Sept. 23, 1947. D. SUMMERS 2,427,933

ARTICLE TURNER

Filed March 29, 1945 3 Sheets-Sheet 1

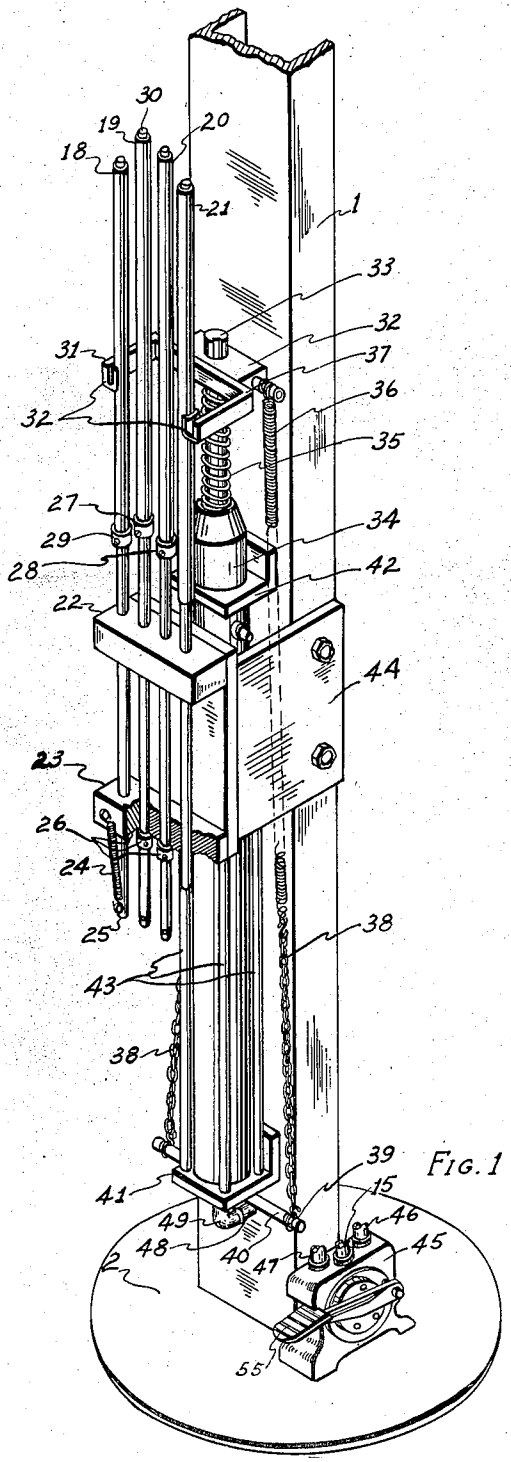


FIG. 1

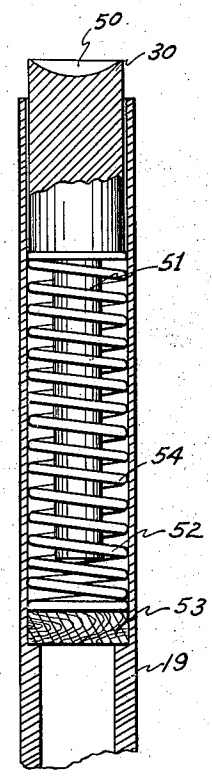


FIG. 4

INVENTOR.
DARRELL SUMMERS
BY Benedict & Swartwood
ATTORNEYS

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ARTICLE TURNER

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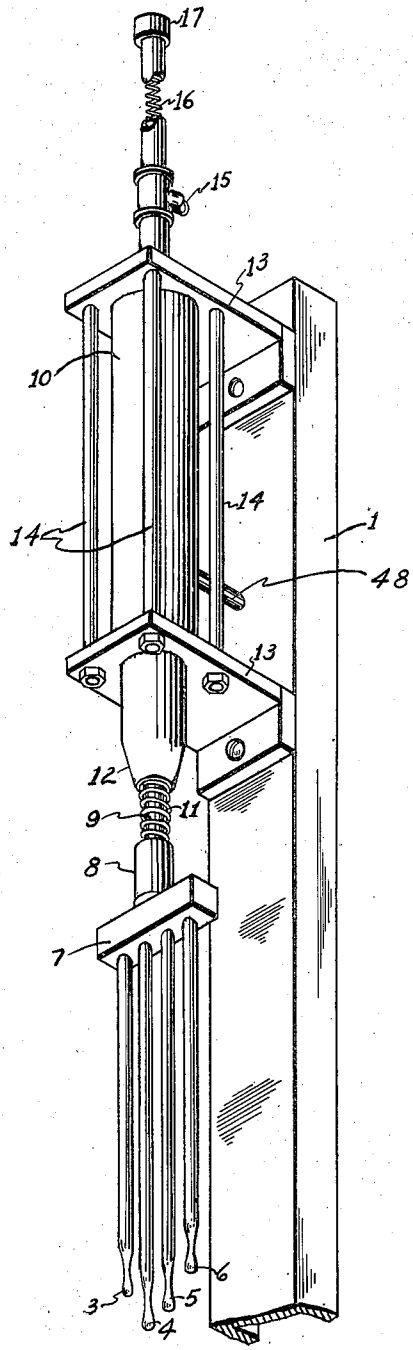


