June 5, 1934. R. W. WHITE 1,961,318

SYSTEM FOR MANUFACTURING SHOES

Filed July 14, 1930

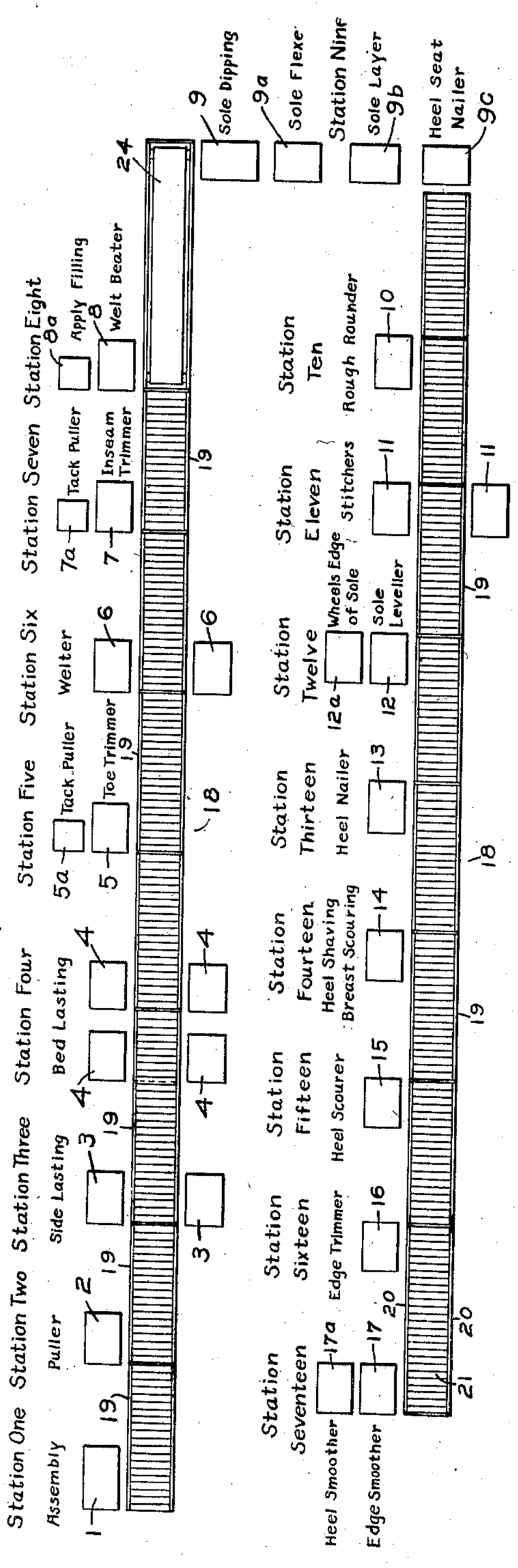

Fig. 1.

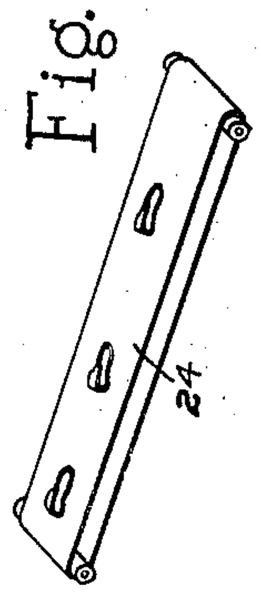

Fig. 4.

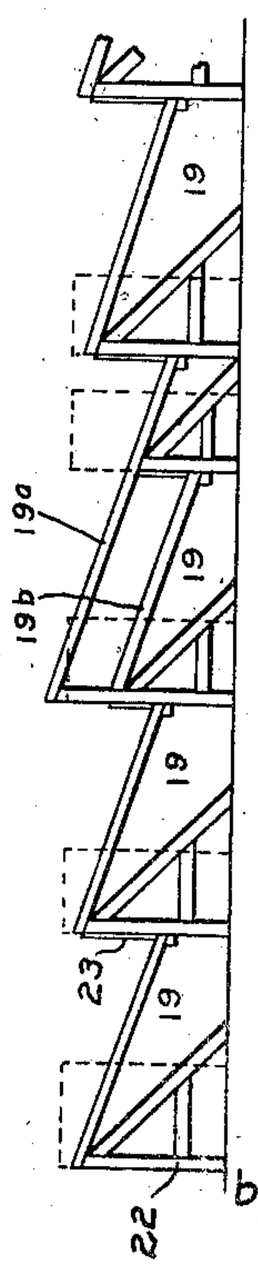

Fig. 2.

