle, and means to so actuate the conveyer and pusher.

12. In a broom machine, the combination with the broom-handle support, of a conveyer adapted to carry the corn toward the handle, a pusher adapted to push and hold said corn against the handle, a cutter adapted to slice certain corn longitudinally, actuating means for the conveyer, pusher and cutter, and means to render the cutter inoperative.

13. In a broom machine, the combination with the broom handle support, of a source of wire supply from which wire is delivered to the handle, a conveyer adapted to carry the corn toward the handle, a pusher adapted to push said corn against the handle, a breaker adapted to underride the wire, a cutter adapted to slice certain corn longitudinally, actuating mechanism for the conveyer, pusher and cutter, and means to render the cutter inoperative.

14. In a broom machine, the combination with a support for the broom-handle, of a reciprocating lever, a slide carried thereby, fingers carried on the slide adapted to receive corn and convey it toward the handle, means to reciprocate the lever, and means to move the slide along the lever.

15. In a broom machine, the combination with a support for the broom-handle, of a reciprocating lever, a slide carried thereby, fingers carried on the slide adapted to receive corn and convey it toward the handle, means to reciprocate the lever, a roller carried by the slide, and a cam along which said roller travels.

16. In a broom machine, the combination with the broom handle support, of a lever, means to reciprocate the same, fingers carried by the lever adapted to receive and convey corn toward the handle, cams, and devices controlled by the cams, in the reciprocation of the lever, to open and close the fingers.

17. In a broom machine, the combination with the broom handle support, of a lever, means to reciprocate the same, and a slide movable longitudinally of the lever, fingers carried by the slide, a cam, a roller carried by the slide adapted, in the reciprocation of the lever, to travel along said cam and thereby move the slide longitudinally of the lever, other cams, and devices connected with the fingers and adapted, in the reciprocation of the lever, to coact with the last named cams and open and close said fingers.

18. In a broom machine, the combination with the broom-handle support, of a reciprocating lever, intermeshing pinions carried thereby, fingers carried by the pinions adapted to receive corn and convey it toward the handle, cam devices, and an arm actuated by the cam devices to turn said pinions, thereby opening and closing the fingers.

19. In a broom machine, the combination with the broom-handle support, of a reciprocating lever, intermeshing pinions carried thereby, fingers carried by the pinions adapted to receive corn and convey it forwardly toward the handle, means to reciprocate said lever, an arm secured to one of said pinions, a roller thereon, a cam along which said roller travels in its return movement, said cam having an inclined section, a second cam above the first cam, a pivoted gate cam at the rear end of the second cam, its free end resting substantially at the rear end of the inclined section of the first cam, said roller in its return movement traveling along the first cam and in its forward movement traveling along the gate cam and the second cam and dropping off the front end of the latter onto the first cam, thereby actuating the arm to open and close said fingers.

20. In a broom machine, the combination with the broom-handle support, of a lever, means to reciprocate the same, a source of wire supply from which wire is delivered to the handle, a pusher carried by said lever adapted to push corn deposited on the wire toward the handle, and means to turn the handle support.

21. In a broom machine, the combination with the broom handle support, of a lever, means to reciprocate the same, a source of wire supply from which wire is delivered to the handle, a pusher carried by said lever adapted to push corn deposited on the wire toward the handle, said pusher being recessed to permit the wire to extend through it, and means to turn the handle support.

22. In a broom machine, the combination with the broom-handle support, of a lever, means to reciprocate the same, a source of wire supply from which wire is delivered to the handle, a pusher carried by said lever adapted to push corn deposited on the wire toward the handle, and a tension device between the lever and pusher adapted to forcibly press the pusher against the corn and handle as the lever moves beyond the handle support.

23. In a broom machine, the combination with the broom-handle support, of a lever, means to reciprocate the same, a source of wire supply from which wire is delivered to the handle, a pusher pivoted to said lever and adapted to push corn deposited on the wire toward the handle, a rod secured to the lever, a nut thereon, and a spring confined between the nut and pusher.

