

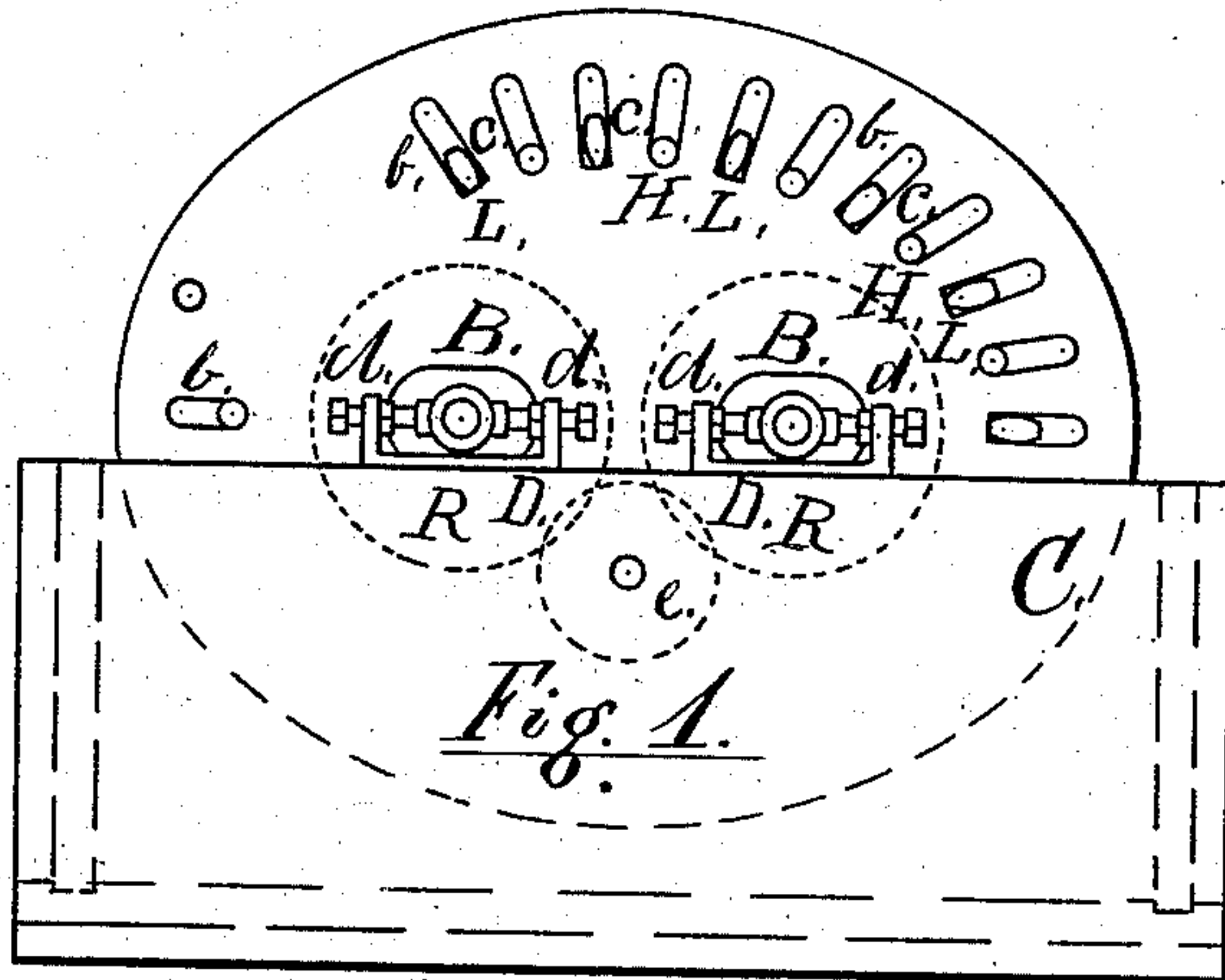
(No Model.)