FIG. 2

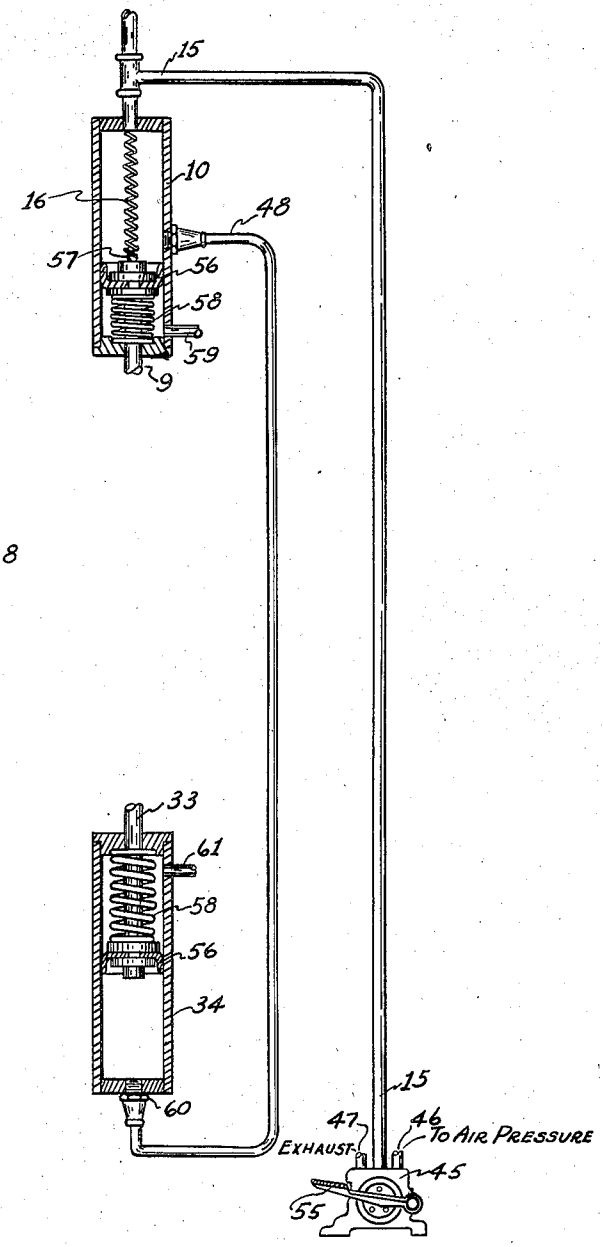


FIG. 5

INVENTOR.
DARRELL SUMMERS
BY Benedict & Swartwood
ATTORNEYS

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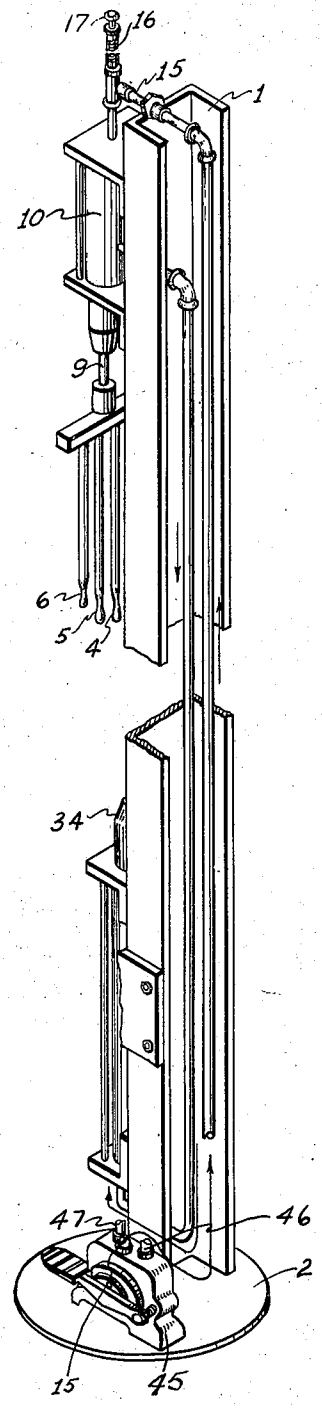


