March 6, 1962 F. E. UNDERWOOD ET AL 3,023,720

LINKING MACHINES

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FIG. 1.

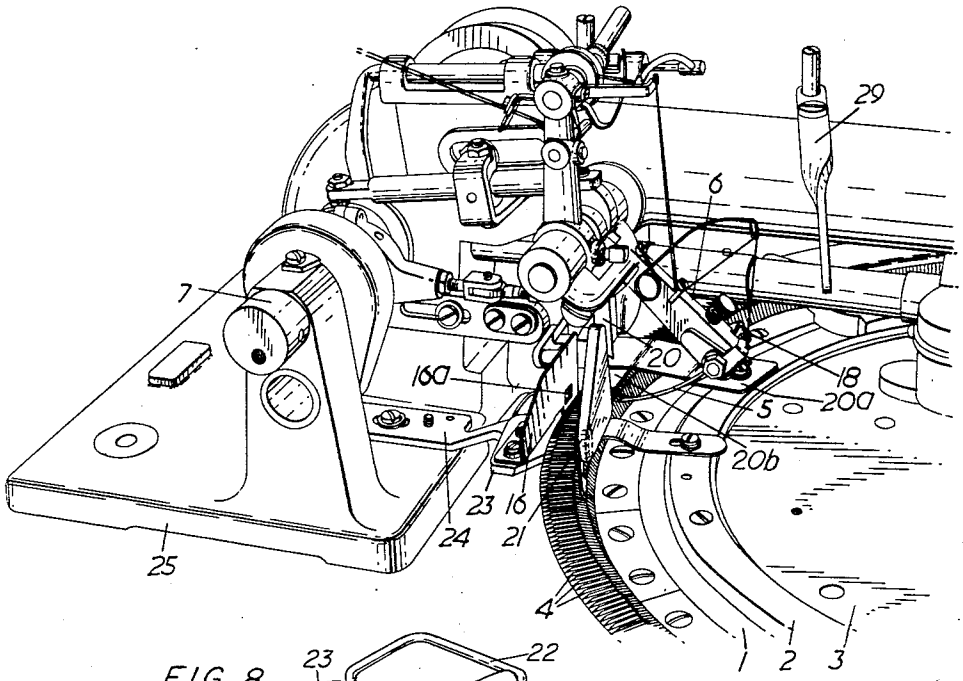


FIG. 8

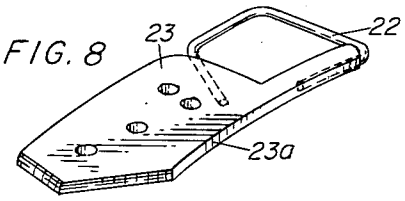


FIG. 9.

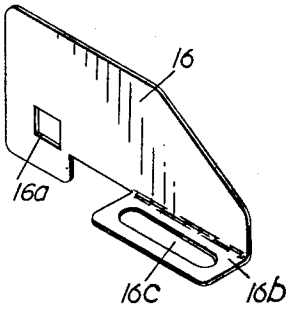
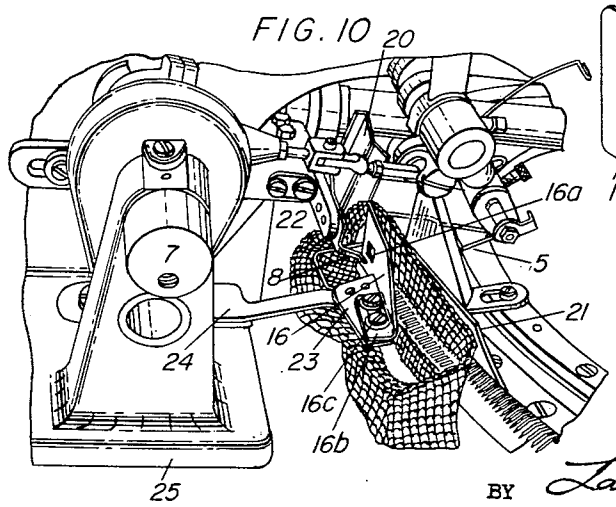


