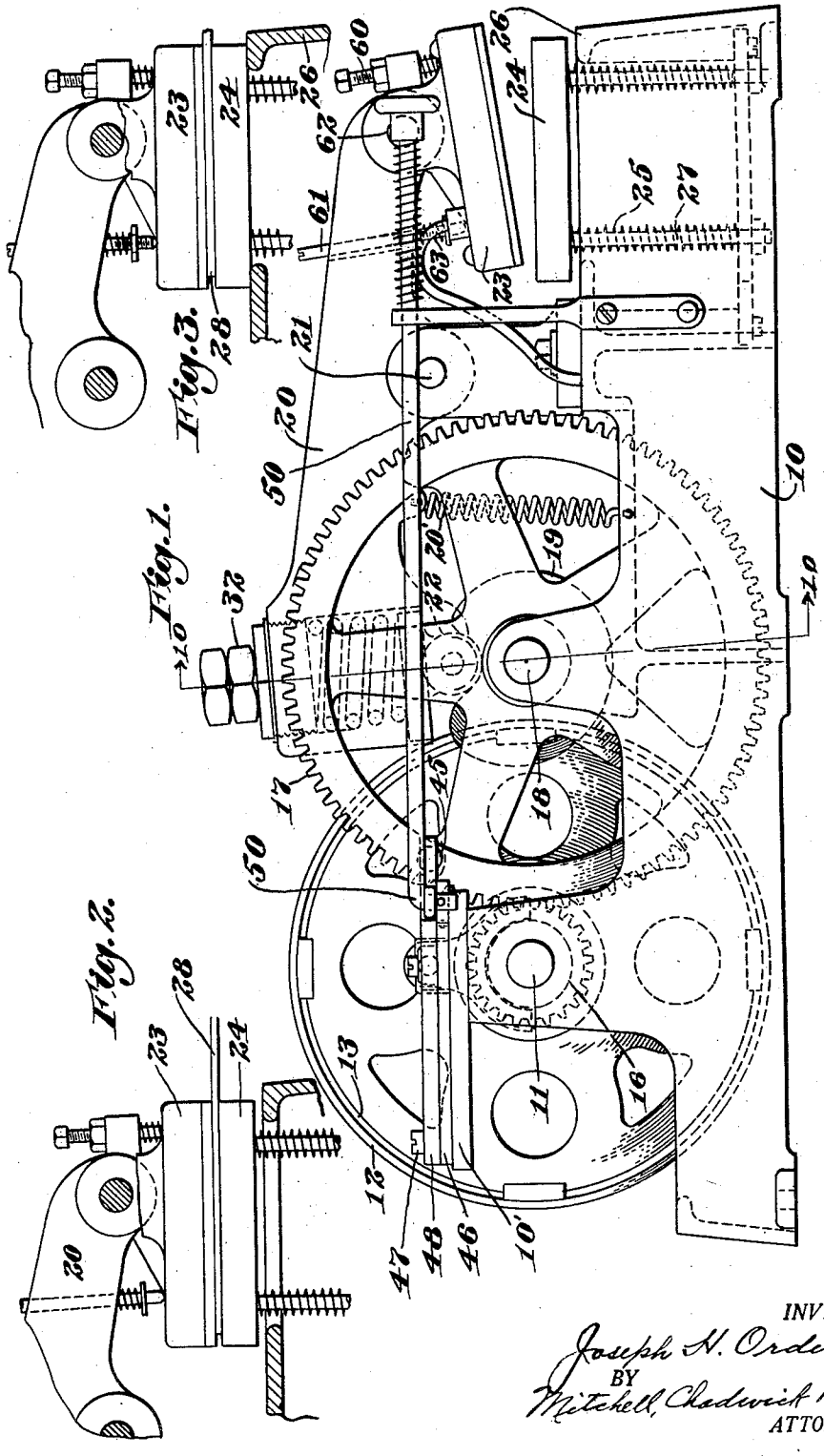
April 27, 1926. 1,582,074

J. H. ORDWAY

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES

Filed Jan. 25, 1923 5 Sheets-Sheet 1



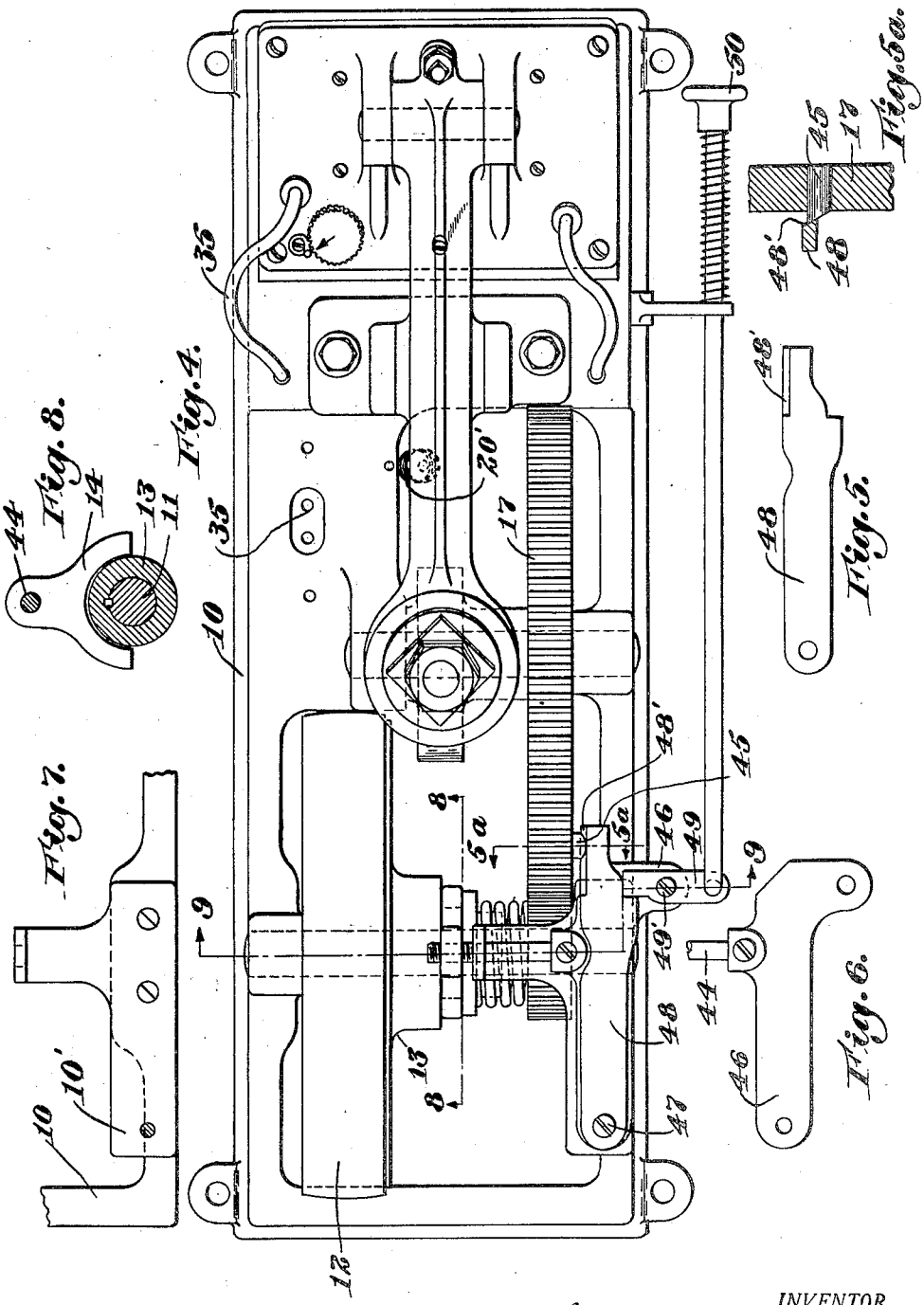
INVENTOR.
Joseph H. Ordway
BY
Mitchell, Chadwick & Kent
ATTORNEYS.

April 27, 1926. 1,582,074

J. H. ORDWAY

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES

Filed Jan. 25, 1923 5 Sheets-Sheet 2



INVENTOR.
Joseph H. Ordway
BY
Mitchell, Chadwick & Kent
ATTORNEYS.

April 27, 1926. 1,582,074

J. H. ORDWAY

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES

Filed Jan. 25, 1923 5 Sheets-Sheet 3

Fig. 9.

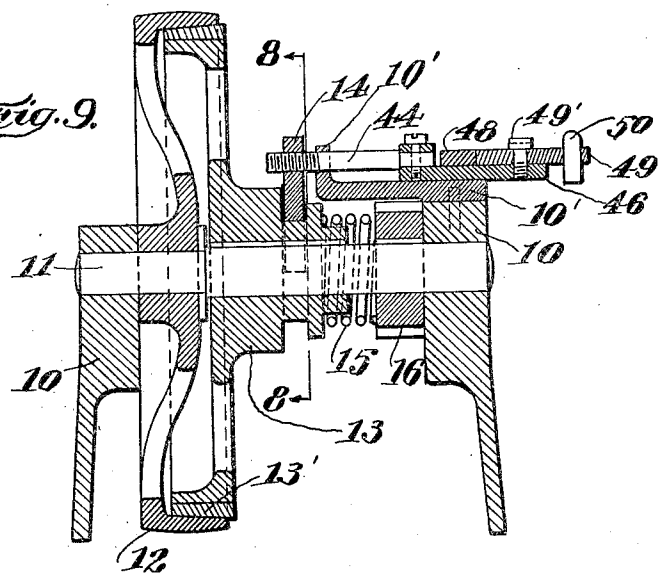
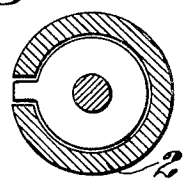


Fig. 11



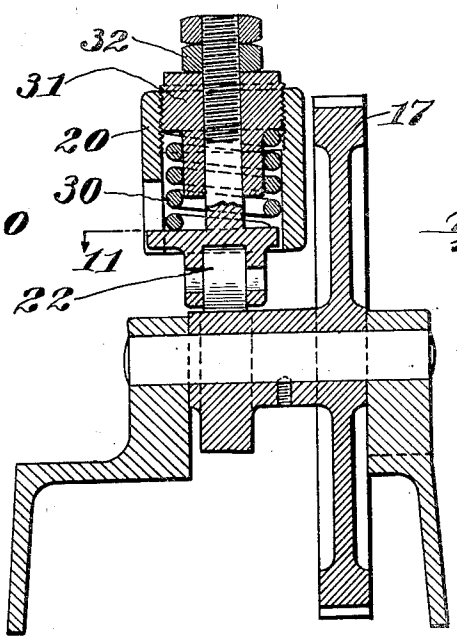


Fig. 10.