24. In a broom machine, the combination with the broom handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the same, a conveyer carried by the lever, means to move said conveyer below the wire in the forward movement of the lever and above the wire in the return movement thereof, a breaker carried by the lever, a roller thereon, and a cam along which said roller travels whereby the breaker is moved toward and from said wire.

25. In a broom machine, the combination with the broom handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the same, means supported by the lever to convey and push corn along said wire toward said handle, a cutter supported by the lever, and cams adapted, in the reciprocation of the lever, to coact with the cutter to operate the same.

26. In a broom machine, the combination with the broom handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the same, means supported by the lever to convey and push corn along said wire toward said handle, a cutter supported by the lever, a cam having an inclined section, a gate cam pivoted above the rear portion of the first

cam and whose free end rests substantially at the top of said incline, a second pivoted gate cam back of the first gate cam and adapted to move in and out of line therewith, and a roller on the cutter adapted, when the second gate is moved out of line with the first gate cam, to drop upon the rear end of the first cam, whereby the cutter is placed in position to operate on the forward movement of the lever.

27. In a broom machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the same, means supported by the lever to convey and push corn along said wire toward said handle, a pinion and a vertically movable bar both supported by said lever, a cutter connected to the pinion, a rack on the bar engaging the pinion, and means adapted, in the reciprocation of the lever, to move the rack bar vertically, thereby turning the pinion and operating the cutter.

28. In a broom machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the same, a conveyer carried by the lever adapted in the forward movement thereof to receive and convey corn toward the handle, a pusher carried by the lever adapted to push the corn toward the handle, a pinion carried by the pusher, a bar movable along the pusher, a rack on the bar engaging the pinion, a cutter connected to the pinion, a roller on the bar, and cams coacting with the roller, in the reciprocation of the lever, to move said bar and thereby operate the cutter.

29. In a broom machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the lever, a conveyer to take the corn and convey it toward the handle along the wire, a pusher to push toward the handle the corn carried by the conveyer, a breaker adapted to move toward the wire and reinforce it under downward strain, a cutter to cut the stalks longitudinally, said conveyer, pusher, breaker and cutter being carried by the reciprocating lever, and cam devices adapted in the reciprocation of the lever to coact respectively with the conveyer, breaker and cutter and cause them to operate.

30. In a broom-machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a lever, means to reciprocate the lever, a conveyer to take the corn and convey it toward the handle along the wire, a pusher to push toward the handle the corn carried by the conveyer, a breaker adapted to move toward the wire and reinforce it under downward strain, a cutter to cut the stalks longitudinally, said conveyer, pusher, breaker and cutter being carried by the reciprocating lever, and cam devices adapted in the reciprocation of the lever to coact respectively with the conveyer, breaker and cutter and cause them to operate, timing mechanism, and means actuated by the timing mechanism to rearrange the cam devices for the cutter to cause them to coact with the cutter to render it inoperative.

31. In a broom machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a carrier, means adapted to convey corn from the carrier and apply it to the handle at the latter's point of engagement with the wire, a driving shaft, a rotary member driven from the driving shaft, a second shaft driven from said rotary member, mechanism connecting the second shaft with the carrier, mechanism connecting the second shaft with the corn-operating means, mechanism connecting the rotary member with the handle-support, and means to disrupt the driving connection between said rotary member and the second shaft.

32. In a broom machine, the combination with the broom-handle support, of a source of wire supply from which wire is delivered to the handle, a carrier, means adapted to convey corn from the carrier and apply it to the handle at the latter's point of engagement with the wire, a driving shaft, a rotary member driven from the driving shaft, a second shaft, a clutch by means of which the rotary member drives the second shaft, mechanisms connecting the second shaft respectively with the corn-operating means and the carrier, mechanism connecting the rotary member with the handle support, timing mechanism, and means operated by the timing mechanism to unclutch the rotary member from the second shaft.

33. In a broom machine, the combination with a broom-handle support, of a carrier, means adapted to convey corn from the carrier and apply it to the handle, timing mechanism, driving mechanisms respectively for the corn-operating means, the carrier, the timing mechanism and the handle-support, and devices actuated by the timing mechanism to render inoperative all of said driving mechanisms except that for the handle shaft.

