

W. W. Cumberland.

Felting Machine.

N^o 13698

Patented Oct. 23, 1855.

Fig. 1

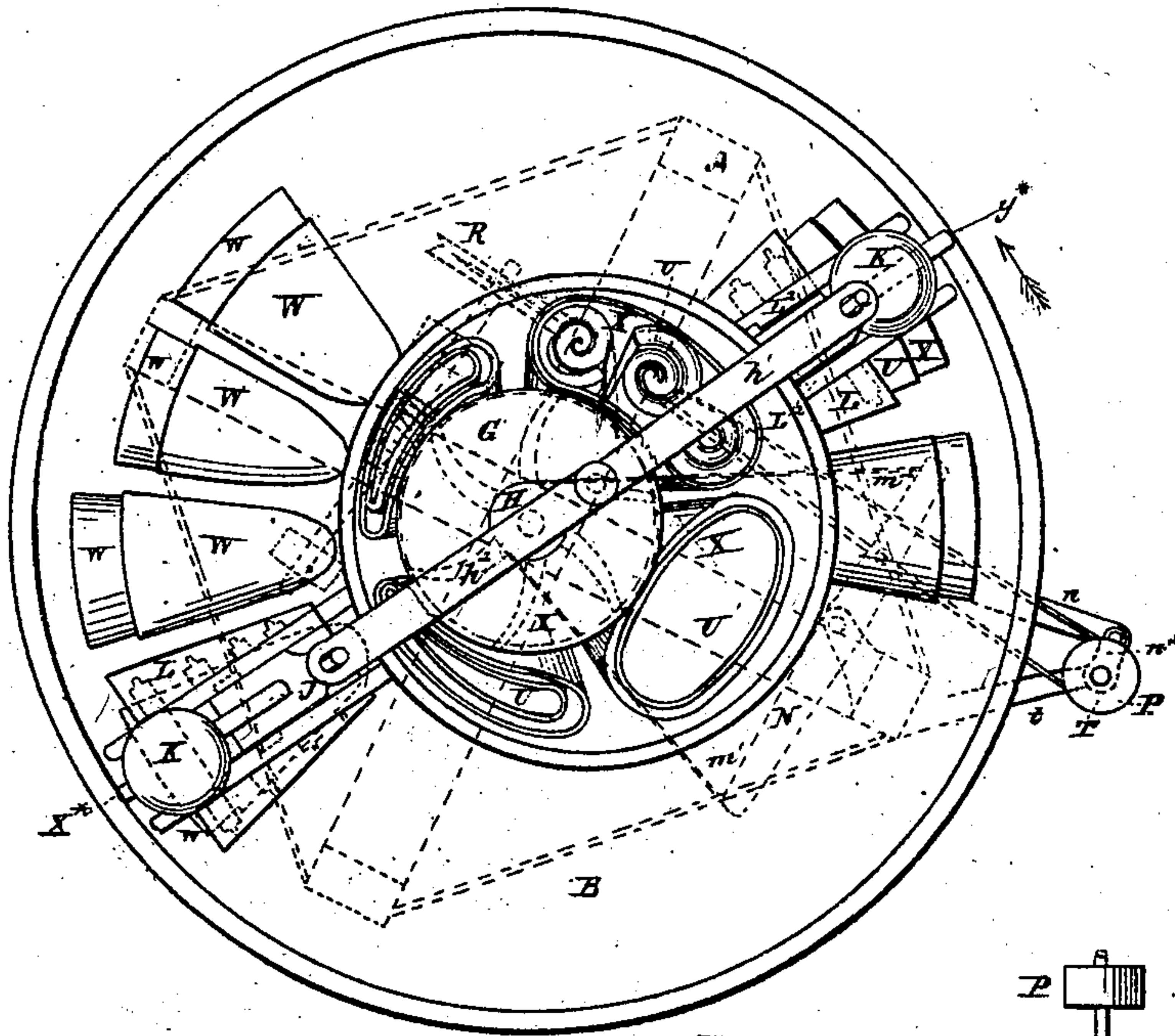
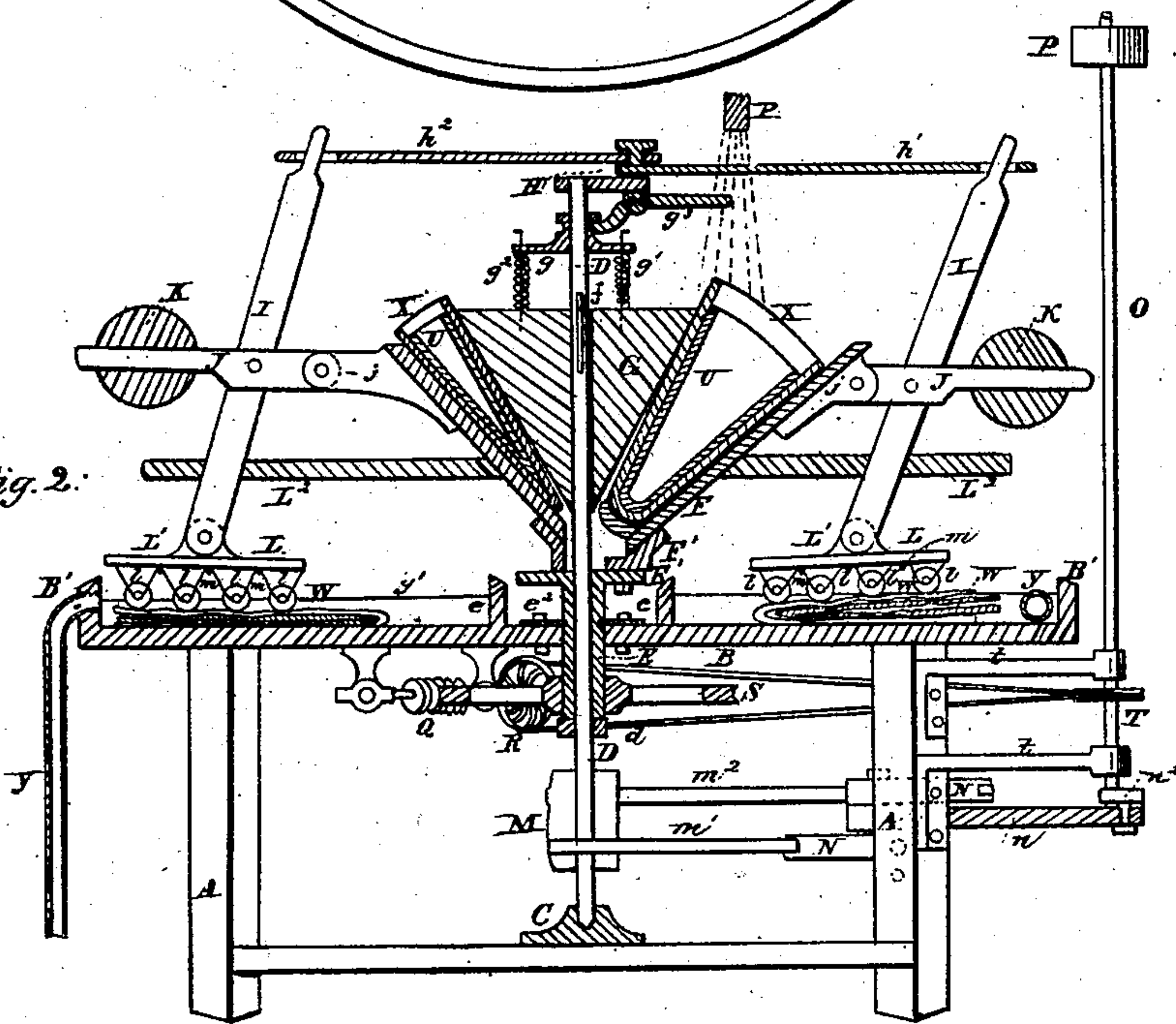