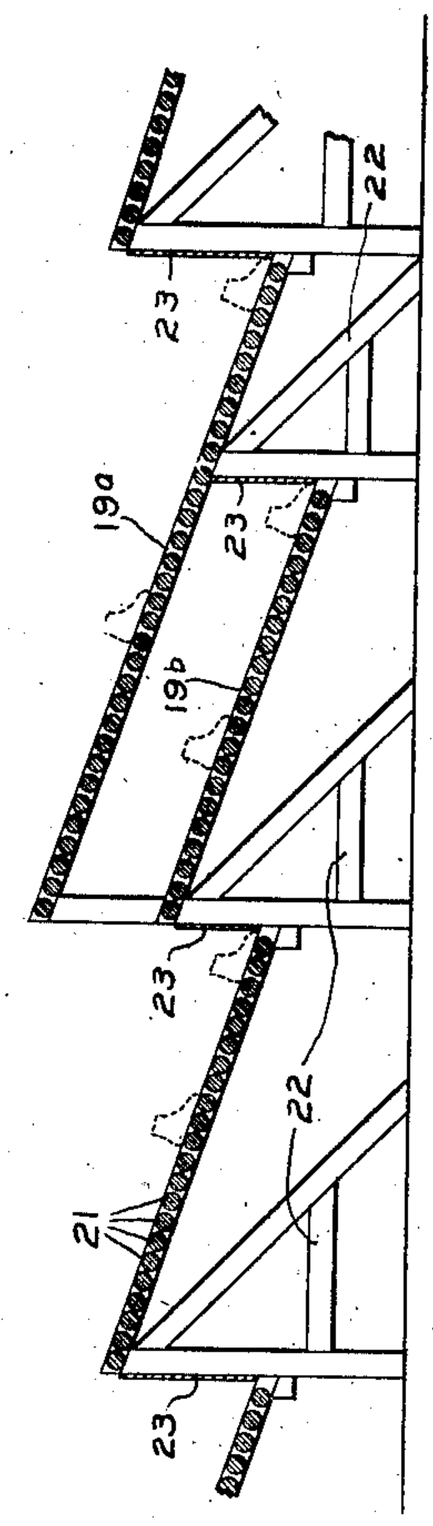

Fig. 3.

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SYSTEM FOR MANUFACTURING SHOES

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6 Claims. (Cl. 12—142)

This invention relates to the manufacture of shoes and has for its general object to provide a novel system of making shoes by which the individual shoes can be carried through the various stages of manufacture much more expeditiously than according to the method which is now commonly used, and also to provide a novel method of making shoes which results in a greatly reduced money tie up of shoes "in process".

A further object of the invention is to provide a novel process of manufacturing shoes by which the shoes are carried through the various stages of manufacture individually instead of in large lots.

According to the method of manufacturing shoes which is now commonly used in shoe factories the shoes are carried through the successive stages of manufacture in "case lots". The number of shoes in a case varies in different shoe factories, sometimes there being 6 pairs to a case, sometimes 12 pairs, sometimes 24 pairs and sometimes even 36 pairs. The number of pieces necessary to form the uppers of a case of shoes are first cut and then these pieces are taken to the stitching room where they are sewed together to form the uppers.

After the uppers for a case of shoes have been completed they are then assembled with the lasts and as the shoes constituting any case are assembled they are placed on a rack and are carried on the rack from one operator to the next, all the shoes comprising any case being always kept together on the rack throughout the entire range of operations on the shoe from the assembling to the finishing.

Each rack containing the case of shoes, is passed from one operator to the next and as a rack containing the case of shoes is brought to any operator he takes each individual shoe from the rack, performs his prescribed operation on the shoe and then returns the shoe to the rack.

When an operator has performed his operation on all the shoes on any rack then the rack will be transported to the next operator who will similarly perform his operations on the shoes. With this system each shoe is retained at any operator's station for a length of time sufficient for the operator to perform his prescribed operation on all the shoes comprising the case and hence the time required for any shoes to pass from one operator to the next is dependent on the time required for the operator to complete his operation on all the shoes of the case.

In an ordinary shoe factory, therefore, it will be found that each operator will have at his station at least one case of shoes on which he is operating and sometimes there will be one or more additional cases of shoes waiting for the attention of an operator.

The carrying of the shoes through the various manufacturing operations in case lots necessarily results in a large money tie-up of shoes "in process" and also necessitates the expense of providing a sufficient number of lasts to accommodate all the shoes "in process".

Moreover, where the shoes are carried through the various manufacturing operations in case lots, the individual shoes can advance from one operation to the next only as fast as the entire case advances. As a result it usually takes anywhere from four or five days to two weeks or more to complete the operations on any shoe depending on whether or not the case is held up for "cripples". In other words, it takes this time for any individual shoe to pass from the station where the uppers and insoles are assembled around to the station where the finishing touches are put on the shoe.