FIG. 3

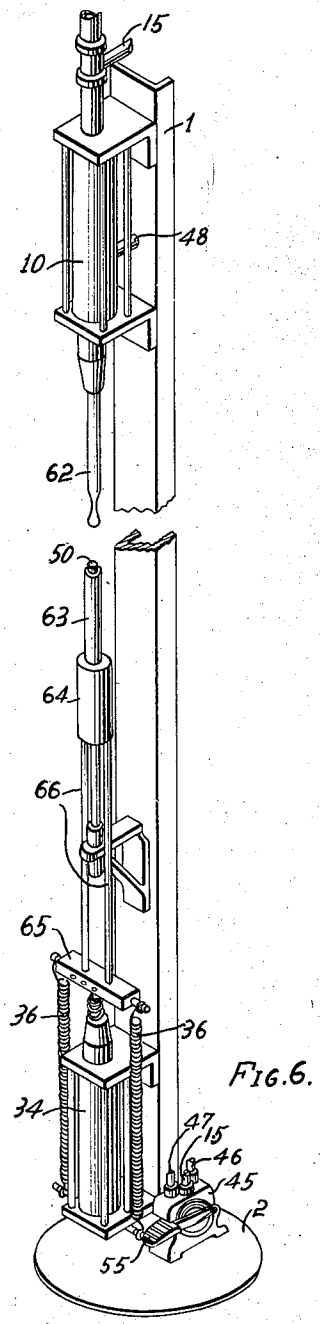


FIG. 6.

INVENTOR.
DARRELL SUMMERS
BY Benedict & Swartwood
ATTORNEYS

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2,427,933

ARTICLE TURNER

Darrell Summers, Pana, Ill.

Application March 29, 1945, Serial No. 585,432

3 Claims. (Cl. 223—40)

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This invention relates to an improved article turner. In the manufacture of many articles such as gloves and mittens, the article is made inside-out or in unturned condition and must be turned to produce the final article in marketable form. My invention relates to an apparatus for accomplishing such turning and while it is particularly adaptable for turning gloves, mittens, and the like, the principles of the invention may also be adapted for turning other articles such as belts, ties, etc.

The turning of such articles by hand and even the turning of the articles partly by hand and partly by machine has been done in the past but was a costly and time-consuming operation. Machine article-turning apparatus even of the semi-automatic type that has been used has many disadvantages. Such previous machines have been cumbersome and not speedy enough to be adaptable for turning large quantities of articles in mass production. Furthermore, such machines involve complicated mechanical apparatus using cams, gears, levers, and other mechanical parts which are slow-acting and tend to wear out and also are expensive to manufacture.

It is an object of the present invention to provide a machine overcoming these objections wherein the turning operation is quickly accomplished, readily adaptable to mass production and the apparatus is simple and cheap to construct.

One of the principal objects of my invention is to avoid the use of mechanical actuating parts and to use cylinders actuated by compressed gas such as air. Furthermore, this invention provides the utilization of a compressed gas circuit whereby the timing of the coacting and successively acting movements, for accomplishing the turning quickly and readily, are obtained without using complicated timing mechanism such as gears, cams, and the like. This is accomplished by causing the relative movement between the several mechanical actions by using compressed gas such as air to actuate the first mechanical movement and then using the compressed gas exhaust therefrom to actuate the second cooperative and succesively acting mechanical movement. The point of withdrawal of the exhaust gas from the cylinder actuating the first movement controls the timing of the actuation of the second movement.

It is a further object of the invention to provide a device for turning at least four fingers at a time of a glove wherein female unturned-finger-receiving members are arranged to reverse

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their position when urged by opposing male turned-article-receiving members so that they will correspond to each other when holding the fingers therebetween during the turning of the glove from the female member onto the male member.

A more specific object of the invention is to provide a simple, substantially automatic device for quickly turning an article such as a belt; or a single finger or thumb of a glove where, due to the thickness in construction in the article, it is not feasible to turn four fingers of a glove at one time.