Fig. 2.



Inventor.

W. W. Cumberland

UNITED STATES PATENT OFFICE.

WM. W. CUMBERLAND, OF NEWARK, NEW JERSEY.

FELTING HAT-BODIES.

Specification of Letters Patent No. 13,698, dated October 23, 1855.

To all whom it may concern:

Be it known that I, WILLIAM W. CUMBERLAND, of Newark, in the county of Essex and State of New Jersey, have invented
5 certain new and useful Improvements in Machinery for Felting Hat-Bodies, and do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying
10 drawings, forming part of this specification.

This invention has for its object the felting, sizing or planking of hat bodies formed of wool, fur or other suitable felting materials.

15 It consists of certain apparatus for covering and protecting the hat body in its tender state from rubbing either against itself or against the hard parts of the machinery, and in certain mechanism for giving a bend-
20 ing vibrating, sliding, or crimping motion to the hat body while thus protected and in combination therewith (after the hat body has been partially felted by the preceding process) of certain machinery for rolling
25 the hat body upon a plane surface, and causing it to turn, while being thus rolled, so as to present a new line of surface to the rollers and to be crozed in a new place, whereby the felting or planking of hat
30 bodies is facilitated and performed with a great saving of labor.

Figure 1 is a top view or plan of the machine. Fig. 2 is a vertical section through the points x^* , y^* as seen in Fig. 1, looking
35 in the direction of the arrow point.

The same letters refer to the same parts in different figures and to similar parts in the same figures.

40 A is a suitable framework of timber consisting of four uprights braced together for supports, and two cross pieces framed into them so as to form a support for a step C of the vertical shaft D at their intersection in the center of the frame. Upon the four
45 uprights a plane table B of circular form is fastened having a ledge or projection B' around it which will hold water upon the table B.

50 D is a vertical shaft passing through the center of the table B and secured from the overflow of water by the ledge e surrounding it of the same height as the ledge B' around the outside of the table B.

E is a sleeve free to revolve upon the

shaft D, having a flanch E' upon upper 55 end thereof which is above the surface of the table B and passes through the table and rests upon a collar (d), upon the shaft D and is held from rising up by the plate e^2 secured to the table B and fitting in a groove 60 in the sleeve. The sleeve E forms the shaft of a worm wheel S below the table, which is driven by means of a worm Q supported in suitable bearings below the table B, the worm Q has upon its shafts a pulley R 65 driven by a belt from the pulley T on the vertical driving shaft O which is rotated through the pulley P from some prime mover.

F is a large hollow cone made of wood or 70 other suitable material the larger end above, fastened in a manner capable of adjustment by means of bolts and wedges or pivoted to the flange E' of the sleeve E so that it may be set eccentrically from the shaft D around 75 which it turns as an axis, the geometrical axis of the cone E being placed oblique with respect to the axis of motion and adjusted to the degree of obliquity that will suit the kind of hat to be operated upon. The inner 80 surface of the cone F may be corrugated spirally or radially for the purpose of giving additional friction.

G is a smaller solid cone, playing loosely in a vertical direction upon the shaft D but 85 revolving with it by means of a feather f upon the shaft D which fits a corresponding groove in the solid cone G. The surface of G may also be corrugated spirally or radially and covered with cloth or other sub- 90 stance, for the purpose of additional friction as will be mentioned hereafter.

J is a sliding collar upon the shaft D, with projections upon either side to which the cone G is attached by hooks g' g^2 for 95 the purpose of raising and lowering the cone G and for increasing the pressure upon the same by means of the spiral springs surrounding the hooks g^1 g^2 the cone G being raised or lowered by means of a forked 100 lever g^3 fitting into the groove in the collar g , and pivoted to the crank H.

H is a crank upon the upper end of the vertical shaft D designed, when the shaft is rotated or vibrated to operate the levers 105 I, I, by means of the connecting rods h^1 h^2 .

I, I, are vibrating yielding levers which are vibrated in a horizontal direction in

lines radiating from the shaft D, by means of the crank H and connecting rods h^1 h^2 . The fulcrum or center of motion of the levers I, I, is placed in the levers J, J, which permits it to rise and fall in a vertical line.

J J are levers pivoted at one end to the outside of the hollow cone F and having the fulcrums of the levers I, I near the middle of them, the other end being extended through the movable weight K, which furnishes a handle for raising the levers I, I.

K K are weights upon the levers J J of such dimensions as shall be adapted to the work under operation and graduated on the different levers so as to bring more pressure upon the hat body as it is longer under the operation of the machine.

L L are roller frames having several rollers l , l , l , l , in them, the axes of which are made to turn in bearings which are capable of yielding slightly so as to accommodate themselves somewhat to the surface upon which they roll. These roller frames L L are pivoted to the lower end of the vibrating levers I, I and are moved by them in the vibrations, and by the arrangements of the several parts are; as will be seen in the drawing Fig. 2, kept in contact with the surface upon which they roll in the vibrations of the frames; by the weight of the levers and by the adjustable weight K, but only in lines radiating from the shaft D as the joints $L' L'$ do not admit of motion in any other direction. The roller frames L, L, in addition to the vibratory motion communicated to them by means of the crank H and connecting rods h^1 , h^2 have a rotary motion around the shaft D caused by the pulleys T and R, worm Q, worm wheel S, which turns the hollow cone F with the pivots j , j , levers J, J, and I, I, with the roller frames L L attached to them. To prevent too much strain on the joints of the levers, guide pieces $L^2 L^2$ are attached to the cone F and bear upon the sides of the levers I, I, below the pivots j , j . Only two roller frames are shown but I contemplate to employ as many as are needed to fill the space of the table B only making suitable allowance for clearance in the motions.

