Dec. 18, 1962 McCONA GEORGE 3,068,814

SUCTION APPARATUS FOR HOSIERY LOOPERS

Filed Aug. 30, 1960 3 Sheets-Sheet 1

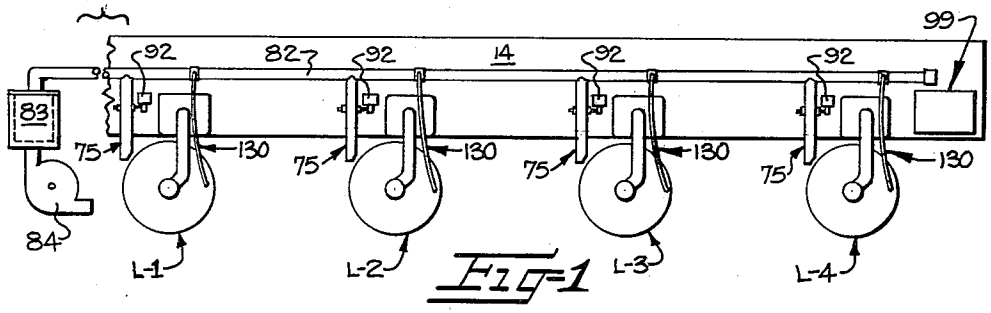


Fig-1

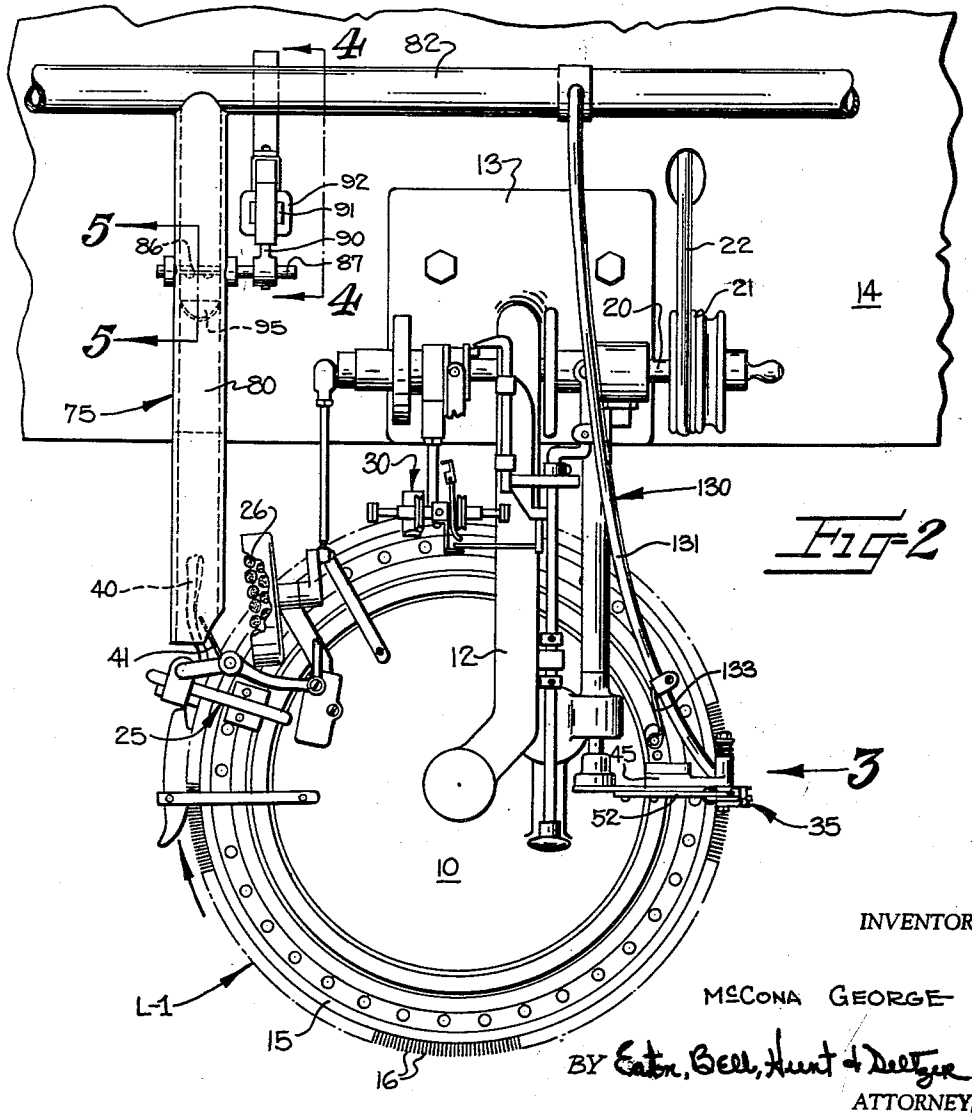


Fig-2

INVENTOR:

