UNITED STATES PATENT OFFICE.

LANSING E. HOPKINS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN THE PROCESS OF MANUFACTURING HATS.

Specification forming part of Letters Patent No. **13,005,** dated June 5, 1855.

To all whom it may concern:

Be it known that I, LANSING E. HOPKINS, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Process of Manufacturing Hats; and I do hereby declare that the following is a full, clear, and exact description thereof.

The nature of my invention consists in providing a new process of forming a bat or hat-body, a new process of bringing the same into a proper size, and a new process of sticking, scalding in, and beating up the nap of hats, the whole forming a complete plan of making hats, from blowing the fur to finishing the napped hat ready for dyeing, by means of a series of machines adapted to the purpose, and applicable to the purposes described, making up a full process of manufacturing hats, whether fur or other material of suitable character be used, and, further, whether it is desired to make napped fur hats, felt hats, or the shells for bodies for plush hats.

The fur having been cleaned by blowing in the usual manner, I proceed to form a bat or hat-body, or what in some cases is termed a "shell." In this process I arrange a solid-surfaced fixed core upon its stationary table, and around it an annular ring or revolving table closely fitting the same, to avoid escape of steam, and upon this revolving ring or table is a cone, perfectly solid upon its conic surface, but having its base open, so that it may set over and cover the stationary steam-cone, which is the inner one, and is fixed to the table. The outer cone is perfectly smooth upon its outward or conic surface, is not perforated, and depends upon the wetted surface to retain the fur upon it when it is revolving. I convey a body of hot steam into the interior of the stationary cone. This impinges against the cone so as to heat it, and thus the space between it and the revolving cone, which causes the fur to dry to a sufficient degree to harden it, so that it may be handled and removed from the smooth cone without the use of any inlayer, and also dispense with the necessity of dipping in hot water for the purpose of hardening, so that it may be handled. Having set the revolving cone in motion, I apply a jet of steam to impinge against its outer surface and dampen it. This I effect by means of pipes so arranged as to cause every part of the surface of the cone to receive a like amount of pressure and dampness from the steam.

In the common way of conveying and delivering fur to the cone, where hats are formed by machines, I deliver the fur to the solid cone, except that the mouth of the delivering-chamber is to be regulated so as to deliver the fur in greater or less quantities on given points or parts of the cone, at the will of the operator, so that the fur may be deposited as in the operation of bowing by hand, in case of hand-made hats—more at the bottom or brim and less at the top of the cone or tip of the hat. The pipes for steam are attached to the adjustable wings of the mouth-piece, so as to move with and be regulated by them, and are of peculiar construction adapted for the purpose.

Part 2: This part of my newly-invented process of making hat-bodies relates to the bringing the bat down to the desired size, and is called "sizing or planking hat-bodies." Although several machines have been attempted for the purpose, nothing as yet has proved fully complete with sufficient economy to induce their general introduction. The machine is a semicircular concave having a beater with a vibrating motion, whose operating-face is corrugated, although it may be used plain. It has, besides, a continuous or endless apron peculiar in its construction, and this runs over a friction-roller, which causes it to continually advance in the desired direction. At the bottom of the concave box or receiver I place a small quantity of water, just sufficient to immerse the bags of hats. I then introduce at the bottom and underneath the body of water a jet of steam, which is to heat the water to boiling. I shall now take a number of hats—from one to twenty-four dozen in number—be the same more or less. These I introduce into bags properly confined, so that they may be readily withdrawn from the water, there being perhaps one or two dozen in a bag. These bags I place within the revolving apron and between the corrugated beater and concave of the box within the boiling water. I then set the beater in motion jointly with the roller carrying the apron, when the back and forward motion of the beater beats up the bag of hats and the onward motion of the apron keeps

the several bags in continuous revolution, and the beater is constantly and rapidly knocking them up against the side of the concave box. I next take out the bag of hats and croze them in the same manner as hand and machine formed hats usually are—that is, fold each one where it is too much fulled and expose them where fulling is most required, and this is repeated as often as is necessary until the hat is brought into the desired size, when it is forwarded for the next part of the process, presently to be described. In this I begin by light blows upon the bags of hats, and increase the force and motion of the beater as the state of hardness requires until the operation has completed the sizing of the hats.

