

E. E. WINKLEY.
METHOD OF MAKING HEELS.
APPLICATION FILED APR. 2, 1915.

1,209,531.

Patented Dec. 19, 1916.

Fig. 1.

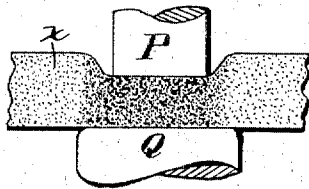


Fig. 2.

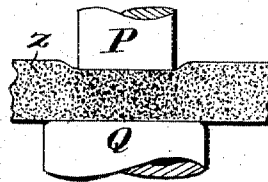
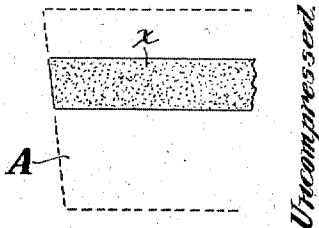
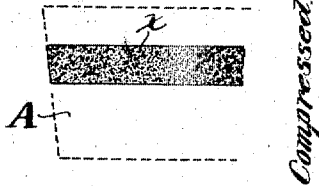


Fig. 3.



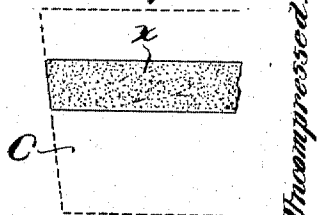
Uncompressed.

Fig. 4.



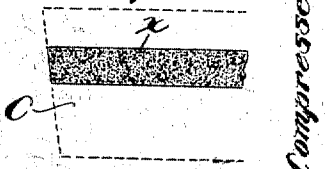
Compressed.

Fig. 7.



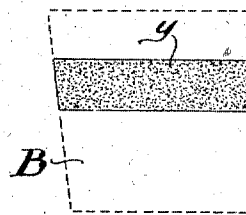
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Fig. 8.



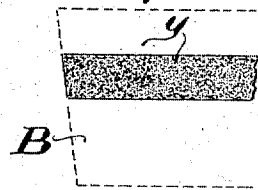
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Fig. 5.



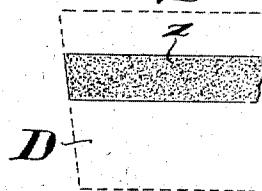
Uncompressed.

Fig. 6.



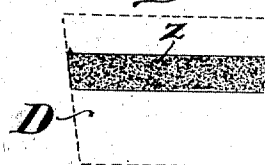
Compressed.

Fig. 9.



Uncompressed.

Fig. 10.



Compressed.

Inventor;
Erastus E. Winkley
by his attorney
Phillips, Van Orman & Irish

UNITED STATES PATENT OFFICE.

ERASTUS E. WINKLEY, OF LYNN, MASSACHUSETTS.

METHOD OF MAKING HEELS.

1,209,531.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed April 2, 1915. Serial No. 18,686.

To all whom it may concern:

Be it known that I, ERASTUS E. WINKLEY, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Methods of Making Heels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enables others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of heels such as are built up of layers or lifts and compressed under heavy pressure to compact the lifts and bring the heels substantially to their final form.

The invention will be described in connection with its application to lifts made of leather, as leather embodies the characteristics which control the utility of the invention to a more marked degree than do other materials which are used for lifts in building heels. It should be distinctly understood, however, that the utility of the invention is not confined to the making of leather heels.

The leather of which heel-lifts are formed varies greatly in thickness, and in density, and if a given number of lifts, selected at random, be assembled and compressed under a definite pressure the height of the resulting heel blank will be indeterminate.

In making a quantity of shoes of the same size and style it is desirable that the heel blanks prepared for application thereto be uniform in height for appearance, and particularly for comfort to the wearer. Heretofore the heel-lifts have been graded according to thickness, and for any given height of heel a heel body has been built of a definite number of lifts of a particular thickness and the heel body is then compressed to increase its density. The present commercial heel compressing machines are constructed in such manner as to operate the compressing dies through a positive train of mechanism which imparts a definite movement to said dies and reduces all heel-blanks delivered from the machine for any particular setting of the dies, to the same height, thus gaining the desired result just adverted

to. But those skilled in the art have long recognized a serious disadvantage accompanying this method of making heel blanks. Obviously, because of the original variation in density of the lifts and the consequent varying pressure exerted on the heel bodies by the compressing machine it has been impossible to compress all heel blanks to a uniform density. Uniformity in density is highly desirable for all heel blanks of the same size or style because then the expansion of the material, which occurs after the blanks are ejected from the compressing dies, will be uniform and the uniformity in height determined by the heel compressing operation will be maintained. Under the old method, when the expanded heel blanks are attached to the two shoes of a pair, it frequently happens, due to the heel measuring and pressure applying operations employed in heel attaching machines, that uniformity in height is lacking. A further advantage secured by uniform density in two heels of a single pair resides in the resultant uniform wear of the heels.

