(No Model.) 3 Sheets—Sheet 1.

N. HARPER.

HAT SIZING MACHINE.

No. 278,332. Patented May 29, 1883.

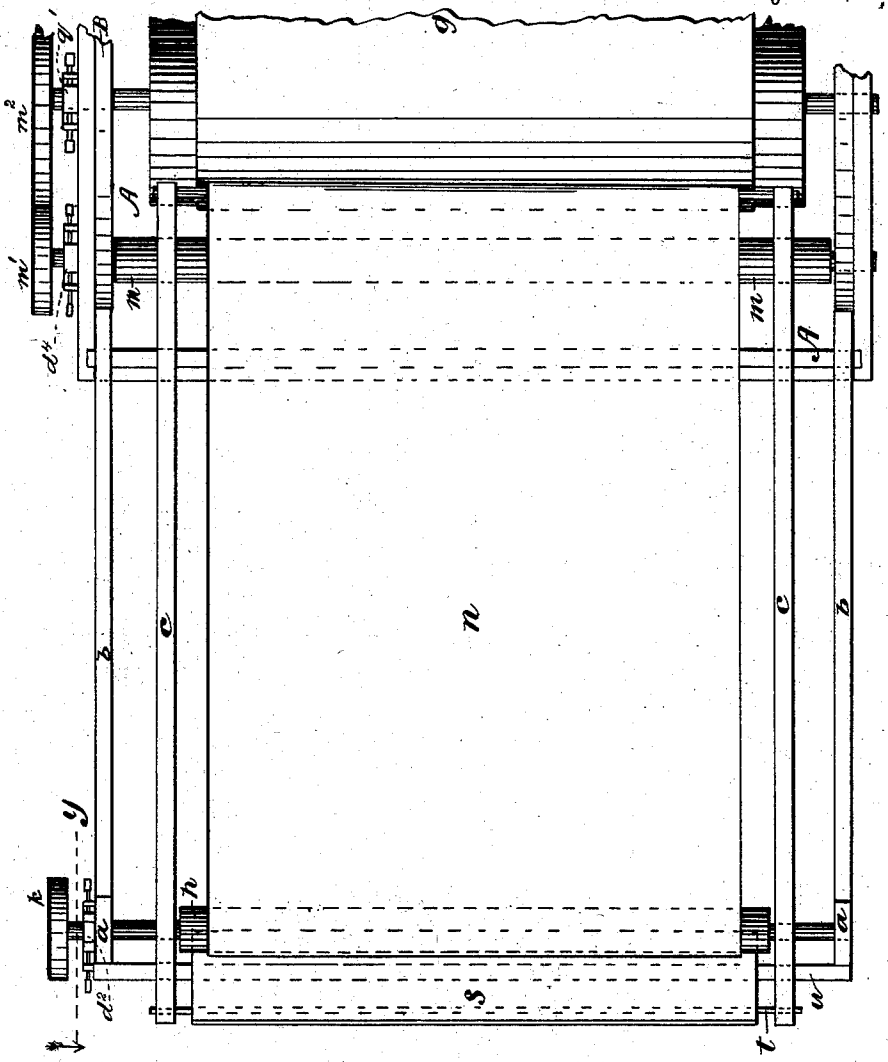


Fig. 1.

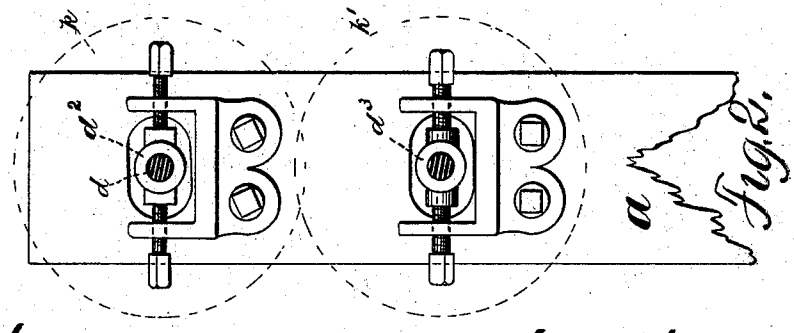


Fig. 2.