INVENTOR.

Joseph H. Ordway

BY

Mitchell, Chadwick & Kent

ATTORNEYS.

April 27, 1926. 1,582,074

J. H. ORDWAY

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES

Filed Jan. 25, 1923 5 Sheets-Sheet 4

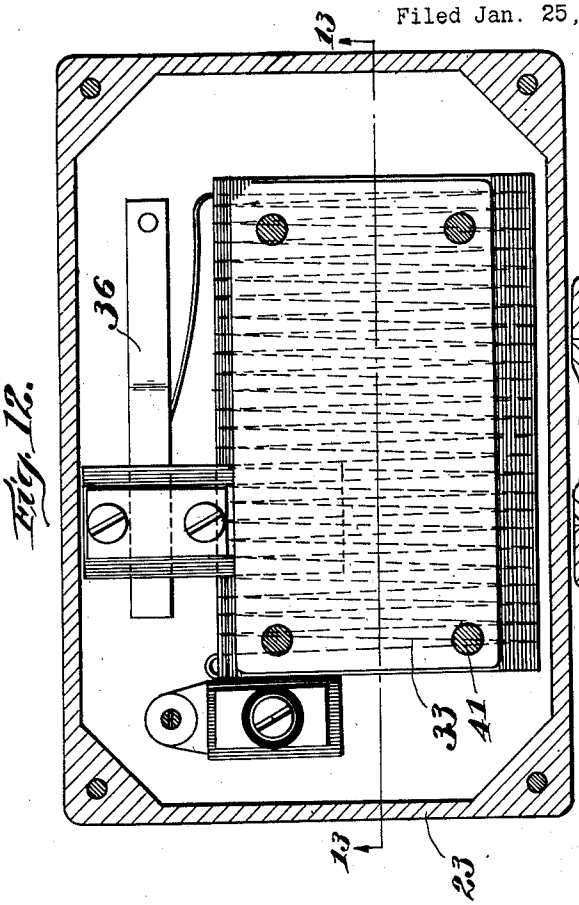


Fig. 12.

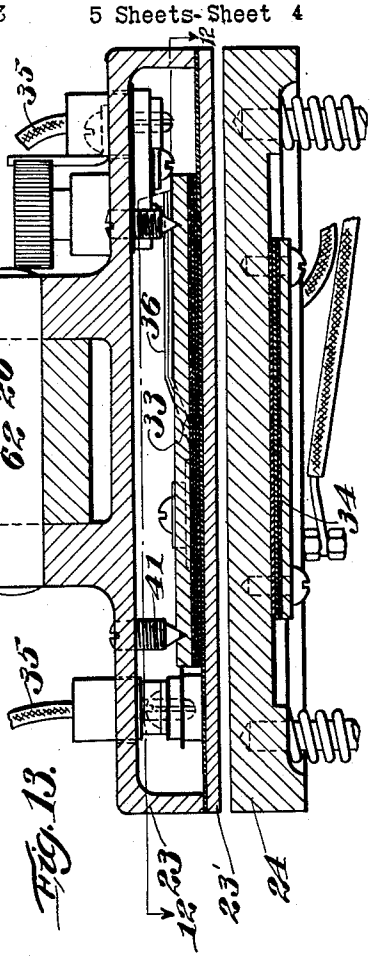


Fig. 13.

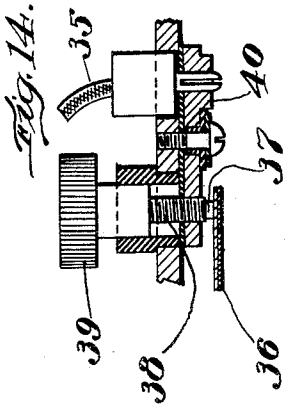


Fig. 14.

INVENTOR.
Joseph H. Ordway
BY
Mitchell, Chadwick & Kent
ATTORNEYS.

April 27, 1926. 1,582,074

J. H. ORDWAY

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES

Filed Jan. 25, 1923 5 Sheets-Sheet 5

Fig. 15.

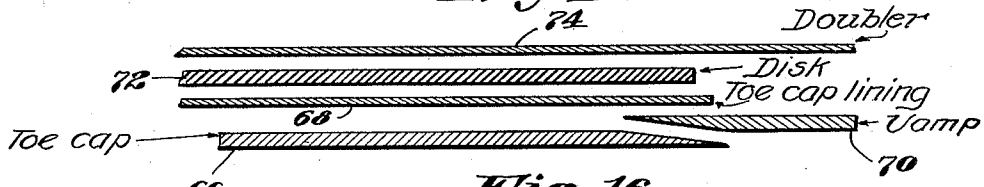


Fig. 16.



Fig. 17.