As stated above it is one of the objects of my present invention to provide an improved system of manufacturing shoes by which the number of shoes "in process" at any one time will be greatly reduced thereby also reducing the number of lasts which it is necessary for a manufacturer to have on hand for a given output per day.

My improved system extends from the cutting of the parts making up the shoe clear through to the completion of the shoe, and briefly stated it consists in routing the individual parts making up the shoe as separate units to the point of assembling and thence routing the assembled shoe individually as distinguished from routing the shoes in case lots or group units, from the point of assembly through the various operations to the point where the shoe is completed, and finally, when the individual shoes have been separately completed, mating them for the first time in pairs for shipment.

A further object of the invention is to provide a novel system by which the time required for any shoe to progress from the station where the shoes are assembled around to the station where the shoes are completed will be very greatly reduced. In fact, my invention provides a system by which the operations on an individual shoe can be carried out in the course of a few hours as compared with four days to two weeks or more by the method now commonly used.

As stated above these objects are accomplished

by the employment of a new system in which the unit of operation is a single shoe instead of a case of shoes.

In carrying out my improved method the pieces forming the uppers of the shoe are cut and are then stitched together, the separate pieces going to make up an upper being assembled and stitched together and then being conveyed or passed on individually for the subsequent operations. When the uppers arrive at the assembly point where the uppers and the lasts are assembled, this operation is carried out on each shoe individually and without regard to whether it is a right or a left shoe, it being necessary, however, that in assembling an upper and a last the assembler should make sure that each "right" or "left" upper was assembled with a "right" or "left" last.

From the assembling of the upper and last the shoes are carried through the various subsequent operations to a point of completion individually and as separate units as distinguished from carrying them through the operations in case lots or in groups or pairs. After the shoes have been separately completed then they are mated up for the first time for shipment.

There is no attempt at any time in the operation to keep the shoes in pairs as each shoe is carried through its manufacturing operations separately and independently of any other shoe, the pairing up or mating of the shoes being done for the first time as fast as the shoes become finished and are put on the packing bench for shipment.

With this system each shoe can be carried through all the various manufacturing stages to completion in a fraction of the time required where the shoes are carried through the various operations in case lots. In fact, according to the method now in use where the shoes are handled in case lots it will take anywhere from four days to two weeks to carry the shoes from the assembling operator around to the finishing operation while with my improved method it takes only two or three hours for each shoe to be carried through the various successive manufacturing operations from the assembling around to the finishing.

In the manufacture of shoes it is customary to temper the outsole before it is applied to the shoe, this usually being done by soaking it in water to soften it for the sole laying, heel seat nailing, rough rounding and stitching operations.

After the tempered sole has been stitched to the shoe it is necessary that it should be properly dried out before subjecting the shoe to some of the subsequent operations such as scouring, trimming and finishing the edge of the heel and sole, for if these operations are performed while the sole is too moist, the subsequent drying and shrinking of the sole is apt to open up cracks thus producing an inperfection in the shoe. Hence in shoe factories it is customary to subject the cases of shoes to a drying operation after the outer sole has been stitched to the shoe and levelled, and frequently it is necessary to dry the shoes for several hours or even days to bring the tempered sole into the properly dried condition so that the edge-trimming and the edge-finishing operations can be properly performed and in such a way that there will be no danger of cracks appearing in the edge of the shoe due to further shrinkage and drying of the sole after the finishing operations.

Another feature of my invention concerns the tempering of the outsole and the relation which this tempering operation has to the subsequent sole-attaching operations, such as sole-laying, rough rounding the outsole, stitching the outsole to the welt, levelling the sole, etc. According to this feature of the invention the tempering of the sole is so performed that the sole will be sufficiently flexible and correctly tempered for the above-mentioned sole-attaching operations, but by the time these operations have been performed the sole will be sufficiently dry to permit of the subsequent operations, such as scouring and filling the edge of the heel, trimming the edge of the sole, etc.

As soon as the sole and heel have been attached to the shoe it can be immediately passed to the next succeeding operators who shave and scour the heel, apply filler to the edge thereof, trim the edge of the sole, etc., and without laying the shoe aside at the end of the heel-attaching operation to permit the sole to become dry, as has heretofore been necessary.

With this improvement, therefore, the shoe can be passed continuously through the successive stages of operations between the sole-tempering and the edge-trimming operation and by the time the operations on the shoe which come between the sole-laying and edge-trimming are performed the sole will be properly dried so that the edge-trimming and edge-finishing operations can be carried out without danger that there will be any subsequent cracking of the shoe due to further shrinkage of the sole after the edge thereof has been finished.