FIG. 10



Inventors
FRANK EDWARD UNDERWOOD
EDWARD HORNDON PERRY

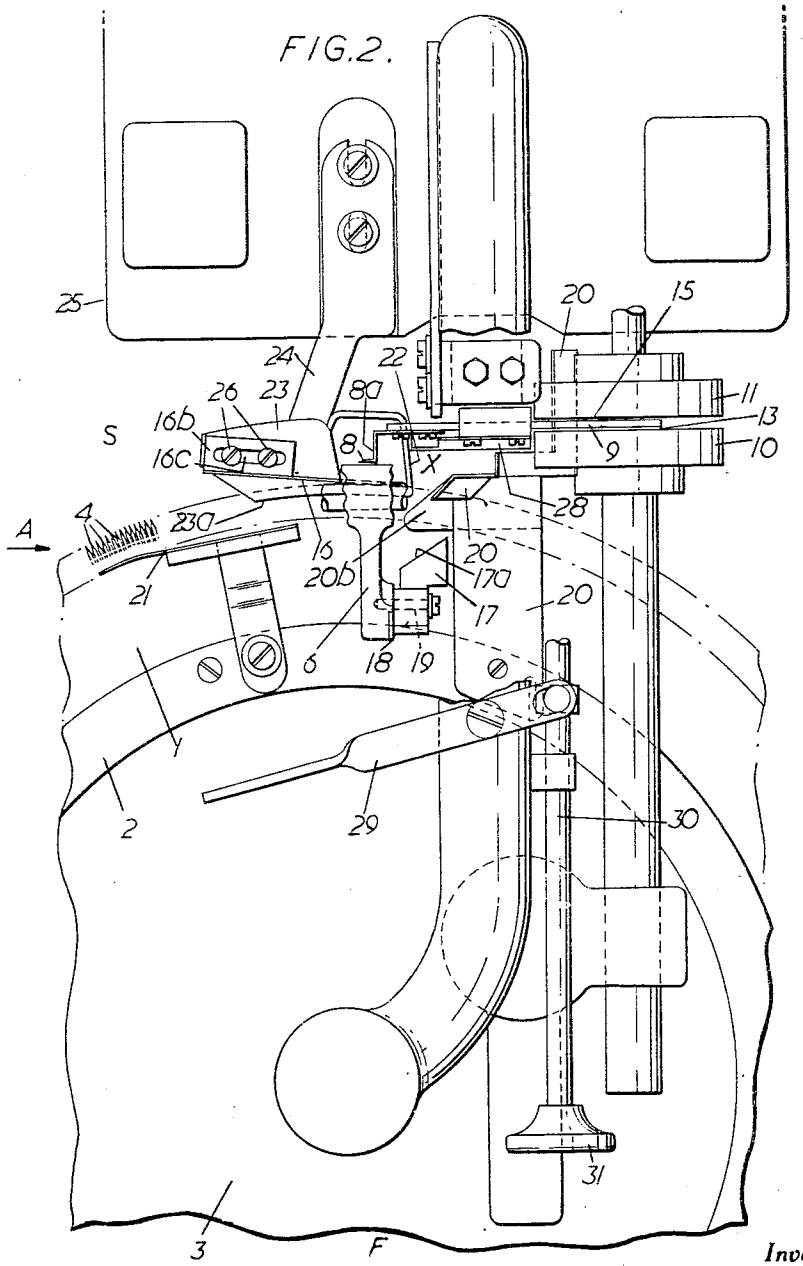
BY Larson and Taylor
Attorneys

March 6, 1962 F. E. UNDERWOOD ET AL 3,023,720

LINKING MACHINES

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FIG.2.