M is a pulley upon the shaft D, upon opposite sides of which are fastened the ends of two belts m^1 m^2 , the other ends of which are attached to the opposite ends of a lever N pivoted near the middle and vibrated by the connecting bar n , by the revolution of the crank n^2 on the lower end of the driving shaft O; the vibrations of the lever N causes the pulley M with the shaft D to revolve nearly a whole revolution in one direction, and then as far in the opposite direction by the alternate pull upon the belts m^1 , m^2 , attached to its opposite ends.

O is the driving shaft supported in a ver-

tical position by two standards firmly bolted to the frame A, having suitable boxes in them.

P is the driving pulley receiving power from some prime mover and communicating motion to the machinery by means of the pulley T and crank n^2 .

Q is a worm or endless screw driven by the pulley R and working into the worm wheel S, giving a slow rotary motion to the hollow cone F, levers I, I, and roller frames L, L, around the shaft D.

R is a pulley upon the worm shaft.

S is a worm wheel attached to sleeve E and drives it.

T is a V pulley upon the driving shaft P and bolted to R.

X is an india rubber or other elastic yielding cone, the inside surface of which may be covered with knit cloth. Into this the hat body is placed in its tender state. This cover with the hat body or hat bodies contained in it, is then placed between the hollow cone F and the solid cone G and by means of the friction of the surfaces of G and F upon the opposite sides of the cover X it is caused to roll first in one direction and then in the opposite, by the vibrations of the cone G, while by the slow revolution of the cone F upon the shaft D the cover is gradually brought from the more open to the narrower space between the cones, G and F, when F is placed eccentrically to the shaft D as seen clearly in Figs. 1 and 2, and thus more pressure is applied to them and the crimping or rolling becomes more effective as they are more prepared to resist it. After passing the narrowest part, they are again allowed to expand and the hat bodies to assume a new position in the covers, which tends to prevent the felting of the parts of the hat body to each other if it is desired to have them subjected to the operation during more than one revolution of the cone F, but if not, they can be removed more readily when in the widest part.

W is the hat body and w the india rubber cone inside of the hat body W for the purpose of diminishing the friction between the sides of the hat body and permitting it to cross by the turning of the roller frames around the shaft D which causes the hat body to turn upon its axis and be rolled in a new line of the vibration of the roller frame.

U is the hat body inclosed in the india rubber cone X when operated upon by the hollow cone F and solid cone G.

Y is a pipe for the supply of hot water or steam which is brought up through the table B and extends nearly around it near the ledge B' with openings at suitable distances for the supply of hot water to the table B, y' showing the water line on the

table and y the escape pipe for the superfluous water.

p , is a pipe for the supply of hot water to the cones G and F.

- 5 The construction of the several parts of the machine and their operation having been now explained, I will proceed to describe the process of felting a hat body in the machine.
- 10 The machine with a full number of roller frames requires two attendants, who stand upon opposite sides of the machine, usually upon those sides where the motion of the roller frames is the shortest on account of
- 15 their working in a line near that of the crank H, but they may from time to time pass part way around the machine as may be necessary in regulating the action of the several parts.
- 20 The hat bodies as they come from the hardening operation used in forming them, are first placed in the india rubber cones X X, the inside of which are lined with cloth, two or three being placed within each
- 25 other and separated from each other by their cones of rubber. The rubber cones X X with their contents are then placed in the hollow cone F, hot water being poured upon them through the tube p , the machine
- 30 being in motion, they are operated by the friction of the cone G as it revolves back and forth and are gradually carried around under the narrowest place between the cones G and F by the slow revolution of the cone
- 35 F upon the shaft D. Other cones X filled in the same way are placed at intervals so as not to rub against each other in their motions. The cone X is introduced into the cone F at the part which is farthest from
- 40 the center, and when it arrives at the same part again it is withdrawn and another substituted in its place, while the one just withdrawn undergoes examination and is prepared to be again introduced in its
- 45 turn with a less number of bodies in it, and after the bodies have acquired some degree of toughness a number of them after being rolled up singly into a small conical bundle by laying them flat upon a table and roll-
- 50 ing them down one of the two sides or across the end, and placing several of these bundles in the cone X to be further operated upon in a similar way to that just described.
- 55 After the hat bodies are sufficiently shrunk and thickened by the process just described, they are taken out of the cone X and opened. The thin india rubber cone w , is then introduced into each of them, and
- 60 they may be placed again in the covers X or not as the case requires. When they are thus prepared they are then placed upon the table B under the roller frame L by taking hold of the lever J and raising the
- 65 weight K with the roller frame L, under