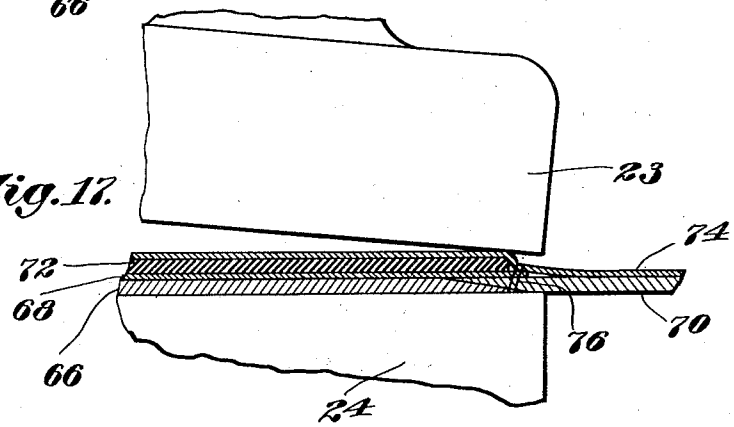


Fig. 18.

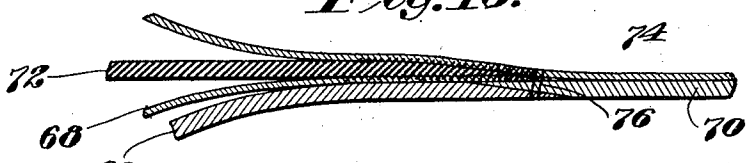


Fig. 19.



Fig. 20.

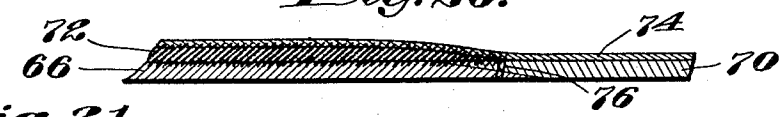


Fig. 21.



Fig. 22.



Inventor
Joseph H. Ordway
By Mitchell, Cadwick & Kent
his Attorneys

Patented Apr. 27, 1926. 1,582,074

UNITED STATES PATENT OFFICE.

JOSEPH H. ORDWAY, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO YAWDRO MANUFACTURING COMPANY, OF CAMBRIDGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PROCESS AND INTERMEDIARY PRODUCT IN MANUFACTURE OF BOX TOES.

Application filed January 25, 1923. Serial No. 615,446.

To all whom it may concern:

Be it known that I, JOSEPH H. ORDWAY, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Processes and Intermediary Products in Manufacture of Box Toes, of which the following is a specification.

This invention relates to improvements in processes for making shoes. More particularly it relates to the process of making the toe part of the shoe, to provide a stiff toe of the type called a box toe. To this end it has been customary to insert material in the toe part of the upper, before the lasting operation, made of something which is stiff under ordinary conditions, but which may be made flexible temporarily. Among the many materials and many devices which have been proposed to accomplish this, the idea found most prevalent in practice is to associate a sheet of some fibrous or colloidal material with some cloth part of the upper at the toe. In my Letters Patent No. 1,252,298, dated January 1, 1918, I have disclosed an improvement in which a non-colloidal stiffening composition is handled in sheet form as a solid body placed next to the cloth or other material, and while soft from heat is forced into said material, so that upon cooling of the mass a composite sheet results in which the characteristic flexiblity of the threads and brittleness of the composition are harmless while the characteristic tensile strength of the threads renders the stiffness of the composition available to make the whole toe stiff. The present improvement relates to shoes made with box toes of this last mentioned type, but also can be applied with advantage to stiffeners of types previously known.

Prior to my said patented invention it was generally found necessary to go through a preliminary process of skiving the stiffening pieces, followed by stapling or stitching them to the upper. This was so especially when, for example, the process consisted in first attaching a piece of felt or cloth, and afterward spreading the stiffening composition upon it by hand; or where the inserted stiffening sheet comprised felt already impregnated with the stiffening material. In the latter case the impregnated felt would not hold enough of the stiffening compound for the latter to act as a glue, with sufficient adhesion to prevent the parts from crawling during the lasting operation. Moreover, on account of the thickness of such a sheet of felt, commonly known as a "disk", although not round, it was necessary to skive the edge of the felt disk in order to avoid the making of an abrupt ridge on the finished toe, along a line crossing the top of the shoe where the toe stiffener begins. This skiving and the stapling or stitching of the disk to the upper were two separate operations each requiring the use of machines, the time of labor, and the danger of occasional mistake with damage to the shoe. The process used in my patented improvement, above mentioned, eliminates the need of the stapling and stitching operation, and makes possible the proper shaping of the stiffener during the lasting operation, without the need of having the edges of the inserted disk preliminarily skived, because of the plasticity with which the composition could change its position and shape to fit available space.