To produce the desired results the characteristics of leather must be considered. As to any two heel lifts of the same original thickness, the thickness of the lifts after they have been subjected to a uniform pressure will not be the same unless the lifts were originally of the same density, while conversely, two heel-lifts originally of different thicknesses may be of the same thickness after being subjected to uniform pressure, if the originally thinner lift were of denser material than the other, so as to be less reduced in thickness by the compressing operation. It will be apparent, accordingly, that in selecting lifts to produce a compressed heel of a given height and density these lifts should be selected or graded not in accordance with their original thickness, but rather in accordance with the thickness which they will have after compression.

The requirement may be stated otherwise, *i. e.*, in terms of mass. After any two lifts have been subjected to a heavy, uniform, equal pressure they will have been condensed to substantially the same density, owing to the yielding and porous character of the

leather, and if, with this same density, they be found to have the same thickness, it may be expected that they will have the same mass, if of the same size, or the same mass per unit of area whatever their size. For convenience, the thickness to which any lift, of a "lot" varying as to both thickness and density, is reduced when subjected to the pressure just referred to will be herein-
 5 after termed the "mass characteristic" of the lift.

It has been discovered by the present inventor that the relation just described is true. If two heel-lifts of the same size, and
 15 the same condition as to moisture, weigh the same before compression, no matter how they may differ in thickness and in the original density of the material, it will be found that they have the same mass characteristic.

20 The object of the present invention is to improve the manufacture of shoe heels in such a manner as to produce, in a convenient and reliable manner, heels of substantially uniform density and conforming closely to
 25 the predetermined standard height, while utilizing heel-lifts cut from material of varying density and thickness. This is accomplished by grading the heel-lifts in accordance with the foregoing principles, and
 30 building each heel of a definite number of lifts having each a definite mass per unit of area, rather than a definite original thickness, the heels being then compressed to bring the lifts all to substantially the same
 35 density and thus reduce the heels all to the same thickness or height.

The novel step of this process, *i. e.*, the grading of the heel lifts according to the characteristics described, may be per-
 40 formed in various manners, but the manner which has been found most convenient and reliable, and which lends itself best to performance by automatic machinery, is that which is described as the function of a
 45 machine disclosed in an application for Letters Patent of the United States, filed by the present inventor April 6, 1912, Ser. No. 689,030, and renewed May 18, 1916, Serial No. 98,437. In that machine each heel-lift
 50 is subjected to a uniform pressure which may be substantially equal to that involved in the heel compressing operation, this pressure being sufficient to condense all the lifts to substantially the same density, and the
 55 thickness of the material as so compressed, or as heretofore termed, its mass characteristic, is measured, and the lifts sorted accordingly. Because of variations in thickness in individual lifts and also in order
 60 that the total pressure to which the machine must subject each lift may not be inconveniently great, the pressure is applied to only a small definite part of the area of

the lift, preferably its central portion, and it has been found that it may safely be assumed, for practical purposes, that the part so measured affords an average or approximate indication of the mass characteristic of the lift as a whole.

The accompanying drawings illustrate, 70 diagrammatically, the results of grading heel-lifts both according to original thickness and according to the method of the present invention, and of combining the lifts
 75 so graded to produce heels. They also illustrate the preferred manner of carrying out the characteristic step of the present invention whereby the different grades of heel-lifts are obtained.

Figures 1 and 2 show heel-lifts of different thicknesses, but equal masses, under the influence of the instrumentalities by which they are subjected to a uniform pressure in the performance of the grading operation. Figs. 3 to 10, inclusive, are diagrammatic
 85 representations of heels, before and after compression, in which heel-lifts of varying thicknesses and densities have been employed.

Figs. 1 and 2 show diagrammatically the preferred manner of performing that step
 90 in the improved method of manufacturing heels which has been described as the grading of the heel-lifts in accordance with their individual mass characteristics, or approxi-
 95 mately in accordance with their mass per unit of area. In each of these two figures the means for subjecting a limited portion of the heel-lift to the predetermined pressure are illustrated as pressure-members P
 100 and Q, which are forced against opposite sides of the material, thus condensing the material and reducing its thickness in that portion which is immediately between the
 105 operating surfaces of the pressure-members. In Fig. 1 the heel-lift *x* is illustrated as a comparatively thick lift of soft or spongy leather, while in Fig. 2 another heel-lift *z*
 110 is shown, which is originally thinner than the lift *x*, but of more dense material. For the purpose of illustration it will be assumed that the difference in the original density of the material of the two lifts is such that the pressure to which they are subjected
 115 brings them to the same thickness in the compressed portions, notwithstanding the greater original thickness of the lift *x*, and these two lifts *x* and *z* are thus found to have the same mass characteristic or to be
 120 of the same grade in accordance with the principles of this invention, and may be used interchangeably in the production of a heel of a given thickness or height.