It is also an object of the invention to provide means including springs to obtain quick returning actions of the several mechanical movements actuated by the compressed gas after the article is turned in order to speed the action of the device to make it adaptable for mass production.

A more specific object of the invention is to provide a female unturned-finger-receiving member adapted to turn only the end of the glove finger when urged by the male member to facilitate the second step wherein the complete turning is accomplished and at the same time provide means for preventing injury to the end of the fingers such as the ripping of the seams during such turning of the end of the fingers.

Other objects, advantages, uses, and applications of my article turner will become apparent by referring to the drawings in which Figs. 1 and 2, taken together, show in perspective one modification of my glove turner for turning four fingers at one time. Fig. 1 shows the lower portion of the device, including the female unturned-article-receiving members. Fig. 2 shows the upper portion of the device, including the male turned-article-receiving members which are opposed to and aligned with the female members shown in Fig. 1.

Fig. 3 shows in perspective the back side of the device illustrated in Figs. 1 and 2 and shows the arrangement of the pipes for the flow of the compressed gas which actuates the mechanism.

Fig. 4 is a detailed and longitudinal sectional view of one of the female unturned-finger-receiving members.

Fig. 5 is a flow diagram showing the flow of air pressure or other compressed gas to actuate the air cylinders and also shows the cross-sectional view of the air cylinders.

Figure 6 is a perspective view of the device showing means for turning only one finger of a glove at a time.

Referring to Figs. 1, 2, and 3, an iron U-frame 1 attached to support 2 is used for mounting of the device. Male turned-glove-receiving members 3, 4, 5, and 6, fixedly attached in header 7, are provided. A rod 8 is attached to the header 7 and to rod 8 is attached piston rod 9 which is actuated by compressed air by a piston in the cylinder 10, as will be described later in more detail. A spring 11 is provided between the rod 8 and the cylinder head 12 for cushioning the contact of the male members with the female members. The cylinder 10 is attached to the frame 1 by brackets 13, the brackets being further supported by the supporting rods 14. A compressed gas such as air enters the cylinder 10 through pipe 15 and actuates the piston which in turn forces the male members in a downward direction toward the female members as will be more fully described later. A spring 16 fixedly attached to the cap 17 and attached to the piston in cylinder 10 is provided for quick disengagement of the male members after the glove has been turned upon them.

Female unturned-article-receiving members 18, 19, 20, and 21 are provided and over them the unturned glove is placed for the turning operation. Member 21 which is the little finger is rigidly attached to the headers 22 and 23. Members 18, 19, and 20 are journaled in the headers 22 and 23 to permit an up-and-down movement when urged by the male members. When not so urged by the male members, the female members are held in the position shown in Fig. 1 by springs 24 and there is one spring attached to each end 25 of the members 18, 19, and 20, although only one spring is shown and the others are not shown since it is a cutaway view for the sake of simplicity. The members 18, 19, and 20 are held in the relative positions shown by the collars 26 which abut against the lower edge of the header 23. After the glove is placed upon the members 18 to 21, inclusive, compressed air forces or urges the male members 3 to 6, inclusive, in the direction toward the female members and it is obvious that the male member 4 first contacts and engages the glove-finger-unturned member 19 and thereby pushes the female member 19 downwardly until the collar 27 abuts against the upper face of the header 22. Likewise, as the next male member 5 urges female member 20 downwardly and male member 3 urges female member 18 downwardly, collars 28 and 29 stop their downward movement against header 22 so that members 18, 19, and 20 reverse their relative positions to conform with the configuration of the male members 3 to 6, inclusive, and thus hold the glove therebetween in position for turning. A piston 30 extends slightly above the edge of each female member, as shown, and its function will be described more fully in connection with Fig. 4.

A U-shaped article turning member 31 having attached thereto two L-shaped members 32 on the inside, as shown, are provided as a means for catching the gauntlet or the wrist part of the glove for turning the glove over the female members as the glove is held between them, which is the manner in which the gloove is turned. The U-shaped member 31 is attached to block 32 and a piston rod 33 is attached to an air-driven piston in cylinder 34 and its action will be described more particularly in connection with the description of Fig. 5. A spring 35 is provided between the block 32 and the head of the cylinder 34 to cushion the stroke of the piston. In order

to provide for a quick return of the article turner 31 after it has turned the glove and after the air has exhausted from the cylinder 34, a spring 36 attached to the block 32 at the point 37 is provided. Spring 36 is attached to a chain 38 which is attached at point 39 to a rod 40 which is fixed to the base frame 41 holding the cylinder 34. An upper bracket 42 also holds the cylinder 34 in place and there is provided supporting rods 43, as illustrated. A plate 44 bolted to the frame 1 and fixedly attached to the headers 22 and 23 is provided for supporting the female members.