Inventors

FRANK EDWARD UNDERWOOD

EDWARD HOUDON PERRY

BY Larson and Taylor

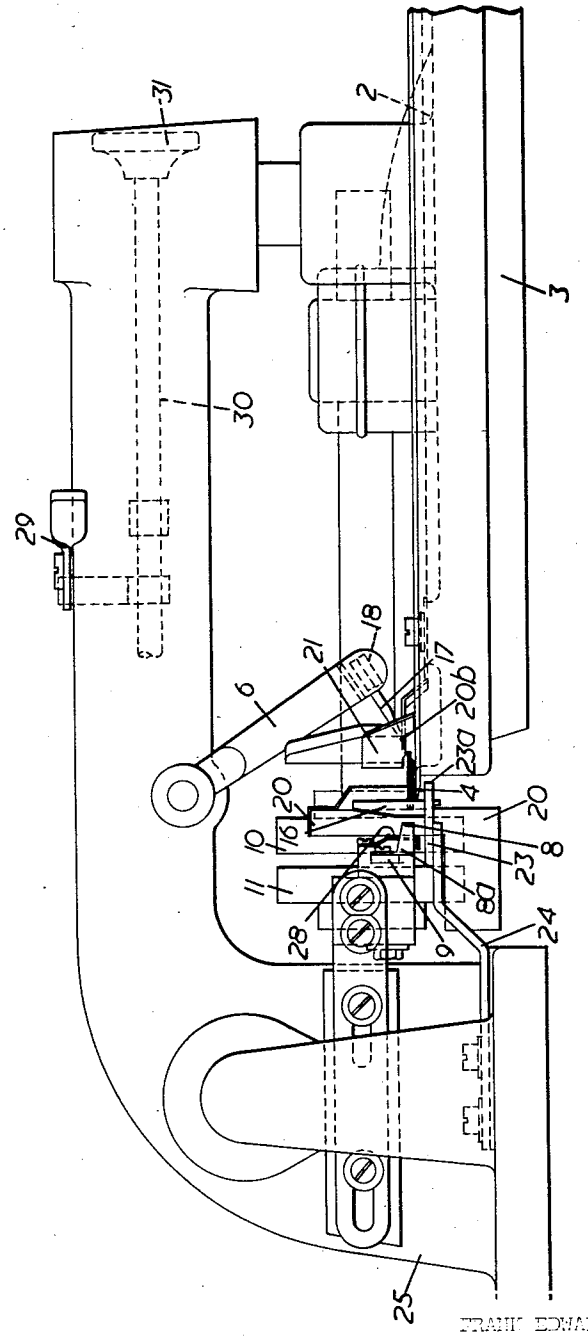
Attorneys

March 6, 1962 F. E. UNDERWOOD ET AL 3,023,720

LINKING MACHINES

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FIG 3.



Inventors

FRANK EDWARD UNDERWOOD

EDWARD HORTON TOMLIN

BY Lawson and Dayton

Attorneys

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LINKING MACHINES

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FIG. 4.

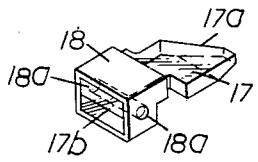


FIG. 5.

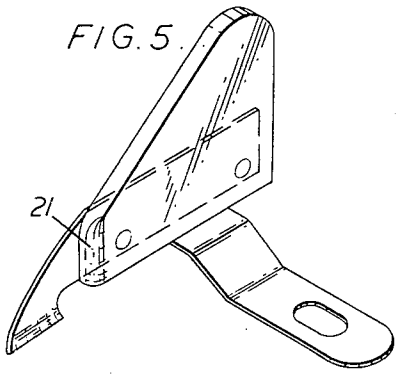


FIG. 6.