The present improvement relates to the preliminary pressing and shaping of the disk with the aid of stiffening material, whether it be the homogeneous disk of composition referred to in my said Letters Patent, which is to be pressed into a sheet of felt or other fabric, and is to be re-shaped, or whether it be a disk of the older mode such as the felt which is rather thick and is already impregnated with material that will soften with heat, but which is to be re-shaped. It consists in the method of introducing and distributing or of redistributing the composition, and of preparing that edge of the disk which is ultimately to be across the top of the shoe by giving it a tapered shape under heavy compression, the taper extending from

the full thickness of the material, at a distance from the edge, down to as thin an edge as may be desired. In this respect the shape of the stiffener just before the lasting may be the same as that obtained in an impregnated thick felt stiffener by the skiving process. In the case of felt thus thinned by pressure the pressed edge is stronger than a skived edge, being composed of the full body of the entire thickness of felt which was originally at the edge. And in the case of my improvement the edge portion is composed of the full body of whatever thickness cloth or other absorbent material is there (there being ordinarily a thin felted cloth to keep the composition sheet intact during preliminary handling) with such added body of composition as will fill all other space up to the limit described. In the case of my said improvement, in which a homogeneous sheet of the stiffening composition in solid state is used, the composition which in the original sheet of composition lay next to the edge of the sheet is forced into the doubler or other cloth which is already at that stage attached to the upper, thereby promptly securing the sheet of composition to the upper along that edge, although it may be free at all of the other edges. In the case of the preliminary impregnated felt, there is a certain small amount of composition held in the interstices of the sheet, which sheet, for example, may be originally a 16th of an inch in thickness, so that when the felt is compressed down to a 32nd or 64th of an inch in thickness this impregnating material is extruded and penetrates the adjacent doubler; and upon the cooling, it hardens therein so that an attachment of the felt impregnating piece is made to the doubler or other lining material of the leather of the upper comparable to that made when my composition is used. In other cases, when my said sheet of composition is employed, the entire sheet may be softened and forced into the cloth parts of the toe, the said seam edge being tapered or not as may be predetermined. In each of these cases the process of the invention consists in first assembling the stiffening material with its edge next to the seam where the toe begins, and then, in the presence of sufficient contained heat, subjecting the whole to pressure, and if desired, this is concentrated initially at the edge, the area of compression extending gradually into the sheet from the edge as the extent of compression increases in the direction of thickness. This edge concentration is accomplished by using die faces for the compression which make a slight angle with each other, according to the angle or degree of taper to be provided from the full thickness down to the edge. The rise in temperature to produce the softening may be accomplished preferably by application of known or controlled heat simultaneously with preliminary moderate pressure through the die faces of the press, as is set forth in my Letters Patent No. 1,443,478 based on my application, Serial No. 373,036, filed April 12, 1920, of which this is in part a division, or by preliminarily heating the material moderately by any suitable method, and then compressing it heavily while it is still soft and plastic, and holding it compressed until it has cooled sufficiently so that the inherent expansive nature of the material in the cloth or felt is held counteracted by the fact that the composition has hardened in the rearranged position into which it has been thrust during the compression. It is an important feature that the preliminary heating and softening be not carried too far for the composition to cool and solidify practically instantaneously with the relief of the heavy pressure which forces it into its changed position. In my preferred process this is attained by holding the sheets in contact, under the moderate heat, for a sufficient time, which may be determined by experiment, and which may vary according to various needs, until the plasticity has developed enough for the heavy pressure to effect the desired rearrangement, and yet not enough for elasticity of the fibres to disturb that arrangement when the heavy pressure is released. And as no more heat is added after this release and cooling begins at once the conditions that have been thus produced become permanent. It will be observed however that if the disk is not desired to be secured to the upper at this time, its shape can be changed, as a preliminary step in substitution for the skiving heretofore practiced, by softening it, compressing it on a taper, and letting it harden in that shape; and in the case of impregnated felt this makes a stronger edge.

The invention may be practiced by various forms of power driven apparatus and even by hand with a hot iron. I illustrate in the accompanying drawings one type of power driven apparatus which has proven successful for adjustable automatic application of measured quantity of heat and suitable pressure for the two pressure stages and also show the initial and successive stages of material undergoing the processes. It is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Figure 1 is a side elevation of a press by which the process may be carried out, showing the pressing plates in position for insertion or removal of the material;

Figures 2 and 3 are similar elevations of the press plates, showing successive stages in the process;

Figure 4 is a plan of the machine.

Figures 5, 6 and 7 are plans of details of the press;

Figure 5ª is a front elevation in section on line 5ª—5ª of Figure 4;

Figure 8 is a side elevation of a detail, in section on the line 8—8 of Figure 4;

Figure 9 is a rear end elevation of parts, in section on the line 9—9 of Figure 4;

Figure 10 is a rear end elevation of parts, in section on the line 10—10 of Figure 1;

Figure 11 is a plan of a detail, in section on the line 11 of Figure 10;

Figure 12 is a plan of the forward portion of the machine on a larger scale, in section approximately on the line 12—12 of Figure 13; just above the thermostat;

Figure 13 is a front elevation of the same, in section on the line 13—13 of Figure 12;

Figure 14 is a front elevation in medial section through certain details which are seen in full elevation in Figure 13.

Figure 15 shows in side elevation, a section through the successive layers of materials which are to be assembled;

Figure 16 shows them assembled as by stitching, but unchanged;

Figure 17 shows an arrangement of the pressing plates for making a taper at the edge of the disk adjacent to the stitching;

Figure 18 shows the layers of material in the position they may be supposed to occupy after the compressing operation, being one variety of the complete product of the process, in which the upper is ready to proceed to the lasting operation;

Figure 19 is a figure corresponding to Figure 16, with fewer parts.