In the drawing I have illlustrated more or less diagrammatically a set up by which my improved system may be carried out.

Fig. 1 is a diagrammatic view of a layout for a shoe-manufacturing plant based on my invention;

Fig. 2 is a view illustrating the operation of the conveyer means by which the shoes are transferred from one operator to the next;

Fig. 3 is an enlarged vertical sectional view of the conveyer;

Fig. 4 is a perspective view of one section of the conveyer.

For the purpose of illustration I will refer to to the invention as it might be applied in the manufacture of welt shoes. The first step in any process of making shoes is the cutting of the individual parts from which each shoe is made.

In my improved process the parts are cut in the usual manner but instead of holding the parts back and conveying them in case lots to and through the stitching room and to the point where the upper is completed ready to be assembled with the last, the individual parts, after they are cut, are sewed together to make shoe uppers and the uppers are individually and separately conveyed or transported to the point where the upper and the last is assembled as distinguished from being conveyed from point to point in case lots. In other words, as soon as the uppers are sewed they are passed on for the next operation and are not held back to proceed in a "case lot" to the next operation.

After the upper and last of each shoe is assembled it is subjected to the usual operations necessary to complete the shoe, but in my invention each shoe is routed individually and separately from the assembling point to the point of completion as distinguished from passing from one operation to the other in case lots.

Some of the operations between the assembling and the finishing are as follows:

Assembling, which consists in applying the upper to the last to which an insole has been tacked; pulling the toe of the upper over the toe of the last and temporarily attaching it thereto; side-lasting the upper; bed-lasting the upper; trimming the toe of the upper; pulling the temporary tacks inserted during the pulling-over operation; sewing the welt to the insole; trimming the edge of the upper to the inseam rib of the insole; pulling the lasting wire put in at the bed-lasting operation, butting the welt and taking out the tacks by which the insole was held to the last; beating out the welt; applying the wooden shank and inserting the filling to the shoe bottom; tempering the outer sole and flexing the same; laying the outer sole; heel seat nailing; rough rounding the outer sole; stitching the outer sole to the welt; levelling the sole and wheeling the edge thereof; nailing the heel to the shoe; trimming the heel and scouring the breast thereof; scouring the heel and applying filler to the edge thereof; trimming the edge of the sole, (the sole which has been previously tempered for the sole laying, rough rounding and stitching operations must be thoroughly dry before the filler is applied or the edge trimmed;) smoothing the edge of the sole and the heel; blacking the edges of the heel and sole and painting the bottom of the shoe if desired, etc.

These various operations are each performed by a machine suited for the purpose and the various machines are placed at different stations and are preferably so located with reference to each other that the successive operations may be performed on any shoe by passing it from station to station.

The number of machines at any one station will depend upon the rapidity with which the operation at said station can be carried out. Some operations can be performed much quicker than others and the number of machines which will be located at any station will depend partly on the maximum output for which the system is designed and partly on the rapidity with which the particular operation can be carried out with respect to other operations. As a general rule a good assembler can assemble about 50 dozen pairs of shoes a day, and based on this output I propose to use one assembling machine at the first station. The pulling-over operation takes just about as long as the assembling operation so that one pulling-over machine will be placed at the second station. The side-lasting operation takes about twice as long as the assembling operation and hence I propose to place two side-lasting machines at the third station, since the two operators working the machines can just about keep up with the assembler. The bed lasting is a slow process and it will take about four bed lasters to keep up with the assembler and hence I propose to place four bed lasters at the fourth station.

The trimming of the toe and the pulling of the tacks can be rapidly performed and a single operator can take care of both of these operations and hence at the fifth station I propose to place both a tack puller and a toe trimmer. The welting machines are located at the sixth station and it will require two welters to take care of the 50 dozen pairs of shoes a day. The next operation is the inseam-trimming and removing the lasting wire and these two operations can be taken care of by a single operator so that at station seven there will be an inseam trimmer and also a machine for removing the tacks used for attaching the insole to the last.

At the eighth station there may be a welt beater for beating out the welt and also a proper machine for use in applying the shank and filling to the shoe. At the ninth station the outer sole is tempered and flexed and then applied to the shoe and the heel seat is nailed. These four operations can all be carried out by a single operator as fast as an assembler can assemble the shoes so that at the ninth station there will be machines located for tempering the sole, flexing the sole, laying the sole and nailing the heel seat.

The next operation is the rough rounding which takes place at station ten and as this operation takes about as long as the assembling operation one operator is sufficient at station ten. At station eleven the outsole is stitched to the shoe and as this operation is slower it will take two operators to keep up with the rough rounder. Hence at station eleven there will be two outsole stitchers.