34. In a broom machine, the combination with a broom-handle support, of a carrier, means adapted to convey corn from the carrier and apply it to the handle, timing mechanism, a driving shaft, connections therefrom respectively to the carrier, the corn-operating means, the handle-support and the timing mechanism, and means operated by the timing mechanism and controlling the operation of the driving shaft.

35. In a broom machine, the combination with a broom-handle support, of a carrier, means adapted to convey corn from the car-

rier and apply it to the handle, timing mechanism, a driving shaft, connections therefrom respectively to the carrier, the corn-operating means, the handle-support and the timing mechanism, means to drive the driving shaft, a belt shifter to engage and disengage the driving shaft from its driving means, a tension device tending to move the belt shifter into position to disengage the driving shaft from its driving means, a belt-shifting lever by which the belt shifter is moved into position to engage the driving shaft with its driving means, means to hold the belt-shifting lever in its operative position, a control lever adapted when operated to disengage the belt-shifting lever from its holding means, and means operated by the timing mechanism to operate said control lever.

36. In a broom machine, the combination with the support for the handle, of means to convey and apply corn to the handle, timing mechanism, a shaft, driving mechanisms connecting said shaft with the timing mechanism and corn-operating means, driving means for said shaft, mechanism connecting said driving means with the handle-support, and devices operated by the timing mechanism to disrupt the connection between said driving means and shaft.

37. In a broom machine, the combination with the support for the handle, of means to convey and apply corn to the handle, timing mechanism, a shaft, driving mechanisms connecting said shaft with the timing mechanism and corn-operating means, driving means for said shaft, mechanism connecting said driving means with the handle-support, an unclutching lever adapted when operated to disrupt the connection between the driving means and shaft, a timing lever adapted to be actuated by the timing mechanism, and a rod connecting the two levers.

38. In a broom machine, the combination with the support for the handle, of means to convey and apply corn to the handle, timing mechanism, a shaft, driving mechanisms connecting said shafts with the timing mechanism and corn-operating means, driving means for said shaft, mechanism connecting said driving means with the handle-support, an unclutching lever adapted when operated to disrupt the connection between the driving means and shaft, a lever adapted to be actuated by the timing mechanism, a rod slotted at one end to receive the unclutching lever and connected at the other end to the timing lever, a manually operated lever, and a second rod slotted at one end to receive the unclutching lever and connected at the other end to the manually operated lever, whereby the unclutching lever may be restored to its normal position after its operation by the timing lever.

39. In a broom machine, the combination with the support for the handle, of a carriage, carrying said handle-support, driving mechanism to turn said support, and means to shift the carriage.

40. In a broom machine, the combination with the support for the handle, of a carriage carrying said handle-support, driving mechanism to turn said support, normally inoperative devices adapted to be actuated by said driving mechanism to shift the carriage, and means to place said devices in operative relation with the driving mechanism.

41. In a broom machine, the combination with the support for the handle, of a carriage carrying said handle-support, a secondary shaft also carried by the carriage, driving means for the secondary shaft, driving connections between the secondary shaft and support, a pinion, normally inoperative clutch mechanism adapted when operative to cause the secondary shaft to drive the pinion, a gear meshing with the pinion and adapted when moved axially to shift the carriage, a cam on the gear, a roller engaging the cam, and means to render the clutch mechanism operative.

42. In a broom machine, the combination with a rotary support for the handle, of a secondary shaft, driving means for the secondary shaft, a driving gear on the shaft, a driven gear meshing therewith loose on the handle-support, a driven wheel loose on the handle-support, a driving wheel on the secondary shaft adapted to intermittently engage the driven wheel on the handle-support, and a clutch feathered on the handle-support and adapted to be moved to clutch either the driven gear or the driven wheel to the support, whereby the handle may be either turned step by step or constantly rotated.