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Chas. T. Winters.

Inventor:

Nathan Harper,

by

O. Drake.

Atty.

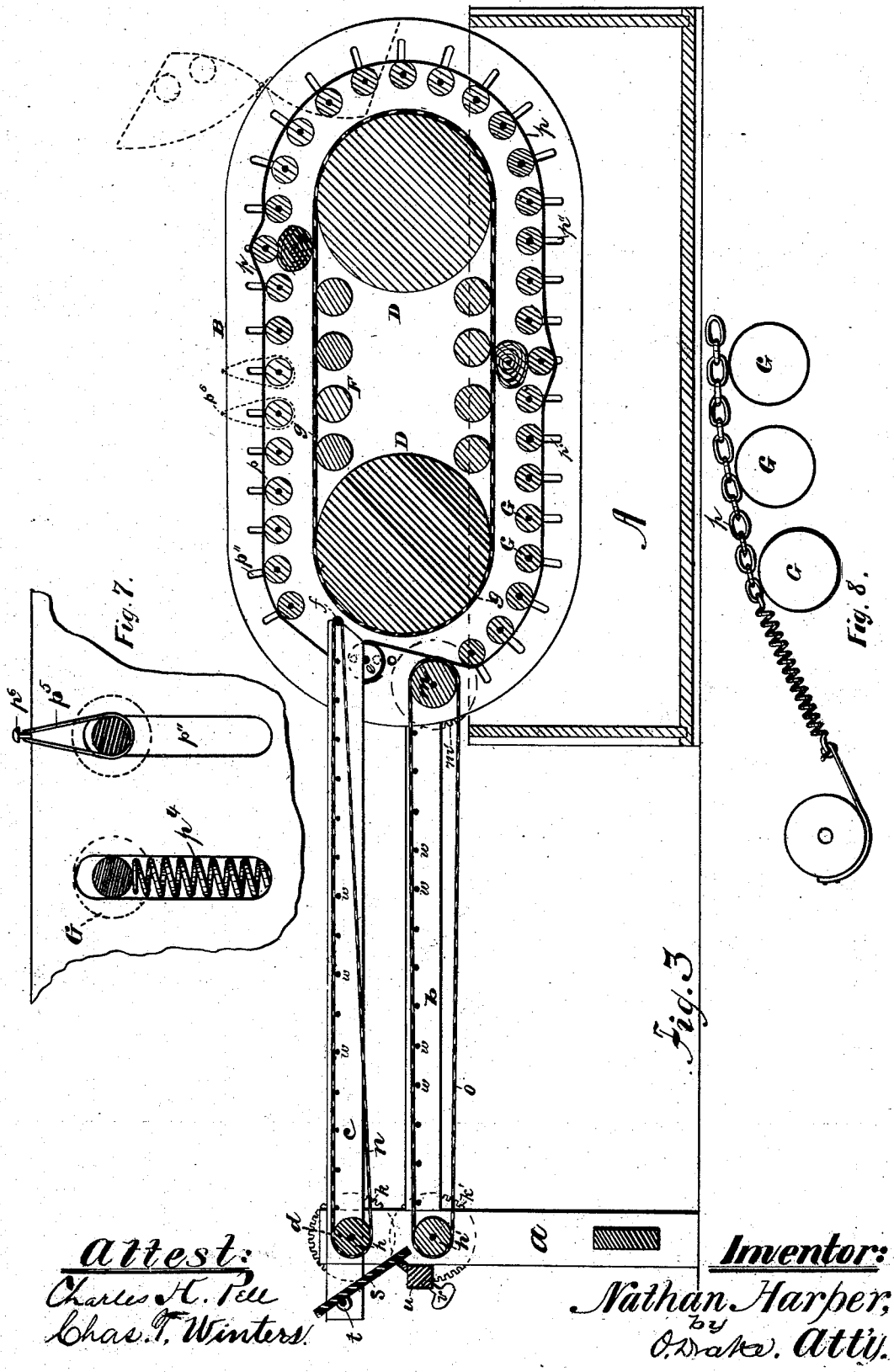
N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

N. HARPER.

HAT SIZING MACHINE.