At station twelve the sole is levelled and the edge of the sole is wheeled. One operator can perform these two operations and hence there may be one sole leveller and one machine for wheeling the edge located at station twelve. At station thirteen the heels are nailed to the shoe and one operator is sufficient at this point based on a 50 dozen pair per day output. At station fourteen the heel is shaved and the breast of the heel is scoured. One operator can take care of these operations.

At station fifteen the heel is scoured and the filler applied to the edge thereof and one operator is sufficient here. At station sixteen the edge of the sole is trimmed. At station seventeen the edges of the sole and heel are smoothed and the operator at this station "cobbles" the shoe, that is, removes any tacks.

In Fig. 1, which shows diagrammatically a layout by which my improvement may be carried out, the separate stations are indicated and the machines located at the different stations are shown diagrammatically. 1 indicates an assembling machine at station one; 2 indicates a pulling-over machine at station two; 3 indicates two side-lasting machines at station three; 4 indicate four bed-lasting machines at station four; 5 indicates a toe trimmer and 5*a* a tack puller at station five; 6 indicate welters at station six; 7 indicates an inseam trimmer and 7*a* a tack puller at station seven; 8 indicates a welt beater at station eight and 8*a* indicates the machine which is used in connection with inserting the filler, said machine being constructed to level off the surface and remove surplus filling.

At station nine there is indicated a sole-dipping device 9, the sole-flexing device 9*a*, and sole-laying device 9*b* and a heel-seat nailing machine 9*c*. 10 indicates a rought rounding machine at station ten and 11 indicate outsole stitches at station eleven; 12 indicates a sole-levelling machine and 12*a* indicates a machine for wheeling the edges of the soles, both situated at station twelve; 13 indicates a heel nailer for nailing the heel to the shoe situated at station thirteen; 14 indicates a heel shaving and breast-scouring machine indicated at station fourteen; 15 indicates the heel scourer at station fifteen; 16 indicates an edge trimmer for trimming the edge of the sole located at station sixteen; 17 is an edge smoother and 17*a* a heel smoother both located at station seventeen.

In connection with this layout of the machines there is provided some suitable means for convey-

ing the shoes individually from one station to the next and to deposit each shoe at the receiving station in convenient position for the operator to reach. The conveyer which I prefer to use is a gravity conveyer system made up of separate sections, there being one section connecting each two adjacent stations. The conveyer herein shown is indicated generally at 18 and it is made up of the separate sections 19. Each section of the conveyer is shown as comprising a pair of side rails 20 which support between them freely rotatable rollers 21. The side rails 19 of each section are arranged on an inclination as shown so that when a shoe is deposited on the upper end of any section it will gravitate to the lower end, the rollers 21 facilitating this movement.

These various sections of the conveyer are supported upon a suitable framework 22 and at the lower end of each section is a board or stop member 23 extending across the conveyer and situated to form a stop for the shoes that gravitate down the section. Any partially completed shoe placed on any section will gravitate to the bottom and will come to rest against the stop board 23.

The machine or machines at each station are placed adjacent the point where the sections 19 of the conveyer meet so that the operator at any machine can easily reach the shoes which accumulate at the lower end of one conveyer section, and after performing his prescribed operation on the shoe, can easily deposit it on the upper end of the next conveyer section.

Where two or more operators are required at any station I propose to place the machines on opposite sides of the conveyer so that one operator will be on one side of the conveyer and the other on the other side of the conveyer as shown with reference to machines at stations three, four and eleven. On the other hand, where there are two or more machines at any station which are operated by a single operator, that is, where a single operator performs more than one operation on the shoe, then I propose to arrange all the machines at said station on the same side of the conveyer as seen with reference to the machines at stations five, seven, eight, twelve, etc.

The lasts with the insoles tacked to them may be delivered to the operator at station one in any approved way. One convenient way is to have these lasts delivered from chutes.

In carrying out my improved process the pieces from which the shoe is made are cut as usual, care being taken to cut pieces for right shoes and for left shoes in equal quantities. After the pieces forming the uppers of the shoes have been cut they are taken to the stitching room and the separate pieces required to form any individual upper are then stitched together thus completing the upper. In doing this the uppers are stitched individually and are individually and separately passed from one operator to the next as distinguished from the usual practice in which all the pieces for a case of shoes are kept together and assed from one operator to the next as a unit.

With my improvement the separate pieces are taken separately and individually to the point of assembly and after each upper has been cut it is individually transferred to the point where the upper and the lasts are assembled, which is indicated as station one in the drawing. At this station the operator assembles each upper with a last and in doing this he takes the upper as it comes to him regardless of whether it is a right or a left and assembles it with a corresponding last, in doing which he makes sure that a right upper is always assembled with a right last and a left upper with a left last.