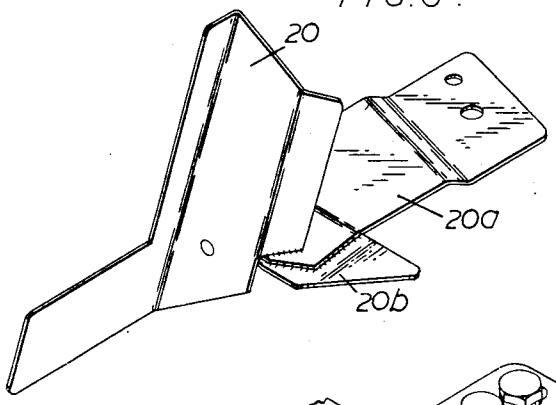
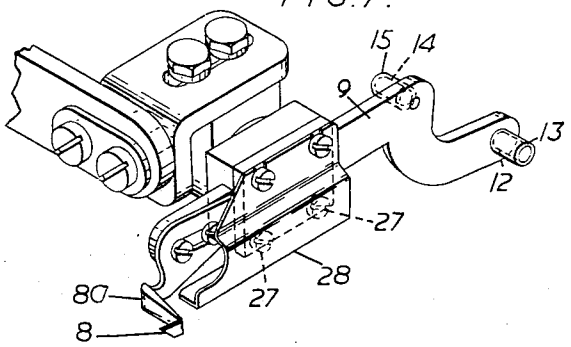


FIG. 7.



Inventors

FRANK EDWARD UNDERWOOD

EDWARD MORRISON PERRY

Larson and Taylor

Attorneys

United States Patent Office 3,023,720 Patented Mar. 6, 1962

3,023,720

LINKING MACHINES

Frank E. Underwood, 78 Braunstone Close, and Edward H. Perry, 1 Belton Road, both of Braunstone, England

Filed Apr. 8, 1959, Ser. No. 805,090
4 Claims. (Cl. 112—25)

This invention relates to linking machines for the joining up, inter alia, of parts of knitted garments.

A linking machine which functions either to stitch together such parts or to link the same loop for loop, conventionally comprises, in combination, a rotary dial which is secured on a carrier by a clamp ring and is furnished with a circular series of radially extending individual points adapted to pierce garment parts and to support the latter during a linking operation, a needle secured in a reciprocatory lever for working through the loops on the joints, and an associated looper or hook, the said needle and the looper or hook carrying either a single linking thread or separate linking threads and being co-operable, in conjunction with a stitch plate, to sew together garment parts on the points with, for instance, a combined chainstitch and lockstitch.

A typical example of such a linking machine is that known in the knitted garment finishing trade as the SOTCO Model P manufactured by the Southern Textile Machinery Company of Paducah, Kentucky, of which several of the U.S. Patents are: 1,092,855; 1,725,819; 1,725,825; 1,677,932; 1,677,673; 1,776,478.

The invention is more especially concerned with modifications of a linking machine of the kind referred to designed to facilitate the linking of circular, e.g. tubularly knitted, fabric parts to marginal portions of other parts defining openings therein. Thus, the modifications constituting this invention are primarily designed to facilitate the linking of knitted collars and neck portions to margins surrounding the neck openings in the body portions of knitted garments such as cardigans, jumpers, pullovers, and the like. Accordingly, whilst for convenience in the following further description, emphasis will be placed on the linking or sewing of collars to body fabric, it is to be understood that there is no limitation in this respect.

Now heretofore the operation of linking or sewing a collar around the neck opening in a body portion on a linking machine of the kind concerned has had to be performed in two stages. Thus, the operator, sitting at the front of the machine remote from the linking station, first impales substantially one half of a collar upon points in the dial, places the corresponding portion of the body fabric on the dial and turns the collar over the said fabric in such a way that the half collar is stitched to the body fabric as these parts pass through the linking station. After the parts have passed through the linking station the operator disengages them from the dial, impales the remaining half of the collar on the points and repeats the process, the parts passing a second time through the linking station.

The object of the present invention is so to modify a linking machine of the kind referred to that a circular collar, neck portion or the like can be linked or stitched to a knitted body portion of a garment in one operation.

According to this invention there is provided, adjacent to the needle in the machine, a reciprocatory pusher which is so formed and operative as to progressively push the work off the dial points as successive portions of the parts to be linked or sewn together pass through the stitching mechanism at the linking station.