A foot control three-way valve 45, attached to the base plate 2, is provided for actuating the two cylinders. The pipe 46 is connected to any convenient source of suitable compressed gas such as a compressed air cylinder. Pipe 47 is a vent to the atmosphere. The operation of this three-way valve will be described later.

Referring to Figs. 2 and 5, an exhaust pipe 48 is connected to the cylinder 10 and through that exhaust pipe air enters the bottom of the cylinder 34 at point 60 and such exhaust air is used to actuate the lower cylinder which, in turn, actuates the glove-turning member 31.

Fig. 4 is a longitudinal-sectional view of one of the female members 19 and the others are similarly constructed. Piston 30 is provided, extending slightly above the tdge of the female member and is concave at the upper end, as shown at 50. A rod 51 is attached to the piston and as the piston is driven downwardly when urged by the male member 4, it can go no farther in the member 19 than the distance between the bottom of the rod 51 at 52 and the stop 53. A spring 54 is provided to cushion the downward stroke of the piston. An unturned finger placed over the member 19 is held in place by the corresponding male member 4 during turning; also, as the male member 4 is urged downwardly, it turns the tip of the finger and since the piston can go no farther than the stop block 53, it cannot tear out the seam or the end of the finger. In general, the piston extends above the member 19 and can only be driven into member 19 about the same distance as it stands above. The total travel of the piston is only about one-half inch, although this can be varied depending on the type of article being turned. After the rod 52 strikes the block 53, the male member 4 forces the female member still more in a downward direction until its downward movement is stopped by the collar 27 in order to provide for the proper positioning of that member for the turning operation.

Fig. 5 is a flow diagram showing the travel of the air through the system and the manner in which it exhausts and actuates the piston in the cylinders 10 and 34. Cylinder 10 is constructed having a leather cup 56 for forming the seal and against which the air pressure actuates. This is a conventional form which is commonly used in air cylinders of this type. As previously described, a spring 16 is attached at point 57 and to cap 17 for providing a quick return of the piston after the glove is turned. A spring 58 is provided to cushion the downward stroke of the piston. An exhaust pipe 59 always open to the atmosphere is provided to prevent any back-pressure of air in the cylinder during its downward stroke. The air enters cylinder 10 through line 15 and after the leather cup 56 passes the outlet pipe 48, the air pressure flows through pipe 48 and enters the bottom cylinder 34 at point 60. A similar leather cup 56 as well as spring 58 is provided for cylinder 34. The rod 9 is the driving

rod for the male members, as shown in Fig. 2 and the rod 33 is the driving rod for the article-turner 31 shown in Fig. 1. Similar to the arrangement for Fig. 5, an exhaust pipe 61 always open to the atmosphere is provided for cylinder 34 to prevent any back-pressure during the upward stroke of the piston. It is apparent that any desired timing effect can be obtained for actuating driving rod 33, depending upon the position of the pipe 48 attached to the cylinder 10. In this case, the piston in cylinder 10 forces the male member downwardly until all the female members are driven downward until stopped by the collars 27, 28, and 29 when the air leaves cylinder 10 through pipe 48 and enters cylinder 34 which forces the rod 33 upwardly and thereby actuates the glove turner 31 which catches the gauntlet or wrist portion of the glove and turns the glove from the female members onto the male members. By this time, the foot pedal 55 has been released and the line 15 is open to the atmosphere through the line 47 and the piston in cylinder 10 urged by the spring 16 is drawn upward which disengages the male members holding the glove fingers against the female members and after the leather cup 56 passes the inlet to the pipe 48, the compressed air from cylinder 34 will exhaust back into the cylinder 10 and out through the exhaust pipe 59. This arrangement of the return of the exhaust from cylinder 34 avoids the necessity of providing complicated check valve on cylinder 34 or else a separate return line to 45.

Referring to the foot valve 45 in the position shown in Fig. 5, the line 15 connects to the line 47 so that the system is always open to the atmosphere and ready for operation. The operator pressing down on the pedal 55 closes off the connection of the pipe 15 and pipe 47 and connects the pipe 15 to pipe 46 to which is attached a source of air pressure.