No. 278,332. Patented May 29, 1883.



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(No Model.)

3 Sheets—Sheet 3.

N. HARPER.

HAT SIZING MACHINE.

No. 278,332. Patented May 29, 1883.

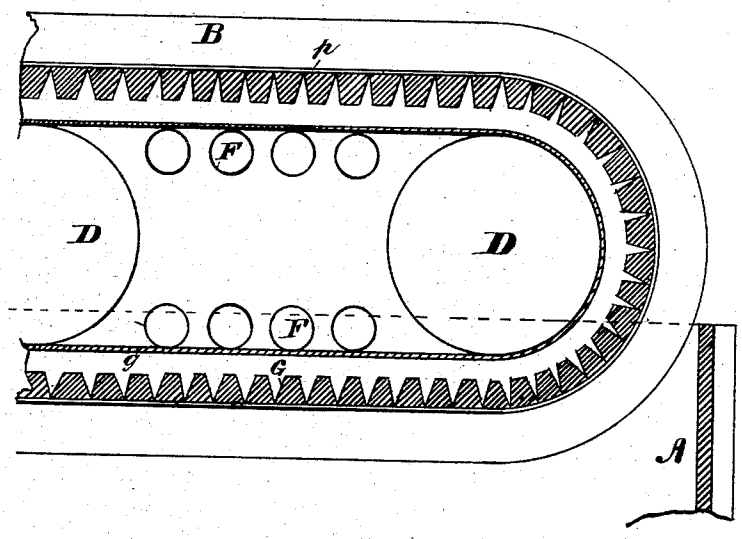


Fig 4.

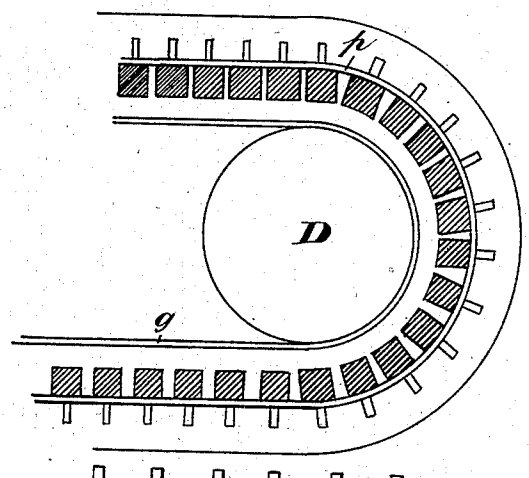


Fig. 5.

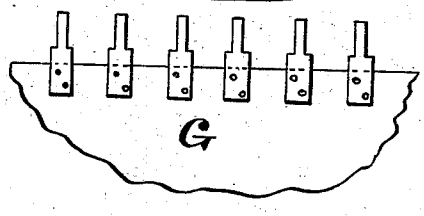


Fig. 6.

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N. PETERS. Photo-Lithographer. Washington. D. C.

UNITED STATES PATENT OFFICE.

NATHAN HARPER, OF NEWARK, NEW JERSEY, ASSIGNOR TO MARCUS W. ADAMS, OF SAME PLACE.

HAT-SIZING MACHINE.

SPECIFICATION forming part of Letters Patent No. 278,332, dated May 29, 1883.

Application filed March 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, NATHAN HARPER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Hat-Sizing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to facilitate and improve the operation of sizing or felting hat-bodies by means of automatic feeding and discharging mechanism, and of other special and peculiar devices, as hereinafter set forth.