The idea accordingly is that the operator, instead of sitting at the front of the machine as heretofore, shall sit at the side of the machine, i.e. immediately adjacent to the stitching mechanism, so as to be in a position to receive work as it is progressively pushed off the points.

That is to say, as it is pushed off the points by the reciprocating pusher the work returns to the operator who is in a position to control the linking of a collar to the body portion in one continuous operation.

The pusher, of relatively small proportions, may conveniently be secured in a holder attached direct to the lever of the needle whereby the pusher is caused to partake of the same reciprocatory movements as the needle. Alternatively, the pusher may be carried by a part separate from, and arranged to reciprocate independently of, the needle.

In either event, the pusher functions to impart on the progressing work, at a location immediately behind the stitching mechanism, a regular series of thrusts which sweep successive portions of the linked parts radially outwards off the points, thereby enabling the work either to return to or be returned to the operator as aforesaid.

In order that the invention may be more clearly understood and readily carried into practical effect, a specific example thereof as applied to a SOTCO Model P linking machine will now be described with reference to the accompanying drawings, wherein,

FIGURE 1 is a general perspective view of so much of such a linking machine as is necessary to illustrate the application thereto of some of the components included in this invention,

FIGURE 2 is a plan view of the relevant part of the machine,

FIGURE 3 is a side view of the same as seen in the direction of the arrow A in FIGURE 2,

FIGURE 4 is a detail perspective view of the pusher and its holder,

FIGURE 5 is a perspective view of an uncurling guard employed in the modified machine for preventing a collar or the like, in the course of being linked to a body portion, from turning over inwardly into the path of the needle,

FIGURE 6 is a detail perspective view of the fabric guide which guides the work progressively pushed off the dial points by the reciprocatory pusher,

FIGURE 7 is a general perspective view of the hook lever assembly of the machine and shows more particularly, the guard by means of which the work progressively pushed off the points from coming into contact with the hook lever slide,

FIGURE 8 is a perspective view of a lead-in guide for the work and of an associated guard designed to prevent the work from fouling the hook,

FIGURE 9 is a detail perspective view of the stitch plate of the machine, and

FIGURE 10 is a perspective view, similar to FIGURE 1, showing a piece of continuous fabric being worked upon by the linking machine.

Like parts are designated by similar reference characters throughout the drawings.

Referring to FIGURES 1, 2 and 3 it will be seen that the illustrated linking machine includes a conventional rotary dial **1** which is secured, by means of a clamp ring **2**, on a carrier **3**. The dial **1** is furnished with a circular series of radially extending individual points **4**. The customary needle of the machine is indicated at **5** (FIGURE 1 only). This needle is secured in a reciprocatory lever **6** which is adapted to be actuated, by means well known to those acquainted with linking machines of the type concerned, from a main shaft **7** at the back of the machine. Associated and adapted to co-operate with the reciprocatory needle **5** is a hook **8** (or looper) which is mounted on a slidable lever **9** whereby it is actuated. The hook **8** differs from normal in a respect hereinafter to be described. Moreover, the whole hook lever assembly of which the lever **9** forms a part,

is located farther back on the machine than usual for a reason presently to be mentioned. Otherwise, the hook lever assembly is conventional, and the lever **9** is actuated in the usual way from front and back rotary cams **10** and **11** respectively (see FIGURES 2 and 3). Thus, on the front of the slidable lever **9** there is a pin **12** on which is mounted a roller **13** arranged to be acted upon by the front cam **10**. Similarly, on the back of the lever **9** there is a pin **14** supporting a roller **15** for action upon by the back cam **11**. The needle **5** and the hook **8** are co-operable in conjunction with a stitch plate **16**. The said hook is located at the back of this stitch plate **16**, and the latter has therein an aperture **16***a* (FIGURE 9) through which the needle **5** reciprocates. As previously mentioned herein, the needle **5** and the hook **8** carry either a single linking thread or two separate linkage threads and they co-operate to sew together garment parts impaled on the points **4**.