In summary, the operation of the device described in Figs. 1 to 5 is as follows: The four fingers of a glove such as a leather glove in unturned condition are placed on the female unturned-finger-receiving members 18, 19, 20, and 21. This is the only manual operation of the device. The foot pedal 55 is then pressed and air flows through the pipe 15 into the cylinder 10 which results in forcing downwardly the male members 3 to 6 so as to successively contact female members 19, 20, 18, and 21. As each female member is successively contacted the fingers are firmly held therebetween and the pistons 30 are pressed downwardly turning the ends of the glove fingers. As soon as the members 18, 19, and 20 have their positions reversed to correspond to the male members, the air leaves cylinder 10 through pipe 48, actuates the piston in cylinder 34, which drives upwardly the glove-turning or article-turning member 31 which catches the gauntlet or wrist portion of the glove pulling it up over the female members 19 to 21 onto the male members 3 to 6. At this time, the spring 16 has returned the piston 57 past the entrance of the pipe 48 and the air exhausts through the line 48 from cylinder 34 to cylinder 10 and to the atmosphere line 59 and the springs 36 attached to the article turner 31 quickly return the article turner to its original position. Then the glove readily falls off the male members and the operation is ready for repetition. The system shown in Fig. 5 is an important feature of the glove turner and such a flow of air to actuate successively several cooperative mechanical movements has many applications, as is readily apparent. Such a system may be used anywhere a plurality of successive mechanical movements must cooperate to accomplish a final job.

Fig. 6 shows a device for turning one finger at a time. In general, the operation is similar to the operation described for Figs. 1, 2, and 3 and therefore I will use the same numbers for indicating comparable parts. A single male turned-article-receiving member 62 actuated by the piston in cylinder 10 is provided. A female unturned-finger-receiving member 63 is provided which is constructed in a similar manner to that illustrated and described in Fig. 4, having the piston 50 serving the same function as previously described. The essential difference in this modification is that in place of the U-shaped article-turning member 31, shown in Fig. 1, a sleeve 64 attached to the header 65 through connecting rods 66 is provided for turning the finger. The unturned finger of a glove unit is placed on the female member 63 and the foot pedal 55 actuated for driving male member 62 in a downward direction until it contacts piston 50 thereby engaging the finger in between and turning the end of the fingers as heretoofre described. The sleeve-like member 64 is then actuated by the cylinder 34 and forces the finger up over the female member 63 onto the male member 62 thereby turning it in the same manner that four fingers were turned at one time in Figs. 1, 2, and 3.

While I have described several modifications of my invention, it is understood that my invention is not limited to such modifications since any other device within the scope of my invention may be used. My invention is only limited by the following claims.

I claim as my invention:

1. An article turner comprising a female unturned-article-receiving member, a male turned-article-receiving member aligned with and opposed to the female article-receiving member, means including compressed gas for moving the male member towards the female member to hold the article in position during turning, means including compressed gas for actuating an article-turning member associated with the female member for turning the article from the female member onto the male member while firmly held between the male member and the female member, means including a spring for moving the male member away from the female member after the article is turned, and means including a spring for returning the article-turning member to its original position after the article is turned.

2. A glove turner comprising a female unturned-finger-receiving member, an opposing and aligned male turned-finger-receiving member adapted and arranged to be moved toward the female member so as to hold the finger in place between the female member and the male member during turning, a piston in the female member and normally extending slightly above the female member and movable to a position slightly inside the female member to permit the male member to engage and hold and to force to a limited extent the end of the finger into the female member to turn the end of the finger without harm to the finger of the glove, and a movable sleeve around the female member adapted and arranged to move toward the male member, while the finger is so held and partially turned, to complete the turning of the finger.

3. A glove turner for turning at least four fingers at one time comprising female unturned-finger-receiving members, opposing and aligned

male turned-finger-receiving members adapted and arranged to be forced in the direction of the female finger members to position the fingers therebetween to permit turning, said female unturned-finger-receiving members adapted and arranged to move when urged by the male members such that each female finger member firmly holds a finger between such female member and the corresponding male member during turning, a finger-turning member movable toward the male members and associated with the female members for turning at least four fingers at one time while the fingers of the gloves are so held between the male finger members and the female finger members, means including compressed gas for actuating the male finger members and the

finger-turning member, and means including springs for disengaging the male finger members from the female finger members and for returning the finger turning member to its original position after the glove is turned.

DARRELL SUMMERS.

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