As fast as the shoes are assembled the operator at station one places them on the first conveyer section 19 and said shoes gravitate to the lower end thereof within convenient reach of the operator at station two. This operator takes the shoes individually as they are brought to him by the first conveyer section 19 and pulls over the toe of the last of each shoe by means of the puller 2. This operation is carried out on each shoe individually and without regard to any other shoe and as soon as the pulling operation on any shoe has been completed it is placed on the upper end of the second section of the conveyer by which it is conveyed to station three.

As the individual shoes are received at station three, the operators at said station take the individual shoes from the conveyer section and perform the side-lasting operation, each operator taking the shoe which first comes to hand, and after side-lasting it, depositing it on the next section of the conveyer. As the shoes come to station four the operators at such station perform the bed-lasting operation and each operator lasts any shoe that comes to him regardless of whether it is a right or a left and without any effort on his part to mate up the shoes.

Where there are four like machines at a station as shown at station four it is convenient to make the conveyer leading to said station with an upper and a lower section as shown in Figs. 2 and 3, the upper section being indicated at 19*a* and the lower section at 19*b*. The upper section 19*a* is shown as longer than the lower section and is designed to convey the shoes to the right hand machines 4 while the under section conveys shoes to the left hand machines at station four. As soon as each operator at station four has lasted his shoe he deposits it on the next section of the conveyer by which it is conveyed to station five. The operator at this station takes the shoes as they come to him and trims the edge of the upper around the toe by the machine 5 and then with the machine 5*a* he pulls the tacks which were inserted at station two during the pulling-over operation.

As the operator at station five completes his operation on any shoe it is deposited on the next section of the conveyer by which it is transported to station six. At this station the operators sew the welt to the shoe by machines 6 and when this is done each shoe is deposited on the next section of the conveyer and conveyed to station seven. The operator at station seven trims the edge of the upper close to the inseam by a machine 7 and he also removes the wire, which was put around the toe in the bed-lasting operation at station four by a machine 7*a*. This operator also butts the welt.

As the operator at station seven completes his operation on each shoe it is placed on the next section of the conveyer by which it is conveyed to station eight. At station eight the operator beats out the welt, inserts the wooden shank, places the filler on the shoe bottom and then levels or smooths off the filling and removes the surface. These operations can all be performed by one operator by means of the machines 8, 8*a*.

After these operations on any shoe are completed the operator at station 8 places the shoe on the next section of conveyer by which it is

conveyed to station 9. The section of the conveyer leading from station eight to station nine will preferably be of the endless belt type rather than the gravity roller type because at station eight the filler, which is a tacky material, is applied to the shoe and it is necessary that the shoe should remain in inverted position with the bottom directed upwardly while passing from station eight to station nine. Consequently, this section of the conveyer may be in the form of an endless belt 24 on the upper run of which the shoes are placed in inverted position. This belt may pass over idler rolls and may be operated my hand to advance the shoes from one station to the next as needed by the operator at station nine.

When the shoe reaches station nine it is ready to have the outer sole attached but before this can be done it is necessary to temper or condition the outsole. The object of tempering or conditioning the outsole is to render the sole flexible so as to facilitate the sole-attaching operations such as sole-laying, rough rounding, stitching the outsole to the welt and levelling the sole.

This conditioning of the outsole is usually accomplished by dipping the sole in some suitable liquid which penetrates the leather and softens it. For the operations which follow the attaching of the sole and heel to the shoe bottom, such for instance as the operation of scouring the heel and filling the edge thereof and finishing the edge of the sole it is highly important that the sole should be properly dried for if it is too moist when these operations are performed there is danger that the shrinkage which results from the subsequent drying will open up cracks in the edge of the shoe.

My invention provides a novel method by which the outsole can be tempered or conditioned in such a way that it will retain its flexibility while the sole-attaching operations are being performed but will be sufficiently dry by the time these operations are performed so that the subsequent operations of scouring the heel and filling the edge thereof and trimming and finishing the edge of the sole can be carried out without the necessity of laying the shoe aside to permit it to dry.

In accordance with my present invention the tempering of the outsole is accomplished by dipping it into a tempering or conditioning liquid which has the power of readily penetrating the sole and thereby rendering it flexible, but which also has quick drying qualities so that by the time the sole-attaching operations are performed at stations nine, ten, eleven and twelve and the heel is nailed to the shoe at station thirteen the outsole will be in proper condition to have the subsequent operations performed at stations fourteen, fifteen, sixteen and seventeen.

With my improvements the shoes can be carried directly through the operations at stations ten, eleven, twelve, thirteen and can be delivered to the operators at stations fifteen, sixteen for heel-scouring and edge-trimming operations without holding the shoes back to allow time for the sole to dry.