In the hat-sizing machines in use prior to my invention the hat-rolls have been fed to the felting-surfaces by hand. This process, when the machine was capable of operating on several hat-rolls at a time, has made it necessary to employ one person in addition to the hat-folders to feed the hat-rolls to the machine, and a number of other helpers were also generally necessary to return the hat-rolls from the felting-surfaces to the folders. By my invention the machine itself is made the feeding and returning agent, and the folders are enabled to supply the hat-rolls to the machine and receive them from the same without leaving their position at the folding-table, while the number of rolls that may be operated on at one time is only limited by the size of the machine and the number of folders employed. This device, therefore, entirely supersedes and dispenses with all the hands hired either for feeding or for carrying the hat-rolls, while at the same time it allows a much larger number of said rolls to be fed and operated on than could be supplied by the former process.

In the hat-sizing machines using an endless felting-belt prior to my invention the hat-rolls have been discharged from the felting-surfaces at the opposite end of the machine to that at which they entered, thereby losing the services of one-half the felting-belt, increasing the labor of feeding, and making it necessary either to use a double machine with double sets of folders and feeders or to employ additional hands to continually carry the hat-rolls back to the end of the machine from which they originally started. In my machine the felting-surfaces are or may be constructed and arranged so that the hat-rolls can make the entire circuit of the felting-belt under the operation of the felting-surfaces and be discharged at the same point or end of the machine as that at which they entered. This feature of my invention therefore utilizes the whole surface of the felting-belt and increases the capacity of the machine, while it diminishes the amount of feeding and entirely dispenses with the hands employed for returning the hat-rolls. The peculiar construction and arrangement of my felting-surfaces and their relation to and coaction one with another produce, in combination with the other features described, a superior and more uniform quality of hats, as well as a much larger quantity, than the machines previously in use.

The invention consists in the combination and arrangement of parts hereinafter set forth, shown, and finally embodied in the claims.

Referring to the accompanying drawings, embodied in three sheets, in which similar letters refer to similar parts, Figure 1, Sheet 1, is a plan of a portion of my improved machine, showing more particularly the feeding and returning tables or belts and their relation to the felting-surfaces. Fig. 2 is a section of the same, taken through the line *y*; and Fig. 3 is a sectional view of the machine as a whole. Figs. 4, 5, 6, 7, and 8 show some of the modified forms which may be employed in the machine.

In carrying out my invention my machine is or may be constructed as follows:

A is a tank for holding water or other felting-liquid, which may be heated by any of the usual means. To the sides of the tank are secured the disks B B, which, with the tank, support the various felting-rolls and other devices hereinafter set forth. Between said disks are drums, pulleys, or rollers D D, one or both of