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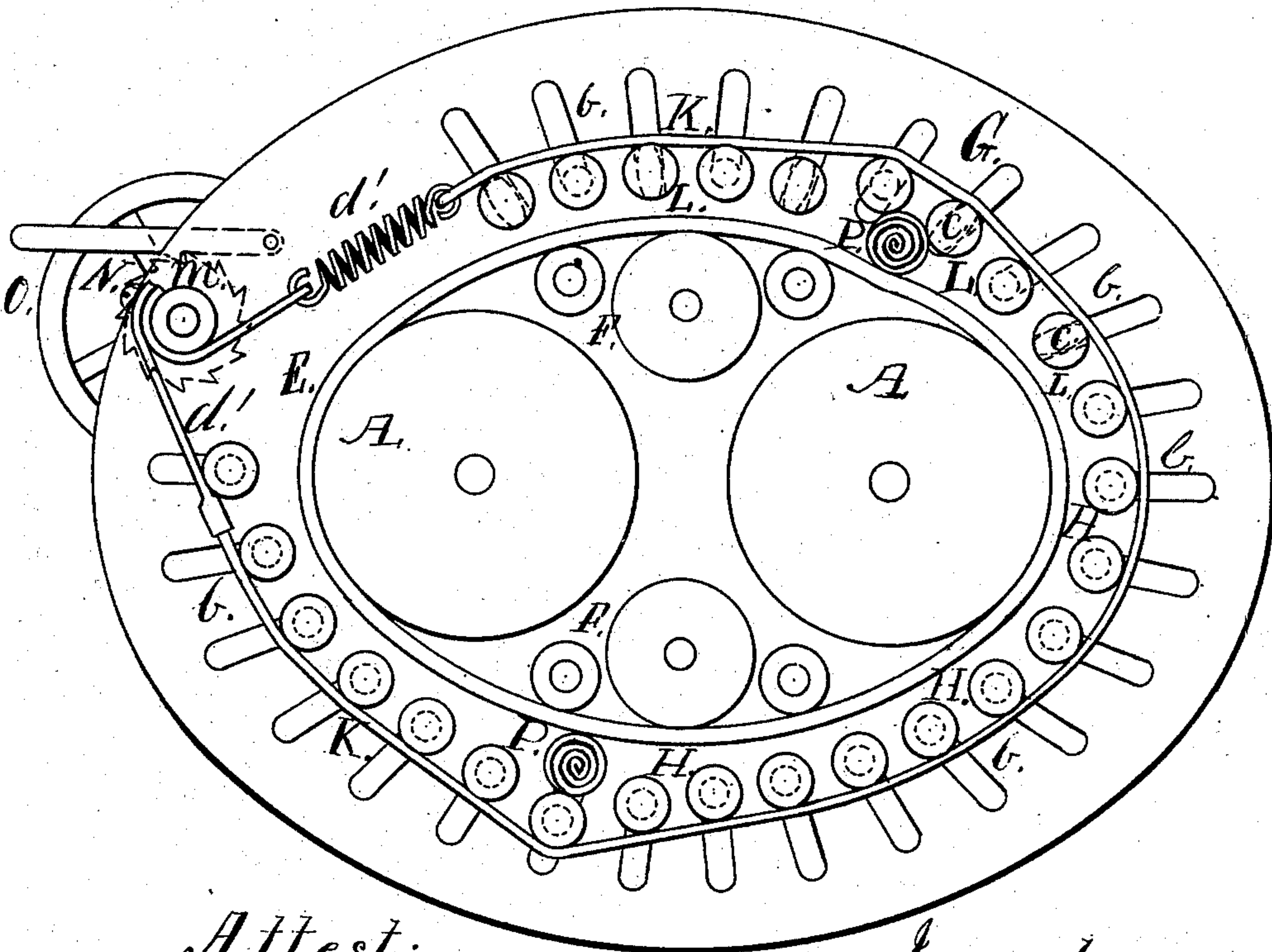
N. HARPER.  
Felting or Hat Body Sizing Machine.

No. 237,269.

Patented Feb. 1, 1881.



*Fig. 2.*



*Attest:*

*Inventor.*

*Charles B. Hays*  
*Charles M. Knapp*

*Nathan Harper*  
*By Horace Harris*  
*Atty*

(No Model.)