which the hat body is introduced, with the apex toward the center of the table B. After passing half way around the table they are withdrawn by the attendant on the opposite side, without the necessity of stop- 70 ping the machine, in the same manner as they are introduced. While under the operation of the vibrating roller frame, the hat bodies are crozed by the gradual turning of the roller frame around the shaft D, and 75 are rolled with a gradually increasing motion from the points opposite the place where the crank H is in a line with the center of the movement, at which points, if the shaft D vibrates less than a whole revolu- 80 tion in one direction the vibration is the least at each motion; and the hat bodies are also subjected to a gradually increasing pressure, depending upon the gradually heavier weights, and increased leverage used 85 upon the successive roller frames.

Having described my machine and its mode of operation and the process of felting a hat body, I will describe a modification of it which I contemplate using. This modi- 90 fication consists in attaching the hollow cone F to the table B which instead of being fixed to the frame work A is made to revolve slowly with the cone F, (being supported near the outside upon friction rollers for 95 the purpose of preventing too much strain upon the shaft D,) while the roller frames L L instead of being pivoted to, and revolving slowly with the cone F are pivoted to standards fixed to the frame A and do not 100 revolve. The crank H is upon the lower end of the shaft D. The levers J J are pivoted to the upper end of the levers I, I and have the roller frames L L pivoted at one end of them, while the other end is 105 drawn up by weights acting over pulleys by cords hooked to them, for the purpose of giving pressure upon the hat bodies under the roller frames L L. The motions and mode of operation are substantially as be- 110 fore described.

I further contemplate using canvas instead of india rubber for the covering cones X X before described, by placing an elastic cone inside the hat body, before covering it 115 with the cone X, which by its elasticity will keep the cone X when made of canvas extended, and keep it in contact with the cones F and G as before described. When a heavier pressure is desired upon the hat 120 bodies when under operation in the cone F than can be obtained by the use of open elastic cones such as heretofore described, I use air tight india rubber cones partially filled with air or water or both placed in- 125 side of the hat bodies.

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

1. The arrangement and combination, in the manner substantially as set forth, of 130

the hollow cone F and solid cone G placed within it, the larger ends of said cones being uppermost, having a wedging space between them, of a proper size and angle, whereby
5 the hat body placed between them in the wedging space will tend to tighten itself by its own weight, in the space, as it is rolled between the cones, as herein fully set forth.

10 2. The combination and arrangement, in the manner substantially as described, of the reciprocating yielding roller frames L L with the table B one of them having such a motion around the shaft D as to croze or
15 change the position of the hat body by the friction of the rollers upon the hat body upon one side and the friction of the hat body, on the table on the other side.

20 3. The combination of the weights K K, the roller frames L L levers I I and J J and the pivots j j attached to the cone F for the purpose of lifting the weights of the cone F and thus diminishing the friction of
25 it upon the collar upon the shaft D on which it rests below.

4. I do not claim felting hat bodies by means of rubbing surfaces carrying a roll between them nor by means of an elastic cone carrying a roll, but

I claim as my invention—

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Partially felting hat bodies, inclosed in their more tender state in a hollow elastic cone of vulcanized india rubber or other suitable material lined with cloth, the larger end uppermost, in which the hat body is
35 placed in an open conical form corresponding to that of the cone, by means of a process of bending or crimping, produced by the revolution of the elastic cone between two surfaces at a less distance from each other
40 than the diameter of the cone but not so near to each other as to cause the sides of the hat body within it to rub against each other, or the hat body to form itself into a roll.

WM. W. CUMBERLAND.

Witnesses:

STEPHEN D. GOULD,
ELLIS DUNN.