which revolve in adjustable bearings q', Fig. 1, similar to those shown in Fig. 2, and which are used to move the said drums nearer to or farther from each other, and thereby control the tension and flexibility of the endless felting-belt g. The said endless felting belt or apron travels over and receives its motion from the said drums and forms one of the felting-surfaces. The said felting-belt is or may be made of india-rubber or of any other suitable material or combination of materials, and may have its surface either plain, ribbed, ridged, fluted, embossed, corrugated, or slatted in any form or direction and with any material that may be preferred. The said belt is or may be sustained between the drums D D by a series of rollers, F, which rollers may be of any desired size and consist of any number. The drums D D are or may be caused to revolve by means of gears m^2 or any other suitable means. In connection with said felting-belt, and at an appropriate distance therefrom, I construct a co-operating felting bed or surface, which surrounds or which almost surrounds the entire surface of the said felting-belt. This encircling or nearly encircling of the felting-belt with a co-operating felting-bed makes every part of the surface of said belt available and operative at the same time, and thereby largely increases the efficiency of said belt and the productive capacity of the machine. I prefer, for general purposes, to construct the said co-operating felting bed or surface as follows: A series of rollers, G, having their ends in the radiating slots p'' in disks B, are adjusted around the belt g at an appropriate distance therefrom to form a felting-chamber for the passage of the hat-rolls, as shown in Figs. 3, 4, and 5. The said slots form guides and bearings for the said rollers, which are each free to move therein independently of the others, either toward or from the surface of said felting-belt, as the size and pressure of the hat-rolls in their passage through the said felting-chamber may require. Instead of the said rollers, I may use independent slats arranged in the same way and having the same inward and outward movement toward or from the felting-belt. These slats may be of any shape desired. Instead of either slats or rollers, the felting-bed may consist of a flexible slatted apron, as shown in Fig. 4, the slats of which may be of any shape and secured to the said apron by the usual means in any position. Knobs or other protuberances may also be used on said apron, either in combination with or instead of the said slats; or the said bed may consist of the said flexible apron only, without any attachments to its surface, as indicated in Fig. 6, and this last form, being without slats, is yielding and flexible in every direction, and in certain cases preferable to either of the preceding forms, in that it is more pliant, soft, and yielding, and consequently better adapted to the felting of the hat-bodies in their early stages. In arranging the said felting-bed I prefer to have it commence at one end of the machine and continue around the felting-belt nearly to the point at which it commenced, as shown in Fig. 3, thereby enabling the hat-rolls to traverse the entire circumference of the felting-belt under the action of the felting-surfaces, and, without the aid of the feeding devices, to continue making their revolutions around said belt without removal as many times as may be desired. This disposition of the felting-surfaces enables the operator to give to the hat-rolls, each time they are introduced, the precise amount of work they require before removal. It also increases the productiveness of the machine, while it diminishes the work of feeding to the lowest point, and as the hat-rolls are discharged from the machine at the same place as that at which they entered, the employment of hands for carrying the hat-rolls from one end of the machine to the other is thereby entirely dispensed with. The said co-operating felting-bed is or may be surrounded with pressing-bands p, which I prefer, because of its peculiar flexibility and durability, to construct of metallic chain, as illustrated in Fig. 8. Each band is or may be provided with one or more springs to afford the requisite elasticity. The said springs may consist of india-rubber or of spirally-wound wire, or any other suitable material, and may be attached to either or both ends of said bands, or to any intermediate part thereof. Said pressing-bands are or may be secured to pulleys on rod e, which rod may be provided with a ratchet and pawl, to lengthen or shorten said bands, and thereby increase or decrease the pressure on said felting-bed to suit the different stages of the felting process. The rollers or slats, or other elements forming the upper portion of said felting-bed, may, if desired, be upheld or uplifted by springs of sufficient force to balance or neutralize the weight of said elements, thereby releasing the hat-rolls from all pressure at every part of the felting-circuit, except the precise amount applied by the operator to the pressing-bands p. The action of said springs in thus neutralizing the weight of the pressing-bands and of the said upper parts of the felting-bed enables the pressure to be graduated to the lightest degree and adapts the machine to the very finest as well as to the coarser grades of goods. The said springs may be composed of metal, india-rubber, or of any other suitable material, and be applied in any manner, either underneath or above the said upper portion of the felting-bed. Two forms of such springs are shown in Fig. 7, Sheet 2, in which p^4 is a metal spring placed in the slot underneath the bearing end of one of the pressing-rollers, and p^5 is an elastic band or loop placed over the end of one of said rollers and suspended above the same by a hook, p^6, in the disk.

Springs have heretofore been used in connection with felting-slats, to increase the pressure of the latter upon the hat-rolls—a function

directly the opposite of that for which I employ them, and arranged to operate in a different manner.