Figure 20 is a figure corresponding to Figure 18, showing the result of applying the pressing plates as in Figures 2 and 3;

Figure 21 shows a disk of impregnated felt, to which the process may be applied for redistributing the composition therein;

Figure 22 shows the same after the process has been applied indicating also the compression of the felt fibers together, which in this case supplants the skiving thereof which has heretofore been customary.

Referring to the drawings, 10 indicates a base wherein is journaled a shaft 11 which, as most clearly seen in Figures 4 and 9, supports loosely a driving wheel 12 whose interior face constitutes one member of a clutch, the other member of the clutch being marked 13, splined on shaft 11 and slidable thereon by fork 14 working against spring 15. When the clutch is set closed, the shaft 11 is thereby driven, and with it the pinion 16 thereon which, as seen in Figures 1 and 4, drives a larger gear 17 set in the middle portion of the machine on a shaft which also carries a cam 19 for operating the lever 20. Said lever, fulcrumed further forward in the machine at 21, has at its rear a roller 22 riding on top of the cam, so that the rises in the cam cause depression of the forward end of the lever 20, forcing the upper presser block or plate 23 which is there located down upon the under presser block or plate 24. The latter is supported in a substantially horizontal position on four springs 25, one at each corner, and when these yield from the position seen in Figures 1 and 2, it rests firmly on the base 26 in the position seen in Figure 3. These springs are stiff enough to require exertion of a moderate pressure between the blocks before the under one yields. In yielding, the latter may be guided, as illustrated, on rods 27 on which the spiral springs 25 are wound. Co-operating with these springs is a single and powerful spring 30 at the other end of the lever 20, inserted between the cam roller 22 and the lever 20, as seen in Figure 10. The cam 19 is shaped with a quick rise followed by a rest at that elevation and then gradual further rise, followed by quick descent to initial point. When it begins to turn from the position illustrated in Figure 1, it quickly lifts the cam roller 22. As the spring 30 remains unyielding, the lever swings the upper pressure block 23 downward toward the lower plate 24, engages anything that may be thereon, such as an upper 28 with a sheet of composition assembled on it, and depresses it a little, enough to make sure that pressure equal to the tension of the springs 25 is experienced. The rest, produced by the semi-circular right-hand half of the cam as represented in Figure 1 occurs here. Resumption of the rise of the cam slowly carries the under block down, through perhaps a fourth of a revolution, until it rests against the firm base support 26, after which the continuation of rise results in yielding of the material which is between the two blocks, or else in yielding of the powerful spring 30. The limit of pressure on the material may be adjusted and predetermined by the screw setting of the plug 31 which backs the spring and cam roller 22 and is held by lock nuts 32. It is at this stage that the composition is forced into the interfibrous spaces, having been preliminarily softened and rendered plastic by heat during the moderate pressure applied by springs 25. Upon the ensuing fall of the cam, at which the spring 20′ draws down the cam roller, all is released and the blocks return to the position illustrated in Figure 1.

The heating is illustrated in Figures 4, 12, 13, and 14. Uniformity of heat is important, for obtaining uniform results. For the particular work that is being described, it is important to supply to the press block all heat that is abstracted by the work, or lost by radiation. This might readily be done by supplying an abundance of heat; but the

leather would thereby be injured, as the rate of abstraction may vary considerably. It is, therefore, important to prevent over-supply of heat. To accomplish this, the face plate of the press block is made of thin material, for example 1/8" metal; and the heating unit is arranged close to its inner face, spread over it, and powerful enough to put heat back into that thin plate as rapidly as the shoe tip abstracts it. In practice, its capacity must exceed the normal rate of withdrawal. The invention, therefore, makes provision whereby it operates only intermittently, upon variations of temperature above and below a small fixed range, as controlled by a thermostat in the midst of the block. The heating unit 33 of the upper block may be of any suitable type, but it is represented as a flat unit set within the block against its removable and insulated under cover plate 23' (Figures 12 and 13). As automatic means governing uniformity of temperature of this plate the heating unit has in series a thermostatic element 36, at whose free end is a contact 37 with the tip of a screw 38, having a head 39 conveniently accessible for its hand adjustment on the top of the block. The circuit continues thence through the socket piece 40 to the plug end of the conductor 35. Turning the knurled head 39 varies the position of tip 38 where the contact is made. The thermostatic element is set in air enclosed within the hollow presser block 23 to the rear of the heating unit, where the latter does not intervene between it and the face of the plate, and is secured to the inner face of that plate, duly insulated electrically so that it is by conduction and by convection subject to temperature conditions thereof. It is a spring pressing upward. With increase of temperature, it tends to curve downward and so to break the contact 37, which occurs when the temperature reaches the point predetermined by the setting of the screw 39, 38; and with the ensuing decrease of temperature it curves upward and remakes the contact. The heating unit thus controlled is held against the inside of the bottom plate by pressing screws 41 whose conical points reach it from above. The heat generated close to the plate is readily transmitted through it to the material on which that plate operates; and the thermostat causing intermittent action of the heating coil has been found by experience capable of maintaining temperature at a fixed degree without more than 2° to 5° variation. The under plate 24 is thin, and is maintained moderately heated by a heating unit 34 of suitable sort, arranged beneath and in contact with the metal of the plate. This may be continuously connected, or may be in the circuit controlled by the thermostat; or it may at option be disconnected, leaving the lower plate cold, which is desirable for certain sorts of work. Its purpose when used is to prevent the leather from withdrawing heat from the plastic composition, filling the leather with heat from this source to a moderate degree; or, per contra, when not used to cause the leather to withdraw heat from the composition by leaving the leather cool, thus hardening the lower surface of the composition without much penetrative flow thereof.