Fig. 3 shows a heel A made up of lifts such as the lift *x* of Fig. 1, prior to the compression of the heel. Fig. 4 shows the same

heel after compression, the thickness of each lift and the total thickness of the heel having been reduced so that each lift has only the thickness indicated by the grading operation of Fig. 1. Fig. 5 shows another heel B, built up of lifts y of the same original thickness as the lifts x , but of greater density. Fig. 6 shows the same heel B after it has been compressed under the same pressure to which the heel A was subjected. In this case the thickness of each lift, and the total thickness of the heel, have been reduced somewhat, but much less than in the case of the heel A, owing to the greater original density of the heel lifts and their greater resistance to compression, so that although the lifts as shown in Fig. 6 have been brought to the same density as the lifts x in Fig. 4, the compressed heel B is of greater thickness than the compressed heel A. It will be obvious that if the heel B had, by the compressing operation, been reduced to the same thickness as the heel A then its density per unit of area would have been considerably greater than that of the heel A. A comparison between Figs. 3 and 4, and 5 and 6, illustrates in an exaggerated manner the inaccuracies resulting from the selection of heel-lifts solely in accordance with their original thickness to produce heels of the same density and height.

Figs. 7 and 8, compared with Figs. 9 and 10, illustrate the uniform results which may be secured by the present method. In these figures, for the sake of comparison, the heel C, shown in Figs. 7 and 8, is built up of lifts such as the lift x of Figs. 1 and 3 so that the heel C when compressed will be identical with the heel A. The heel D shown in Figs. 9 and 10, however, is built up of lifts like the lift z of Fig. 2. Accordingly, the heels C and D before they have been compressed are of different thicknesses and densities, but after they have been compressed to the same thickness, as shown in Figs. 8 and 10, they are also of the same density, whereas, in the old method shown in Figs. 3, 4, 5 and 6, as just described, the heels are originally of the same thickness but of different densities, and after compression they are of the same density and different thickness or the same thickness and different densities according to whether a uniform or a positive pressure is employed for the compressing operation. This application is a division of the said application, Serial No. 98437.

It will be understood that the term "heel-lift," wherever used in the following claims is intended to designate a blank or piece of leather, of any form, which may be used to constitute a layer of a heel or heel-block, whether or not such blank or piece has been

shaped to the curved outline of the finished heel.

What is claimed is:—

1. The method of making shoe-heels which consists in building a heel-body of a plurality of heel lifts so selected as to provide a definite mass and compressing said body to a substantially uniform density.

2. The method of making shoe-heels which consists in grading heel-lifts in accordance with their thickness when subjected to a definite pressure per unit of area, building heel-bodies of definite members and grades of such heel-lifts, and compressing said bodies throughout under substantially the said pressure per unit of area.

3. The method of making shoe-heels which consists in building a heel-body of a plurality of lifts selected to produce a definite total mass but an indefinite total thickness, and compressing said body to a definite thickness.

4. The method of making shoe-heels which consists in grading heel-lifts in substantial accordance with their mass per unit of area, building heel-bodies of definite numbers and grades of such heel-lifts, and subjecting said bodies to a uniform compressing operation.

5. That step in the manufacture of shoe-heels which consists in grading heel-lifts heterogeneous as to both thickness and density substantially in accordance with their mass per unit of area.

6. That step in the manufacture of shoe-heels which consists in grading heel-lifts heterogeneous as to both thickness and density in accordance with the product of the original thickness and density of each lift.

7. That step in the manufacture of shoe-heels which consists in grading heel-lifts heterogeneous as to both thickness and density in accordance with their thickness when subjected to a definite pressure per unit of area.

8. The method of grading lifts for shoe-heels which consists in subjecting a plurality of heel-lifts severally to a definite pressure over a limited part of the area of each lift, and sorting the lifts according to the thicknesses of their said parts when so compressed.

9. The method of making shoe heels, which includes the steps of determining the mass characteristic of each individual heel-lift of a lot which are heterogeneous as to both thickness and density, sorting such lifts into different grades in accordance with their determined mass characteristics, and forming a heel-body by assembling together definite numbers of lifts from one or more of said grades.

10. The method of making shoe-heels of

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uniform height and density from a lot of heel-lifts which are heterogeneous with respect to these two characteristics, which includes the steps of determining the mass characteristic of each individual heel-lift, sorting said lifts into different grades in accordance with their determined mass char-

acteristics, forming heel-bodies by assembling together definite, equal numbers of lifts from said grades, and subjecting said heel-bodies to a uniform compressing operation.

ERASTUS E. WINKLEY

It is hereby certified that in Letters Patent No. 1,209,531, granted December 19, 1916, upon the application of Erastus E. Winkley, of Lynn, Massachusetts, for an improvement in "Methods of Making Heels," errors appear in the printed specification requiring correction as follows: In the heading strike out line 5 and insert the following: *Original application filed April 6, 1912, Serial No. 689,030. Divided and this application filed April 2, 1916, Serial No. 18,686. Original application renewed May 8, 1916, Serial No. 98,437;* page 3, line 76, claim 2, for the word "members" read *numbers*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of February, A. D., 1917.

[SEAL.]

Cl. 12—147.

F. W. H. CLAY,

Acting Commissioner of Patents.