At or near the opposite end of the machine to that at which the hat-rolls are usually introduced, as indicated in outline in Fig. 3, I construct or may construct an additional opening in the felting-bed to allow the hats in their early or tender stages to be discharged from the machine without making more than half the circuit of the felting-belt. By this arrangement the hats, when desired, can also be passed through the lower or submerged section of the felting-surface only without passing through the upper or dry section, or through the dry section only without the lower or submerged section. The said opening is or may be provided with a lid, door, or connecting-piece for the purpose of closing the same, and thereby connecting or uniting the upper section of the felting-bed with the lower section. The lid or connecting-piece may be hinged or pivoted at said opening, as shown by the dotted lines, Fig. 3, or adjusted in any other way for the purpose desired. The said lid or connecting-piece forms, when closed, a continuation of the felting-bed, and may be provided with rollers or slats or other felting elements on its inner surface, the same as any other portion of the felting-bed. The use of the said connecting-piece is not confined to the form of machine herein described, but may also be applied to a variety of other machines to unite the upper section of the felting-surfaces with the lower section, thereby making each section continuous to and with the other, and enabling the hat-rolls to traverse the circuit or length of both sections with once feeding only.

To keep the felting-surfaces fed to their fullest capacity, and to dispense entirely with the employment of hands both for feeding and for carrying the hat-rolls, as hereinbefore stated, I construct an automatic feeding and returning device, which is or may be composed as shown in the drawings, Fig. 1, or in any other form that may be preferred. In the drawings the upright *a*, side pieces, *b*, and adjustable bars *c* constitute the frame for said device. The said adjustable bars *c* are or may be pivoted near their outer ends on shaft *d*, and their inner ends may rest on pins or other adjustable supports near the felting-surfaces. By raising or lowering these supports the said bars may be elevated or depressed at their inner ends to the working-surface of the felting-belt. The inner ends of these bars are provided with bearings for the small roller *f*, which is brought quite close to the surface of the felting-belt.

To the uprights *a* are secured adjustable or other bearings d^2 d^3 for the rollers or drums *h h'*. Similar bearings, d^4, Fig. 1, are also provided for the roller or drum *m* and secured to the disks B B. The rollers *h* and *f* are connected by an endless belt, *n*, which carries the hat-rolls from the felting-surfaces, and the rollers *h'* and *m* are likewise connected by a similar belt, *o*, which carries the hat-rolls toward the said felting-surfaces. These belts may be made of india-rubber, textile material, or any other substance suitable to form a carrying-surface for the hat-rolls. Said belts, when traveling on the said rollers or drums, form movable conducting-tables, and are or may be supported by a series of intermediate rollers, *w*, to prevent them from sagging. The adjustable bearings d^2 d^3 d^4 perform a threefold function: They support the rollers or drums *h*, *h'*, and *m*, adjust the tension of the belts *o* and *n*, and also enable the said belts to be moved nearer to or farther from the felting-surfaces. The rollers *h*, *h'*, and *m* may be operated by gear-wheels *k*, *k'*, and *m'*, Fig. 3, or by belts or other usual means.

Behind or in juxtaposition to the roller *h*, I construct an adjustable guide, *s*, by arranging a board or other suitable device in such a position as to guide or conduct the hat-rolls off and from the belt *n*, which carries them from the felting-surfaces to and on the belt *o*, which carries them toward the said surfaces. The method herein shown of constructing and arranging this guide-piece (but to which I do not limit myself) is to suspend the said guide *s* on the pivots *t*, which have their bearings in the bars *c*. I may secure a cross-piece, *u*, against the upright *a* and beneath said guide, which cross-piece may be provided with an adjusting-screw, *v*, adapted to raise or lower the free end of said guide. I may, should I desire, do away with the guide and so arrange the belts as that the rolls will fall from the upper belt and be received by the lower.

I am aware that various modifications and changes can be made in the construction and arrangement of the feeding and other portions of the machine to adapt it to the various and special circumstances under which it may be used, such as the characteristics of the felting-surfaces and their relation to each other and to the body of the machine, the construction and arrangement of the feeding and returning devices and their relations to the felting-surfaces and to the hat-folders, &c.; and therefore I do not wish to limit myself to the special construction and arrangement of parts herein illustrated and set forth, as these can be varied to adapt them to each other and to the special circumstances of the case.