From the foregoing description it will be realised that the front of the machine is at F (FIGURE 2). The operator normally sits at F—remote from the linking station. With the operator sitting at the front of the machine, however, it is impossible, for reasons previously explained herein, for more than half of a collar to be linked to body fabric during any one linking operation. Accordingly, to achieve the object of the present invention, i.e. to enable a collar to be linked or stitched to a knitted body portion of a garment in one operation, the machine is modified so that the operator can sit at the left-hand side S (FIGURE 2) adjacent to the stitching mechanism so as to be in a position to receive work as it is progressively pushed off the points **4** at a location immediately following such mechanism.

In this last connection, the modified machine is, in accordance with the characteristic feature of the present invention, provided with a reciprocatory pusher **17** (see FIGURE 4). So as to enable it to be kind to and not mark the fabric, the pusher **17** may advantageously consist, as shown, of a small flat plate or block of an acrylic ester product, such as PERSPEX, or any other suitable material. As will be seen, the front edge **17***a* of the pusher is obliquely disposed with respect to its path of reciprocation. The stem or shank **17***b* of the pusher is secured in a metal, e.g. brass, holder **18** which, in the particular example illustrated, is secured directly to the reciprocatory needle-actuating lever **6**. Provision may be made for making the pusher adjustable heightwise, and for setting it in position after such an adjustment. Conveniently for this purpose, and as shown, the opposite sides of the holder **18** have drilled therein aligned holes **18***a* to receive a single screw **19** whereby the pusher is attached to the needle lever **6**. Consequently, by slackening this screw and suitably turning the holder **18** about the axis thereof, the height of the pusher **17** can be varied according to requirements before retightening the screw to set the adjustment.

The pusher **17** partakes of the same reciprocatory movements as the needle. Immediately behind the stitching mechanism the pusher imparts to the progressing work a series of thrusts which sweep successive portions of the linked parts radially outwards off the points **4** into the space marked X (FIGURE 2). As the work is progressively swept into this space X it is protected from oil dropping from the cams **10**, **11** by means of a suitably shaped and bent sheet metal guide **20** the form of which is more clearly seen in FIGURE 6. The guide **20**, which is steeply inclined in a direction away from the stitching mechanism, is welded to a cranked sheet metal bracket **20***a* by means of which the guide is attached, through the medium of screws, to the dial clamp ring **2**. At its left-hand side, this bracket **20***a* is provided with a flat, ear-like protuberance **20***b* over which the pusher **17** reciprocates, this protuberance being disposed above the points **4**, and so prevents the pusher from fouling the points and also assists in guiding the fabric off the points. It is, therefore, in relation to the top surface of this protuberance **20***b* that the pusher **17** is adjusted heightwise.

It is to provide an adequate space X to receive the work progressively pushed radially off the points **4**, that the hook lever assembly including the lever **9** is located farther back on the machine than usual. It is hence also for the same reason and therefore to facilitate guidance of the fabric, by the guide **20**, between the points and the hook lever assembly that the hook **8** is cranked at its operative end instead of being straight as it customarily is. That is to say, it is the cranking of the hook which enables the hook lever assembly to be set back. The cranked form **8***a* of the hook **8** is very clearly depicted in FIGURES 7 and 10.

In accordance with the invention there is also essentially provided, in the modified linking machine, an outer guard **22** which is so designed and arranged as to prevent work progressively pushed off the points **4** from fouling the cranked hook **8** as shown in FIGURE 10. As will be seen, this guard **22** consists of an open loop of thin metal or stout wire which is secured at its ends beneath a flat guide plate **23**. The open loop **22** surrounds the working location of the hook **8** and prevents portions of the fabric pushed off the points immediately beyond the linking station from fouling the hook **8**, as clearly shown in FIGURE 10. The guide plate **23** is so contoured at its front edge **23***a* as to provide an adequate lead-in for the work as the latter is advanced by the dial **1** to the linking station. As compared with a conventional lead-in fabric guide, the guide plate **23** may, as shown, be shortened—both at its leading end to enable the operator to sit as close as possible to the needle, and also at its opposite end to permit of the work being progressively pushed off the points **4** as near as possible to the stitching mechanism. The guide plate **23**, moreover, is attached to a bracket **24** (see FIGURE 1) in turn secured upon the main framework **25** of the machine. The stitch plate **16** is supported upon, and adjustable longitudinally with respect to, the lead-in guide plate **23**. In this connection, the stitch plate is formed with a longitudinally slotted flange **16***b* which rests upon the top surface of the guide plate **23**, and screws **26** inserted through the slot **16***c* are screwed into tapped holes formed in the said guide plate.