Part 3: This relates to the sticking, scalding, and beating up of hats. After the hat has been sized, as hereinbefore stated, it is dried, when it is shaved or singed in the usual manner by hand. If it is a felt hat, it is then stiffened, formed into its proper shape, and dyed. If it is to be a napped hat, it is to be treated in like manner, when it is again immersed in hot water. This will cause the fur to adhere to it. I now place the body upon a wooden or other solid cone and give it a revolving motion. Next a chamber for the delivery of fur, having its regulated mouth and steam-jets, as described, in the forming-machine in the first part of this specification, is brought into use. The steam is then let upon the body, and the fur prepared in the usual manner is thrown in upon the cone, where it adheres until the quantity of nap is put upon the bat which is desired. The hats will have to be turned, as in the hand process, for the purpose of napping the under side of the brim. I now proceed to my new process of nesting up, which is as follows, viz: I make a soft bag or cone of sponge or other suitable material, and upon it place a flannel cloth, upon the top of which I place a hat upon which the nap has been stuck, and upon this another flannel cloth, and then another hat, and so on until I get the desired number of hats packed or nested. This may be more or less from one dozen to twenty dozen in a nest. They are now ready for scalding in, which is performed as follows, viz: A cylinder of wire-cloth or perforated metal is provided, and is fixed so that one of its ends can be removed so as to introduce the cylinder or nest of hats. This perforated cylinder is arranged so as to have journals upon each of its ends or heads, upon which it may revolve. The hats thus nested are then put into the cylinder, the last being considerably larger in its interior then the nest is on its exterior, so that the rolling of the metal cylinder will cause the nest of the hats to roll in an opposite direction. I next provide a steam-tight box having the necessary journal-boxes, and at or near its bottom introduce a jet of steam to the desired heat and pressure. I also have a stop-cock near the bottom of this box, by which any water which will become condensed may be drawn off, as contact with water might tend to wash the nap from the body. All these being provided, I give to the perforated cylinder a rocking motion to and fro while in the confined steam-box, and this is to be continued during the option of the operator and until the nap is thoroughly scalded in.

My plan of beating up naps is much like the hand process of accomplishing the same result. I provide a table, or "plank," as it is termed by the trade, the plank part resting upon a bed-piece and having a water-tight box around it something larger than the plank itself. To this bed I give a slow reciprocating motion to the extent of about its own length, so that it will move to and fro under the beaters. The beaters consist of a row of thin sticks placed in line in a rocking-shaft, so that they will be beat down upon the hats or table at each rock of the shaft—that is, they rise and fall as the shaft rocks. A quantity of hot water is placed in the box, just sufficient to float over the top of the plank, when in this and upon the plank are placed the napped hats. A jet of steam is then let into the water to keep it hot, a stop-cock being also provided by which to draw off the surplus water. All these being arranged, the beater is put in motion, beating down upon the table. In meanwhile the plank, having been covered with hats, is also put in motion backward and forward. Thus the hats are continually being beat during the option of the operator until the operation is complete and the hats are sufficiently cleaned.

The common way of forming a bat by hand is to take the carroted fur in small quantities upon a table and beat the particles together with a bow-string, and when the bat is formed it is wet in hot water to cause the parts of the fur to adhere each to the other, and when this has been continued until the bat is sufficiently strong the bat is sized—that is, it is worked by dipping in hot water and rubbing by hand over a roller until it is shrunk into a proper size. When the bat is formed by machinery, as heretofore used, the fur is blown onto a perforated cone with an air-exhaust to draw and hold the fur into the cone. Such is the weak state of the fabric that it is necessary to use a cloth upon the outside of the cone in order to be able to remove it from the cone. This is called an "inlayer," and without it the fur would adhere to the cone. Another way is to wrap or cover with a wet cloth and then to immerse in boiling water, when the whole—that is, the inlayer, when it is used, and the bat and the wrapper—are all stripped off the cone together. In my process I use a smooth unperforated cone of metal, heated on its interior and steamed on its outer surface, so that the fur will adhere to the wet surface, and becoming wet there will hold the next layer of fur, which is thrown on at the next revolution of the cone, and so on until the bat has become of sufficient thickness. In the meantime the heat of the cylinder has dried the surface next to and in contact with it, while the continued application of steam to the outer sur-

face has wetted it. This wetting and drying has had the same effect as would the dipping in water in the common process, and has hardened the bat sufficient for removal without the necessity of an inlayer.