The usual manner of rotating the machine and of supplying the hats thereto is substantially as follows: Power being applied to the machine by any of the usual means, the belts commence their revolutions in the directions indicated by the arrows. Folding-tables are arranged parallel with the sides of the feeding-belts, attended by the requisite number of hands to fold the hats and make them up into rolls. Each folder is provided with from eight to twelve hat-bodies, or sufficient to form two rolls. As soon as the folders have made up one roll each they lay them down in front of them on the upper belt, *n*. These hat-rolls are

then carried by said belt to the stop-piece or guide *s*, along which they descend to the belt *o*, by which they are carried to the felting-belt *g* and deposited between the felting-surfaces. By the motion of the said felting-belt they are now carried forward between the said felting-surfaces until they have made the circuit of the felting-bed, from which they are now taken by the belt *n* and carried outward to the folders. While the first series of rolls have been making this circuit the folders have prepared the second series, and as soon as each of the said first series has arrived at its original starting-place it is or may be taken from the belt by the same folder who placed it there, and the second series is deposited to undergo a similar operation. This process is continually repeated with the two series of hat-rolls until the sizing operation is completed. As soon as the hat-bodies are sufficiently hardened to admit of it, the rolls are or may be allowed to make two or more entire circuits of the felting-surfaces and feeding mechanism before removal, the speed of the machine being adjusted to the ability of the folders to supply the hat-rolls, so that none of their time is lost.

If desired, the hat-rolls can be placed on the belt *o* instead of belt *n*, and be thereby carried directly to the felting-surfaces; but in general practice I prefer the former method.

From the foregoing description of the machine and its operations it will be clearly seen that the hat-rolls, when introduced to the machine or to the carrying-belts, can traverse the entire circuit of the felting-belt and felting-surfaces as many times as may be desired without removal; that the entire surface of the felting-belt, except the point at which the hats are introduced, is made available for felting purposes; that the machine can be fed to its full capacity and a large number of rolls be kept constantly under the operation of the felting-surfaces, and that all the feeding and carrying of the hat-rolls by hand-labor is entirely dispensed with.

I disclaim herein anything which is set forth in Patent No. 237,269, granted to me February 1, 1881, for felting or hat-body-sizing machine.

Having thus described my invention, what I claim, and wish to secure by Letters Patent, is—

1. In a hat-sizing machine, the combination of an endless felting-belt traveling on pulleys or rollers, and a co-operating felting-surface adapted and arranged to enable the hat-rolls fed thereto to traverse continuously the entire circuit of said surfaces as many times as may be desired before removal.

2. In a hat-sizing machine, a felting-bed having an additional opening at the opposite end or side to that at which the hats are usually introduced, said opening being provided with an adjustable lid or connecting-piece adapted to close the same.

3. In a hat-sizing machine provided with an opening at each end for the admission or for the discharge of the hat-rolls, an adjustable lid, door, or connecting-piece adapted to close one of said openings when desired to enable the hat-rolls to traverse the entire circuit of the felting-surfaces before removal.

4. In a hat-sizing machine, the combination of an endless felting-belt traveling on pulleys or rollers, with a stationary co-operating felting-bed, consisting of a yielding flexible apron or blanket entirely surrounding said felting-belt except at the point where the hat-rolls are introduced to said felting-belt.

5. In a hat-sizing machine, the combination of pressing-bands consisting of metallic chains, and springs arranged to operate in connection therewith for the purpose of increasing and regulating the pressure of the felting bed or surface, substantially as described, for the purpose set forth.

6. In a hat-sizing machine, the combination of a felting-surface consisting of independent rollers or slats, and springs adapted to uplift or neutralize the weight of said rollers or slats, and thereby diminish the pressure of said rollers or slats upon the felting-fabric, as set forth.