43. In a broom machine, the combination of a rotary handle support, a source of wire supply from which wire is delivered to the handle, reciprocating means adapted to convey and apply corn to the handle, means to simultaneously turn the handle-support intermittently, thereby wiring the corn as it is applied to the handle, means to rotate the handle-support continuously, and means to disengage the support from its intermittent driving means and to engage it with its continuous driving means, thereby coiling the wire continuously around the corn.

44. In a broom machine, the combination with a plurality of supply carriers and their driving shafts, driving means therefor, clutch mechanism for each shaft adapted when rendered operative to cause said driving means to drive the respective shafts, an intermediate transfer carrier, a handle-support, means to convey corn from the transfer carrier and apply it to the handle, timing mechanism, driving means respectively for the timing mechanism, the handle-support and the transfer carrier, unclutching levers normally holding their respective clutch

mechanisms inoperative, and timing levers connected respectively to the unclutching levers and adapted to be successively operated by the timing mechanism to successively withdraw the unclutching levers and permit the clutch mechanisms to successively operate.

45. In a broom machine, the combination with a support for the handle, or driving mechanism to turn the support, means to convey and apply corn to the handle, driving mechanism for the corn-operating means, a source of wire supply adapted to supply wire to be wrapped around the corn applied to the handle as the handle is turned, a pulley around which said wire extends, and brake mechanism adapted to yieldingly resist the rotation of said pulley.

46. In a broom machine, the combination with a support for the handle, of driving mechanism to turn the support, means to convey and apply corn to the handle, driving mechanism for the corn-operating means, a source of wire supply adapted to supply wire to be wrapped around the corn applied to the handle as the handle is turned, a source of supply for the wire, a two-part roller between the source of supply and the handle-support, said wire extending about said roller and between the two parts thereof, and a spring tending to move the two parts toward each other.

47. In a broom machine, the combination with a support for the handle, of driving mechanism to turn the support, means to convey and apply corn to the handle, driving mechanism for the corn-operating means, a source of wire supply adapted to supply wire to be wrapped around the corn applied to the handle as the handle is turned, a source of wire supply, a two part roller between the source of supply and the handle-support, one of said parts having an inwardly-extending annular shoulder and the other part having an inwardly-extending annular projection extending outside the shoulder, said wire extending between said parts, and a spring tending to move the two parts toward each other to hold the wire from movement about the roller except when forcibly pulled.

48. In a broom machine, the combination with a support for the handle, of driving mechanism to turn the support, means to convey and apply corn to the handle, driving mechanism for the corn-operating means, a source of wire supply adapted to supply wire to be wrapped around the corn applied to the handle as the handle is turned, a source of supply for the wire, a pulley between the source of supply and the handle-support and around which said wire extends, brake mechanism adapted to yieldingly resist the rotation of said pulley, a tension roller between said pulley and handle-support and engaging said wire, and a two part roller between the tension roller and the handle-support, the wire extending about the last named roller between the two parts thereof, and a spring tending to move the parts of the roller toward each other.

49. In a broom machine, the combination with the handle-support, of reciprocating means to convey the corn to the handle, and a beater working in unison with said conveying means to push toward the handle the outer ends of the corn.

50. In a broom machine, the combination with the handle-support, of a shaft, means to oscillate the same, a lever secured to the shaft, means carried by the lever to convey and apply corn to the handle, said means acting upon the inner part of the corn, and a beater secured to the shaft to engage the outer ends of the corn.

51. In a broom machine, the combination with a broom-handle-support, of a source of wire supply from which wire is delivered to the handle, means to deliver corn to the part of the wire contiguous to the handle, and to simultaneously bend down the ends of the corn on either side of the wire.

52. In a broom machine, the combination with a broom-handle support, of a source of wire supply from which wire is delivered to the handle, a pair of fingers adapted to take the corn and convey it toward the handle, said fingers working respectively on opposite sides of the wire, and means to move down the fingers, thereby bending the ends of the corn below the level of the wire.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 30th day of July, 1906.

CHARLES CLEMENS.

Witnesses:
M. M. HAMILTON,
A. M. WRIAN.