The soles are tempered by dipping them in a tank 9 containing the tempering liquid and when they are tempered they are run through the sole flexer at 9*a* and then are taken to the sole-laying machine 9*b* where the sole is laid, and are then taken to the heel-seat nailing machine 9*c* at which the heel seats are nailed. A single operator performs all of these operations.

In order to treat the sole in such a way that it will be properly tempered for the operations at stations nine, ten, eleven and twelve and yet will be dry for operations at stations fifteen, sixteen and seventeen I propose to employ a special form of tempering liquid which serves to soften the sole sufficiently for the stitching operation but which has a quick drying action so that it will be dry by the time the shoe has passed from station nine to station fourteen. I find good results can be obtained by a tempering solution made according to the following formula: hypophosphate of soda—10 ounces, hemlock—2 ounces, ether—6 ounces and water in sufficient quantity to make a gallon.

It is not necessary to soak the soles in this solution as if they are merely dipped into the solution and then passed through a sole-flexing machine they will be properly tempered for subsequent operations. The flexing machine is in the usual form of pressure rolls between which the sole is passed, the pressure rolls causing the liquid to penetrate the leather and also squeeze out excess liquid.

As indicated above the operator at station nine after nailing the heel seat deposits the shoe on the conveyer section leading to station ten. The operator at station ten rough rounds the shoe in usual manner and then deposits it on the next section of the conveyer which conveys it to the stitchers at station eleven. Here the outsole is stitched to the welt and then the shoe is deposited on the next section of the conveyer which takes it to station twelve where the sole is levelled on machine 12 and the edge of the sole is wheeled on machine 12*a*, these two operations being performed by the same operator.

After each shoe has been levelled and the edge of the sole wheeled the operator at station twelve deposits the shoe on the next conveyer section by which it is carried to station thirteen. The operator at this station nails the heels to the shoe by the heel-nailing machine and when this operation has been completed the shoe is again placed on the next conveyer section by which it is conveyed to station fourteen. The operator at this station shaves the heel and scours the breast thereof and after completing his operation the shoe is put on the next conveyer section which conveys it to station fifteen. The operator at station fifteen scours the heel and applies filler to the edge of the heel.

In order that these operations may be properly performed it is necessary that the sole of the shoe must be dry at this point. With my improved method of tempering which forms part of this invention wherein the tempering is done with a quick drying liquid the sole will become fully dry in the time required for the passage of the shoe from station nine to station fifften and, therefore, any shoe which arrives at station fifteen is in proper condition to have the filler applied to the edge of the heel. The operator at station fifteen, therefore, takes the shoes as fast as they come to him and scours the heel and applies filler to the edge of the heel and sole. The shoe is then deposited on the next section of the conveyor by which it is carried to station sixteen. The operator at this station trims the edge of the sole and then delivers the shoe onto the next section of the conveyer by which it is conveyed to station 17. The operator at station seventeen smooths the edge of the

sole and also the edge of the heel on machines 17 and 17*a* and at the same time "cobbles" the shoe, that is, removes any tacks which may be apparent on the inside of the shoe.

The next operation on the shoe is that of blacking the heel and edges of the sole and painting the bottom and then there are various subsequent finishing operations such as waxing the edges of the sole, polishing the bottom, cleaning any dirt spots off the upper which may have been made thereon during the preceding operations. The shoe is now completed ready to have the last pulled from it and after this is done the shoe is treed, dressed and brushed, and is then ready to be mated up with another shoe to form a pair. This mating of the shoes as they are finished may conveniently be done at the inspection bench.

With this invention each shoe travels from station one around to station seventeen quite independently of any other shoe and the operator at each of the intervening stations takes each shoe as it comes to him and performs his operation thereon without regard to whether the shoe is a right or left. Hence during these operations no shoe is being held up in its progress to await the performing of any operation on any other shoe or shoes.

Moreover, by the improvement in tempering the shoe above referred to the tempering and drying of the sole are so coordinated with the normal speed of travel of the shoe from station nine to station fourteen that by the time each shoe arrives at station fourteen the sole will be properly dried so that the subsequent operations at stations fifteen, sixteen and seventeen, etc., which can only be successfully performed on the sole when the latter is dry, can be carried out in proper sequence as fast as the shoes arrive at said stations and without necessitating that the shoes be laid aside between stations nine and fourteen to enable the drying to be completed.

With my improved method, therefore, each shoe is conveyed from station one around to station seventeen as fast as the operators at the several stations can perform their operations thereon and no one of the shoes is being held up at any point along its progress to wait any operations on other shoes, as is necessarily the case where the shoes are being conveyed from one operator to another in case lots and by means of racks.