7. In a hat-sizing machine, a feeding mechanism adapted to convey the hat-rolls or hat-bodies from the folders to the felting-surfaces.

8. In a hat-sizing machine, the combination of the felting-surfaces, with a discharging mechanism adapted to take or convey the hat-rolls from the said felting-surfaces to the folders or other parts desired.

9. In a hat-sizing machine, the combination of a feeding and discharging mechanism adapted to convey the hat-rolls from the folders to the felting-surfaces and from the felting-surfaces to the folders.

10. In a hat-sizing machine, the combination of a feeding and discharging mechanism constructed and arranged so that the hat-rolls, when supplied to either mechanism, will be conveyed to the felting-surfaces.

11. In a hat-sizing machine, the combination of a feeding and a discharging mechanism constructed and arranged so that the hat-rolls placed thereon will be conveyed to the felting-surfaces and will continue to traverse said surfaces and said mechanism as many times as may be desired without removal.

12. In a hat-sizing machine, the combination of the felting-surfaces with a feeding-belt adapted to convey the hat-rolls from the folders to said felting-surfaces.

13. In a hat-sizing machine, the combination of the felting-surfaces with a traveling belt adapted to take or remove the hat-rolls from said felting-surfaces and convey them to the folders.

14. In a hat-sizing machine, the combination of a traveling belt adapted to convey the hat-rolls to the felting-surfaces with a traveling belt adapted to take or remove the hat-rolls from the said surfaces.

15. In a hat-sizing machine, a feeding-belt

actuated by drums or rollers arranged and adapted to cause the hat-rolls to travel to a point where they will come under the operation of the felting-surfaces.

16. In a hat-sizing machine, the combination of an endless felting-belt traveling on pulleys or rollers with an endless feeding-belt adapted to feed the hat-rolls to said felting-belt.

17. In a hat-sizing machine, the combination of an endless felting-belt with an endless discharging-belt adapted to take or remove the hat-rolls from the said felting-belt.

18. In a hat-sizing machine, the combination of an endless felting-belt with an endless feeding-belt and an endless discharging-belt, for the purpose set forth.

19. In a hat-sizing machine, a feeding and a discharging belt or apron constructed and arranged at the same end of said machine.

20. In a hat-sizing machine, a feeding and a discharging belt or apron, one of said belts being above and over or approximately over the other.

21. In a hat-sizing machine provided with feeding and discharging mechanism, a guide or connecting device adapted to guide or convey the hat-rolls from the one mechanism to the other.

22. In a hat-sizing machine, the combination of the feeding-belt or band with adjustable bearings adapted to graduate the tension of said belt.

23. In a hat-sizing machine, the combination of the feeding mechanism with adjustable bearings adapted to move said mechanism nearer to or farther from the felting-surfaces.

24. In a hat-sizing machine, the combination of the discharging mechanism with adjustable bearings, adapted to move said mechanism nearer to or farther from the felting-surfaces.

25. In a hat-sizing machine, the combination of the discharging belt or bands with adjustable bearings adapted to graduate the tension of said belts.

26. In a hat-sizing machine provided with feeding or discharging mechanism, adjustable supports adapted to raise or lower the inner end of said mechanism to its appropriate relation to the felting-surfaces.

27. In a hat-sizing machine, feeding or discharging mechanism arranged upon pivotal bearings that adapt said mechanism to be raised or lowered to its appropriate relation to the felting-surfaces.

28. In a hat-sizing machine, the combination of the felting-surfaces with adjustable bars *c*, belt *n*, and roller *f*, arranged and adapted for the purpose set forth.

29. In a hat-sizing machine, the combination of belts *n o*, drums or rollers *f h h' m*, and guide *s*, arranged and adapted for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of March, 1882.

NATHAN HARPER.

Witnesses:
CHARLES H. PELL,
CHAS. T. WINTERS.