2 Sheets—Sheet 2.

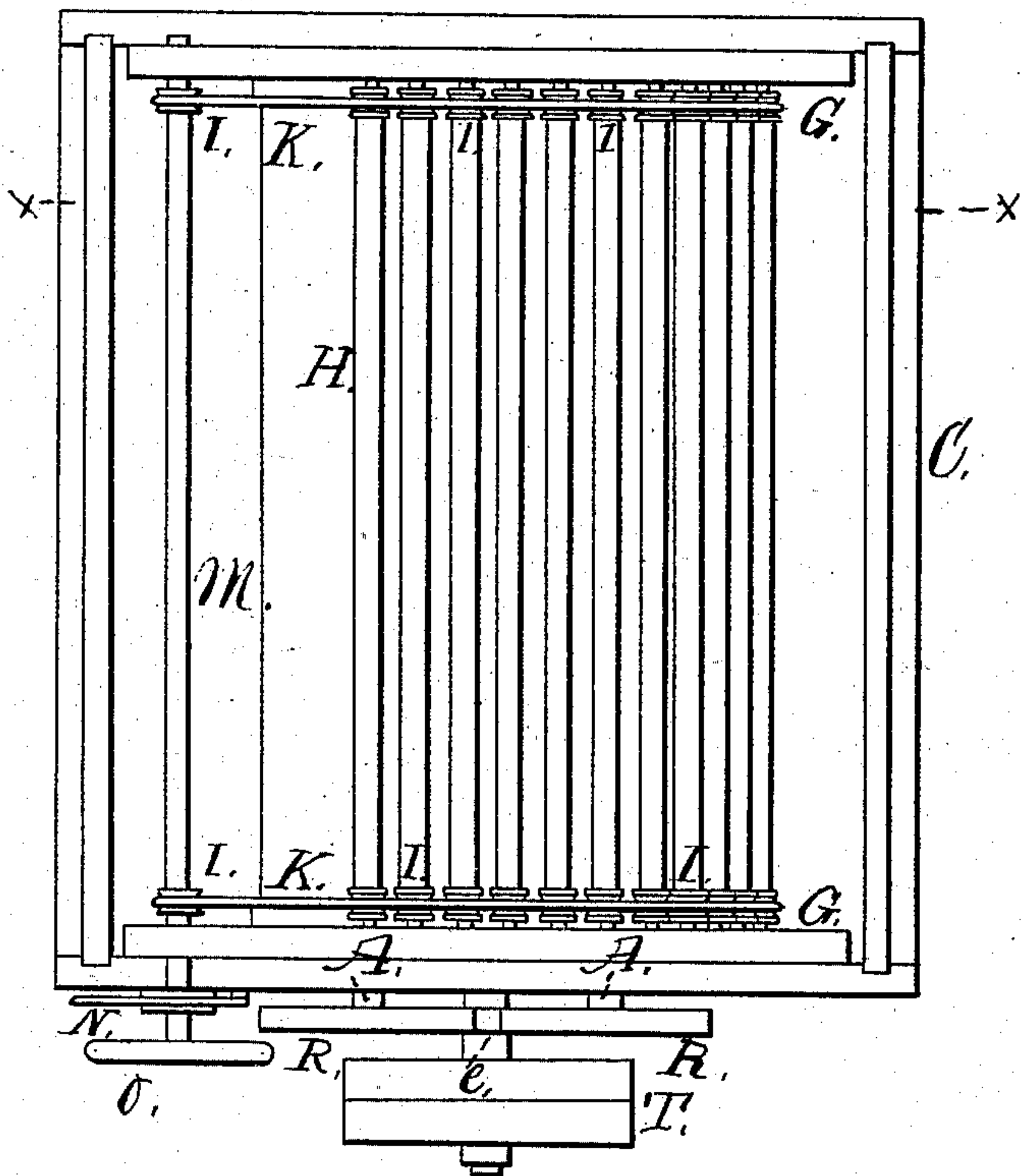
N. HARPER.

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**No. 237,269.**

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Fig. 3.



*Fig. 4.*

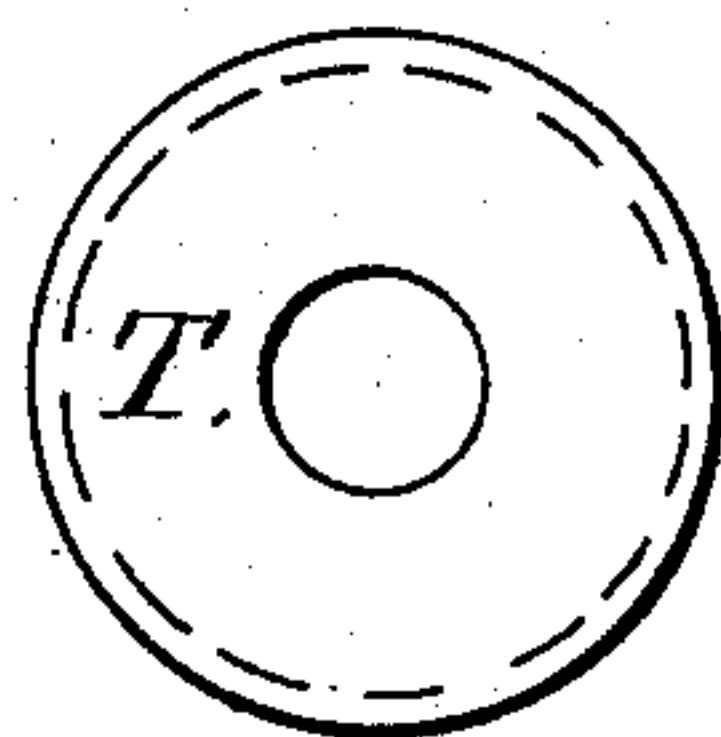


Fig. 5.