It is a well-known fact that a bat has not sufficient strength of itself to bear its own weight until wetted in boiling water, which brings out the gluten and causes one part to adhere to another. Thus by the heating and steaming I effect the hardening while in process of forming, and make a bat which is at once sufficiently strong to handle for sizing—a result which is in itself novel and far more economical than the hand-hardening. At the same time a more even and workman-like job is produced. Sizing hats, which means bringing the bat down from its original form or size to the size to be used, is conducted by hand operation only under the present method, but in my process is worked to better advantage by the use of machinery. I will here refer to the simple but plain description given, with the addition of the remark that it has been considered previous to my invention that two bodies of the same material did not act when intact or closely packed together to produce motion combined with friction; but in this case, where the fabric is the constituent part of both bodies, it has proven to be an existent fact; not this alone, but it has also shown it is the best possible agitator, and that by placing many hats side by side and beating or knocking them up is the best possible way of producing the best-fitting size, always provided it be within the hot or boiling water during the operation. Although the common operation is to dip in hot water, and work by hand and over a roller for the purpose of sizing in, the machine referred to gives a more uniform body, and better work is the result of the machine-sized hat.

Sticking the nap is performed by using the bowstring, as in case of forming the bat. In this case, however, the uncarroted fur is used, and the barb of the fur is relied upon to hold it into its place in the felted body. One or more bodies are laid upon the table or plank, a small quantity of fur being properly placed upon the wet hat-body, which has been already worked into shape. This, with the sprinkling of hot water, and other operations, is repeated until the body is fully stuck. The body is then turned so that the opposite side or under side of the brim may be stuck in like manner. This is the hand process, and the only one heretofore adopted. In my new process I place the body upon a block or cone and give it a rotary motion, and then proceed to steam and blow on the uncarroted fur in a manner to that of forming the bat, this being continued until the napping is complete.

It will not be inappropriate here to remark that the napping material is mixed with the cotton, cut to short lengths, before it is applied to the body for the last coat, and after it is scalded in, the beating up draws out all the cotton, leaving only the fur as a nap. The object of the use of the cotton is to dress or clean the nap fur, which, in being withdrawn by the beating up in hot water, is effectual in the result.

Scalding in naps is performed by hand only in the present manufacture of hats. It is done by dipping in boiling water and rubbing or rolling the body with the hands rolled up in a cloth until the nap is thoroughly worked in. In my case, the nest of hats rolling in the cylinder works all the hats evenly and far better than by hand. By this machine I scald in many dozens of hats in the same time one hat will now be done by hand.

Beating up naps is now performed by hand only, and is as follows, viz: A table is placed so as to be just immersed in hot water, and upon it is placed the scalded-in body. The operator then takes a thin stick in each hand, and passing along up and down the table beats upon the bodies rapidly, and this is continued until the cotton is beat out and the nap is clean. In my improved process I place the hats in a similar manner on a table, giving it the continued heat of steam to keep the water hot, and pass the reciprocating bed slowly to and fro under the rapid beating of a series of sticks, by which much more and better work will be performed in the same time, and this at a very decreased cost.

I would further remark that although a patent for a machine for rolling single hats between boards while under water was issued to one Rankin in 1839, and such device was intended for the purpose of "napping hats," yet by no means do I consider that such application to use is at all similar to my method of application for the purpose of a similar result. Instead of the plan he referred to, I pack the formed bats into bags, and rely upon the friction while they are being rolled and beaten up within the hot water to cause the felting to take place, which necessarily brings the bat into its desired size. For the purpose of scalding in the nap I nest many hats together and rely upon the friction while the hats are being rolled with a cap between each of the hats, the whole being immersed in hot water to work the nap into the felted body. Thus, although it is not wholly new to work hats under water by means of machinery, yet the leading feature of my invention is to keep a continued working of the hats by manipulations while they are immersed in hot water during the entire process of its being worked by mechanism after the bat is formed. I do not consider the rolling a hat between boards as any equivalent to the plan of working hereinbefore described, including the full process of making a hat, each of these several proceedings being necessary as a part and parcel of beginning and finishing a hat-body by means of a series of operations performed through the aid of machinery. I therefore have adopted the several means herein described of manipulating the mass of hats while under the hot water. Therefore, while I do not claim the principle of ma-

nipulating while under water for the purpose of working in the nap, or for the purpose of beating up the nap, as referred to in the previous part of this specification, and before patented,

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

The making a complete hat-body by means of the manipulations and process described, including the forming, felting, or sizing, and the sticking, scalding in, and beating up of nap without regard to the peculiar machinery which may be used to produce the combined result of beating or otherwise manipulating in hot water for the purpose of manufacturing a hat by a complete and continuous range of mechanical operations as a substitute for the dipping and rubbing on a plank by hand, all which is herein fully described.

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Witnesses:
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