To prevent the work pushed off the points from fouling sharp protuberances, such as the screw heads **27** (FIGURE 7) on the hook lever assembly, and from getting into contact with the oily hook lever **9**, there is provided yet another guard **28** of the form illustrated more clearly in FIGURE 7.

The modification of the linking machine preferably includes the provision of an uncurling guard **21** which is fixed on the dial clamp ring **2** and is adapted to prevent a collar or the like, in the course of being linked to a body portion, from turning over inwardly into the path of the needle **5**. Like the pusher, the said uncurling guard may, for a similar reason, be made of an acrylic ester product such as PERSPEX or of any other suitable material.

To enable the operator to sit at S, a special shift rod lever **29** is provided for actuating the main control member **30** of the machine which member, in the ordinary way, would be actuated by the knobs **31** at the front of the machine.

As will be evident from the foregoing description the basic principle of the applicants' machine is that the smallest possible portions of the fabric parts to be linked are held on the points of the machine during the linking operation, successive linked portions being immediately pushed off the points directly beyond the linking station to allow the appropriate portions of the parts still to be linked to be impaled upon the points.

We claim:

1. A linking machine for joining circular parts of knitted garments comprising, in combination, a framework, a rotary dial support carried by said framework, a

dial furnished with a circular series of radially extending individual points adapted to pierce loops on garment parts, a main shaft from which said dial is rotated, a ring clamping the dial to the rotary support, a first lever pivotally mounted on said framework, a needle carried by said lever, said lever being oscillatable to cause the needle to reciprocate and work through loops on the points, a second lever arranged at right angles to said first lever and having rollers on the front and back thereof, a forwardly cranked hook attached to said second lever, front and back rotary cams acting on the aforesaid rollers to impart longitudinal and rocking movements to the second lever and thereby cause the cranked hook to co-operate with the needle, a shaft supporting said cams and being driven from said main shaft, the forward cranking of the hook resulting in the second lever and the rotary cams for operating same being set back to provide a significant space between the dial points and said second lever, a bracket attached to the framework and located immediately in advance of said needle and said hook, a guide plate attached to said bracket and having a front edge adjacent to the points and so contoured as to provide a lead-in for the work as the latter is advanced by the dial to said needle and said hook, said guide plate extending for a short distance only in advance of said needle and said hook and terminating immediately beyond said needle and hook, a stitch plate attached to and supported upon said guide plate and having therein an aperture through which the needle reciprocates, a holder attached to said first lever, a pusher secured in said holder whereby the pusher partakes of the same reciprocatory movements as the needle and is thereby adapted to progressively push successive portions of

linked circular parts off the dial points immediately beyond said needle and said hook, the linked parts pushed off the points by said pusher being received into the aforementioned space between said points and said second lever, and a guard in the form of a loop secured to said guide plate and surrounding said cranked hook to prevent linked parts progressively pushed off the points from fouling the hook.

2. A linking machine according to claim 1 further including a bracket attached to the dial ring, a flat protuberance of tapered form carried by said bracket and disposed above the points on the dial, said pusher reciprocating over said protuberance.

3. A linking machine according to claim 1, wherein a guard is attached to the front of the said second lever to prevent linked parts pushed off the points by the pusher from contacting and fouling said lever.

4. A linking machine according to claim 1 further including an uncurling guard which is mounted on said dial clamp ring and is arranged to prevent a garment part, in the course of being linked to a body portion, from turning over inwardly into the path of the needle.

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