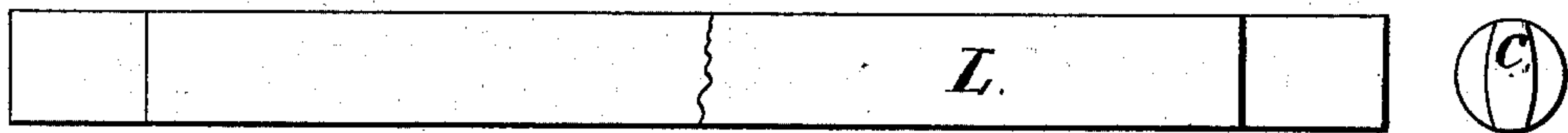


Fig. 6.



*Attest:*

*Inventor.*

To Charles B. Hays  
Charles M. Knapp

Nathan Harper  
By Donace Harris  
att'y



# UNITED STATES PATENT OFFICE.

NATHAN HARPER, OF NEWARK, NEW JERSEY, ASSIGNOR TO AMERICAN  
HAT SIZING MACHINE COMPANY, OF SAME PLACE.

## FELTING OR HAT-BODY-SIZING MACHINE.

SPECIFICATION forming part of Letters Patent No. 237,269, dated February 1, 1881.

Application filed May 27, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, NATHAN HARPER, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful  
5 Improvement in Felting or Hat-Body-Sizing Machines, of which the following is a specification.

My invention relates to improvements in machines for felting or sizing hat-bodies or  
10 other fabrics; and it consists in the arrangement of a series of pulleys or rollers in an oval form, and carrying an endless felting apron or belt; in the arrangement of independent pressing slats or rollers and anti-friction pulleys,  
15 operating in combination with the aforesaid pulleys or rollers, the suspended adjustable bearings for said pulleys or rollers graduating the tension or flexibility of the belt, and the improvement in pressing-bands used in combination with said pressing slats or rollers.

Figure 1 is an end view of the machine, the driving-gears being indicated merely by dotted circles. Fig. 2 is a transverse section on a line of  $x x$  on Fig. 3. Fig. 3 is a plan, and  
25 Figs. 4, 5, and 6 are detailed views.

In my construction A are two main pulleys or rollers, forming the ends of an oval figure, hung by their shafts in the adjustable bearings B, which bearings are secured on the top  
30 of the tank C, which supports the boxes D, which are suspended on the points of screws  $d$ , by which they are moved and adjusted in either direction. This adjustment gives full control over the tension and flexibility of the  
35 felting apron or belt E running over said pulleys. F are a double series of pulleys or rollers, of which any number may be used, hung between the pulleys A in disks G, and completing the oval figure. The belt E is formed  
40 of any suitable flexible material, and may have its surfaces either smooth or rough, embossed, ribbed, ridged, corrugated, or slatted in any form or direction that may be preferred. It is here shown with a plain surface.

H are a series of pressing-rollers hung in slots  $b$  in the disks G, parallel with the surface of the belt E, and free to revolve on their axis and to move in said slots toward or from  
45 the belt.

50 I are small anti-friction pulleys, placed on

each end of the pressing-rollers H to reduce the friction of the pressing-bands K.

Pressing-slats L may be used instead of or to alternate with the rollers H. These slats and their bearing ends may be made of any  
55 desired form, but are here shown cylindrical, with elliptical-shaped bearing ends C, as shown in Fig. 2. This form of bearing ends allows of a rocking motion to the slat on its axis in its movements toward and from the belt E. As  
60 the slats do not revolve they offer more resistance to the passing of the hat-rolls P than the rollers H, and thereby increase the friction and rubbing on the surface of said hats. These  
65 slats may be provided with anti-friction pulleys on their ends, if desired.

In consequence of the increased resistance and friction afforded by the pressing-slats, their employment in alternation with the pressing-rollers, as shown in Fig. 2, furnishes a  
70 greater degree of variation in the intermittent pressure between the two than could be obtained by either alone. The pressing-rollers and slats are here shown with smooth surfaces; but, if desired, they may be fluted or  
75 corrugated longitudinally, or ribbed or beaded at either right angles or spirally to their axis. Each of the pressing rollers or slats is independent of the others, and moves outwardly just so far as any individual roll of hats makes  
80 it necessary. This allows a number of hat-rolls of different diameters to be operated in the machine at the same time, and secures the desired degree of pressure on each.