The drawings illustrate in Figures 1–4 a screw 60 and a pin 61, respectively forward and to the rear of the pivot 62 by which the block 23 is attached to the lever 20, the center of gravity of the block being to the rear of the pivot, so that the block tends to swing forward as illustrated, with its lower face at an angle with the lower block 24. A spring 63, strung on the rear pin, acting in conjunction with gravity keeps the block 23 swung on its pivot 62 against the tip of screw 60 so long as the blocks are apart; and when the heavy compression comes the angle between the block faces may be determined by the setting of screw 60. If this is set down enough to make a small angle, opening to the rear, the upper being inserted with its toe pointing into the machine, the pressure will mold a thin edge of the plastic disk across the midst of the upper, at the beginning of the toe, as is suitable for plain toed shoes, with the thickness of disk gradually increasing toward the left in Figure 1. Although the machine is illustrated with dies having plane faces, it will be understood that concave or convex or composite faces might be used. Where it is desired to pre-heat a large tip, one which reaches to the back of the plates, a withdrawal of the adjusting screw 60 at the front edge lets the back edge of the upper plate sit lower, thus giving more pressure or a quicker contact at the back.

Operating mechanism to be started easily by the operator, and to be stopped automatically, with the presser blocks separated, after application of the predetermined pressures and temperature for a predetermined number of seconds. Important parts which co-operate with others to produce this are the spring 15, which when released closes the clutch to start the machine and the cam pin 45 on the main gear 17 which opens the clutch.

The clutch control device comprises the fork 14, the rod 44 extending therefrom and the horizontally swinging lever 46, pivoted at 47 at the rear on a plate 10' fixed on the base, which when set outward holds the rod 44, fork 14, and clutch member 13 open so that the power is disconnected. This opening is accomplished when the cam pin 45 in the large gear 17 strikes the cam surface 48' on an auxiliary lever 48 which overlies the lever 46, is fulcrumed on the same pivot 47 with

it, and acts as if integral with it, for the instant illustrated in Figure 5ª because of the latch 49 which connects these two. This latch, as illustrated, has the aspect of a detent pivoted on the lever 46 at 49′, resting thereon in the same plane with the lever 48, and normally set so that, when the cam pin 45 in its travel reaches the cam surface 48′ and drives the lever 48 outward, this pulls the rod 44 and clutch 13, cutting off the power; and the pin 45 is so set that this occurs when the roll 22 is at the bottom of the depression of the cam 19. With the power thus cut off, and with the springs 15 and 20′ and the momentum of the heavy lever 20 opposing further motion, the latter having to reverse its motion after a quick swing, the parts come to rest before the pin 45 has passed the cam 48′. Thus they remain with the clutch 13 held open by the cam pin 45, which in turn is held still because the spring 20′ maintains the cam 19 stationary by holding the cam roller 22 in the narrow trough whence it cannot move without rising against the spring 20′. Operation is resumed when the operator pushes the button 50, conveniently located on the end of a spring-held rod, ready when pushed to swing the detent 49 away from the lever 48, so that even though the lever 48 remains engaged by the cam pin 45, the lever 46 is free of it and can swing inward, which it immediately does under the pull of the clutch spring 15. The continuously running drive wheel 12 thereupon sets the cam 19 again in motion and the cycle is repeated, coming to a similar stop at the end of a single revolution of the cam 19.

The various parts thus described co-operate, for the special work for which the illustrated specimen of the press is designed, as follows: It being desired to cause a solid homogeneous sheet of stiffening compound to pass into impregnating relation to the cloth doubler and toe piece of a shoe upper, the purpose of the mechanism is to accomplish this automatically and correctly. The machine must pass heat through the leather and cloth, either or both, enough to soften the disk of composition, meanwhile guarding against injuring the leather by heat; must apply pressure which may be as much as 2,000 pounds for molding the disk, from its initial parallel-sided shape to a thin edged shape, if desired, and to force it into the body of cloth fabric, or, if preferred, merely to make it stick thereto; and must stop automatically when this is done. Furthermore, it is a purpose that the same machine shall be capable of treating large or small tips; thick and thin; and of producing a feather edge, or leaving a thick edge on each or all, with standard results, according to what is predetermined. The specifications to accomplish this in one machine, which may be taken as an illustrative example, is to provide a heating unit 34 in the under plate taking about 25 watts steadily, and a heating unit 33 in the upper plate taking 150 watts for a short period at the beginning of operations, but which, when running, takes only about 60 watts on the average. The under plate is thin so as not to contain a body of heat which may injure the tip, but just enough heat to warm the cold leather when it is put in; and radiation prevents it from rising above approximately 160° F. The upper plate face may be maintained by the thermostat within a range of 2° to 5° in the vicinity of 210° to 220°. The machine, making a complete revolution of the cam in 20 seconds, applies heat for approximately 15 seconds at a moderate pressure of the springs 25 for the pre-heating, and then continues the application of heat at the high pressure for 5 seconds more, during which time the flux of composition into the cloth doubler and into the cloth toe piece lining occurs, and the flux into new shape as desired for production of the thin edge. The machine must then stop and leave the upper safe from the heat. All of this the machine does. The pressure is controlled by the cam 19 and relative action of springs 25 and 30. The intensity of heat is controlled by the thermostat; the length of time during which the heat is applied is controlled by the cam 19, speed of the machine being taken into account; and the automatic cessation of heating comes with relaxation of pressure and heat upon the cessation of operations of the press leaving the upper resting on the merely warm lower plate to await removal.