In case any shoe becomes "crippled" during any of the manufacturing operations I propose to remove from the conveyer at the point where the damage to the "crippled" shoe occurred another shoe of the same size as the "crippled" shoe and which will mate up with the "crippled" shoe to form a pair. These two shoes comprising a pair will then be kept together until the "crippled" shoe is repaired when both shoes will be again placed on the conveyer and will continue their journey around to station seventeen.

The damaging of any shoe to cause it to become "crippled" will, therefore, hold up the operation on one other shoe only, the remaining shoes of the case of shoes with which the "cripple" belongs proceeding on their way through the various stations quite independently from the "cripple."

In my improved system the separate parts from which the upper is made are carried individually from the point where they are cut to points where they are assembled with other parts to make up the upper of the shoe and each upper is carried individually to the point where it is assembled with the last. From this point each shoe progresses individually from the assembling station to the point of completion and after the shoes have been separately completed they are then for the first time mated in pairs for shipment. With this system there is no holding back of the pieces constituting the upper of the shoes in order that they may pass from one point to another in case lots nor is they any holding up of the operations on any shoe due to the fact that a predetermined number of shoes are always kept together on a rack as is the usual practice. This results in a very great saving in the time required to put any shoe through its complete manufacturing operations and also reduces very greatly the number of shoes "in process" as well as the number of lasts required to give a given output per day, all of which reduces correspondingly the money tie-up in the manufacture of a given lot of shoes.

I claim:

1. The process of making shoes which consists of lasting the shoe, attaching the upper to the insole and subsequently laying the outsole, nailing the heel seat, rough rounding the outsole, stitching the outsole to the welt, nailing the heel to the shoe, applying filler to the edge of and trimming the sole, and before the outsole is attached tempering it with a quick drying tempering ingredient which maintains sufficient flexibility in the outsole for the above-mentioned outsole-attaching operations but which under natural drying conditions dries sufficiently during the normal time required for the outsole-attaching operations so that upon the completion of such operations the outsole is properly conditioned for receiving the filler for the edge thereof and for the sole-trimming operation.

2. A system of making shoes which consists in performing the operation of assembling the upper and insole of a predetermined number of shoes and then performing on each shoe individually and in a prescribed order the subsequent operations by which the shoes are lasted, the upper stitched to the insole, the outsole is attached to the shoe and the edge of the heel and sole is trimmed and finished, and in so doing carrying the shoes comprising the predetermined number of shoes individually and in an indeterminate order from one operation to the next, and before the outsole is attached tempering it with a quick drying tempering ingredient which maintains the outsole in sufficiently flexible condition for the outsole-attaching operations but which dries at a speed which is so correlated to the time normally occupied by the outsole-attaching operations that immediately on the completion of said operations the outsole is in proper condition for the sole-finishing operations.

3. That improvement in the manufacture of shoes which comprises routing the individual parts making up the upper of the shoe as separate units to the point where they are assembled to form the upper, assembling the upper and the last of the shoes individually and routing each shoe as an individual unit and without reference to any other shoe and as distinguished from and to avoid delays incident to routing in group units, from the point of assembly to the point of completion, tempering the stock when necessary for instant working as contrasted with tempering for delayed working, and finally when the individual shoes shall have been separately com-

pleted, mating them for the first time in pairs for shipment.

4. That improvement in the manufacture of shoes which comprises routing the individual parts as separate units to the point of assembling and then routing each shoe as an individual unit and without reference to any other shoe from the point where the shoes are assembled through the various subsequent operations to the point of completion, tempering the stock, when necessary, for instant working, then without delay for other shoes in transit restoring the tempered stock forming part of any shoe to its previous untempered condition by allowing the same to dry, and finally when the individual shoes shall have been separately completed, mating them for the first time in pairs for shipment.

5. The steps in the process of manufacturing shoes, which consists in tempering the outsole with a softening and lubricating solution containing hypophosphate of soda, hemlock, ether and water, and capable of softening the sole and rendering it flexible for the sole-laying and sole-stitching operations and having the quality of drying naturally in the time normally occupied by said sole-laying and sole-stitching operations so that at the termination of said operations the sole is sufficiently dry to permit the subsequent finishing operations on the shoe to be properly carried out, and performing such finishing operations immediately upon the completion of the sole-laying and sole-stitching operations.

6. The steps in the process of manufacturing shoes which consists in tempering the outsole with a softening and lubricating solution capable of softening the sole and rendering it sufficiently flexible for the sole-laying and sole-stitching operations but which has the capacity of drying sufficiently under natural drying conditions to place the sole in proper condition for the edge-finishing operations during the time normally required for carrying out the sole-laying and sole-stitching operations, attaching said tempered sole to a shoe bottom, nailing the heel to the shoe, and immediately and without delay finishing the edges of the heel and sole.

RALPH W. WHITE.