The pressing-bands K are made of any suitable  
85 non-elastic material, and provided with a spring or springs,  $d'$ , at their respective ends. The springs may be of india-rubber or other similar elastic material, or of spiral metal, as shown in Fig. 2. The bands K are secured to  
90 the tension-roller M, which roller is operated by the band-wheel O and pawl and ratchet N, by which the tension of the pressing-bands can be increased or diminished at the pleasure of the operator. The bands can be run direct-  
95 ly over the pulleys H or slats L without the intervention of the anti-friction pulleys; but the employment of these pulleys will in either case diminish the friction on the bands.

It is found in practice that elastic pressing- 100



bands utterly fail to accomplish the purpose, and that any attempt to tighten such bands by the tension-rollers only elongates their ends, without bringing any increased tension on the  
 5 portion of the bands at the opposite side of the machine farthest from the tension-roller; but by the use of non-elastic material for the bands the tension is brought equally upon the whole length of the bands, while the springs at their  
 10 ends enable them to yield sufficiently to accommodate the hat-rolls in passing under the pressing rollers or slats.

The disks are attached to the tank C, and have the oval shape corresponding with the  
 15 arrangement of the pulleys and belt. These disks support the pressing-rollers and pressing-slats in slots *b*, made for the purpose. The slots radiate toward, but not through, the periphery of the disks.

20 Power is applied to the machine in any of the usual ways. It is here shown as operating by a pulley and gearing. The stud is secured by a flange to the side of the tank, and carries the driving-pulley T and a pinion, *e*,  
 25 which pinion meshes into the two gear-wheels R, secured on the ends of the shafts of pulleys A.

The operation of the machine and the sizing of the hats is as follows: Hot water being supplied to the tank and power to the machine,  
 30 the hat-bodies are furnished to the operator in the same condition as to hand-sizers. They are then rolled in suitable cloths, from four to six in each, and several such rolls passed into the machine through the opening S, left be-  
 35 tween the rollers for the purpose. They are then carried around between the surface of the felting-belt and the pressing rollers or slats. In their passage through the machine the hat-rolls are caused to revolve rapidly on their  
 40 own axis by means of the belt and pressing-rollers, the same as in hand-sizing, and thereby accomplishing the same results, but doing the work more evenly and uniformly, and in much less time.

45 The felting or sizing machines heretofore constructed and containing any of the general features of my machine have been of two kinds, one class consisting of those employing a number of revolving pulleys or rollers ar-  
 50 ranged in a straight line in either a single or a double series, and carrying a traveling felting apron or belt, and the other class embracing those which contain only a single revolving drum without any traveling felting  
 55 apron or belt. The latter class has the advantage of rapidity of action due to its form and to the continuity of the friction-surfaces, but lacks the lively flexibility of movement im-

parted to a traveling felting-belt, while the former class secures this lively flexibility of the 60 belt, but loses in part the rapidity of action of the single revolving drum, and also utterly fails to secure an equal pressure on a series of hat-rolls of different diameters passing through the machine at the same time, or even on a 65 single roll in its passage from one end of the machine to the other. My invention, by its oval form and other elements, enables me to combine in one machine the special advantages of both these classes, while it overcomes 70 or avoids the characteristic defects of each.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a felting or sizing machine, a series of revolving pulleys or rollers arranged in an oval 75 form and carrying an endless felting apron or belt.

2. An endless revolving felting apron or belt constructed substantially as stated and traveling on a series of pulleys or rollers ar- 80 ranged in an oval form.

3. In combination with a series of pulleys or rollers arranged in an oval form and carrying an endless felting-belt, E, the independent pressing-rollers H, having the movements 85 as set forth.

4. In combination with a series of pulleys or rollers carrying an endless felting-belt, the adjustable bearings B, substantially as and for the purpose specified. 90

5. In combination with a series of pulleys or rollers carrying an endless felting-belt, the pressing-rollers and anti-friction pulleys I, substantially as set forth.

6. In combination with a series of pulleys 95 or rollers carrying an endless felting-belt, the independent pressing-slats L, substantially as and for the purpose specified.

7. In combination with a series of pulleys or rollers carrying an endless felting-belt, the 100 rollers H and slats L, substantially as set forth.

8. In combination with a series of rollers or pulleys carrying an endless felting-belt, the rollers H or slats L, and pressing-bands K, and tension-springs *d*, substantially as and for the 105 purpose specified.

9. In combination with a series of pulleys or rollers carrying an endless felting-belt, the adjustable bearings B, tank C, tension-roller M, pawl and ratchet N, and bands K, substan- 110 tially as and for the purposes specified.

NATHAN HARPER.

Witnesses:

HORACE HARRIS,  
 CHARLES B. HAYS.