Figure 15 shows, in exaggerated thickness, for clearness, several layers of material used in one form of box toe; namely, a toe cap or tip 66, lining 68 therefor, vamp or boxing 70, a disk of composition or impregnated felt 72, and a doubler or lining 74. Figure 16 shows these layers placed together, the cap and vamp being cemented as usual and the linings attached thereto by stitching 76. The disk 72 is placed between the layers of lining, and the whole laid on the lower pressing block 24, as seen in Figure 17. If the disk is to be reshaped only along its edge nearest the stitching 76, the upper pressing block 23 will be set substantially at the angle shown so that when pressure is applied its greatest intensity will be exerted near the seam, growing gradually less toward the toe end. This will produce a tapered or beveled effect on the disk, spreading it toward the seam or stitching to fill all the space between the linings. It is also forced into the interstices of the fabric as indicated by the overlapping cross-hatching in Figure 18.

Figures 19 and 20 show another group of layers, from which the toe cap lining is ab-

sent, the former figure showing the material before the process is carried out, and the latter figure showing the result after pressure and heat have been applied throughout the extent of the layers, when the pressing plates are arranged as in Figures 2 and 3, the intensity of pressure being substantially uniform over the whole area of the disk. Here again the intermingling of the cross hatching illustrates how the composition actually penetrates its neighboring layers.

Figures 21 and 22 show how a plain disk of impregnated felt may be treated in accordance with the process, to compress the disk along the edge which is to be placed near the seam, producing thereat a smooth taper, similar in shape to that heretofore obtained by skiving, but stronger than a skived edge, because of the retention of all the original stock, which by the process is compressed into a smaller space.

I claim as my invention:

1. The method of impregnating articles with a composition softened by heat, which comprises subjecting sheets of the article and said composition to moderate heat and pressure together, temporarily maintaining the said condition until the composition is softened and the article is warmed; and then subjecting them to heavy pressure, thereby forcing the substance into the article.

2. The method of making box toe stiffeners which comprises placing a sheet of solid composition, adapted to be made fluid by heat, adjacent to a sheet of fibrous fabric; subjecting the adjacently disposed sheets temporarily to moderate pressure and to heat to soften the composition, then increasing the pressure thereby forcing the composition into the interfibrous spaces of the fabric, and then allowing the impregnated fabric to cool the composition becoming solid within the fabric.

3. A process of making box toes in which a sheet of stiffening material, adapted to be softened by heat and originally having its sides parallel, is preliminarily softened by heat to a moderate degree, and while soft is deformed by being compressed intensely at its edge, and by being compressed with progressively less intensity at points inward from the edge, whereby the sheet becomes thin toward its edge, and is then cooled and so is hardened in said deformed shape; the softening step being separated in point of time from the deforming step, and the latter being effected by pressure substantially exceeding the pressure which exists during the softening.

4. A process of making box toes in which a sheet of stiffening material comprising a hard composition associated with fibrous material and adapted to be softened by heat into plastic condition, originally having its sides parallel, is preliminarily softened, by moderate heat to a degree sufficient for it to be fluid under heavy pressure, but not under light pressure; is then while soft deformed by being compressed heavily, whereby the composition flows into a new positional relation to the adjacent fibrous material and the fibres thereof are compressed, and is then relieved of further supply of heat and of pressure, whereby its flow ceases at a time when its fluidity is not sufficient for the elasticity of fibres to move those fibres through it to restoration of their former relations.

5. The process of making box toes which comprises the assembling of the upper, including a sheet of absorbent fabric at the toe portion, with a sheet of adhesive stiffening composition; pressing the said sheets heavily together along the edge of the composition, at a line extending across the top of the toe where the toe is to begin, the pressing being progressively less intense forward of said edge, whereby a wedge shaped edge is constituted, adhering on its flat sides to the upper, with the stiffening composition retaining the said shape and adhesion.

6. An upper prepared for lasting, having a sheet of stiffening material adhering to it along a zone crossing the top of the toe at the rear edge thereof, and elsewhere overlying the toe but free from adhesion to it, the adhesion being by a composition which constitutes the stiffening ingredient of said sheet of material.

Signed at Boston, Massachusetts this nineteenth day of January, 1923.

JOSEPH H. ORDWAY.