McCONA GEORGE

BY Eaton, Bell, Hunt & Deltzer

ATTORNEYS

Dec. 18, 1962 McCONA GEORGE 3,068,814

SUCTION APPARATUS FOR HOSIERY LOOPERS

Filed Aug. 30, 1960 3 Sheets-Sheet 2

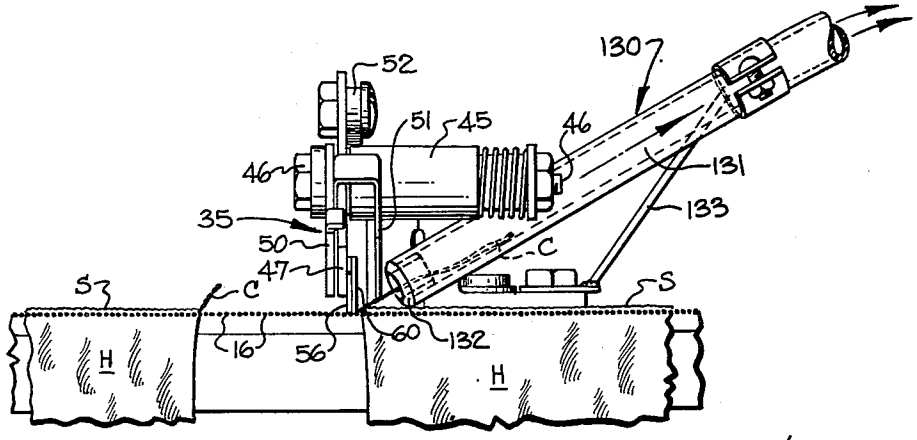


Fig-3

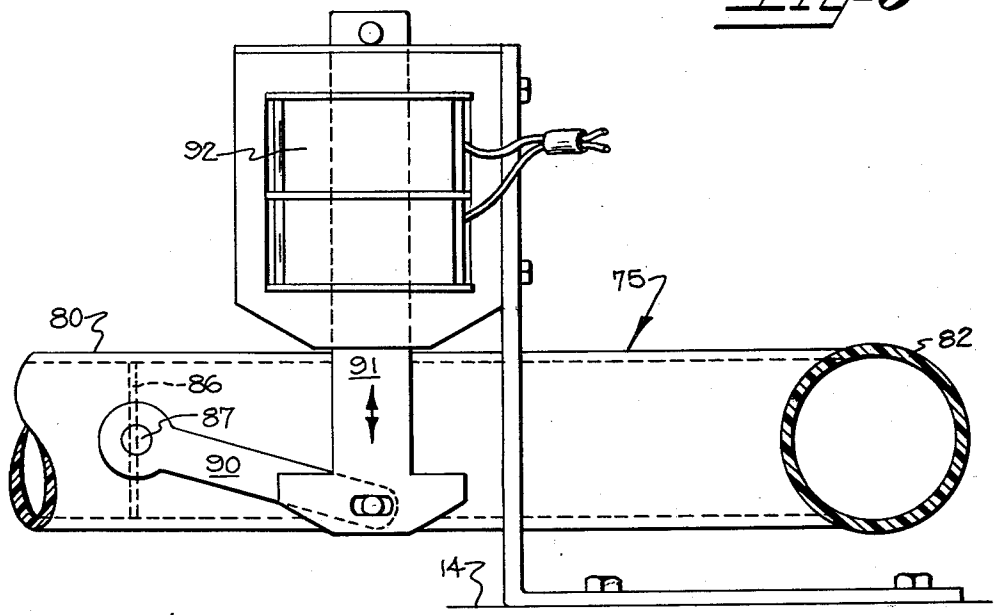


Fig-4

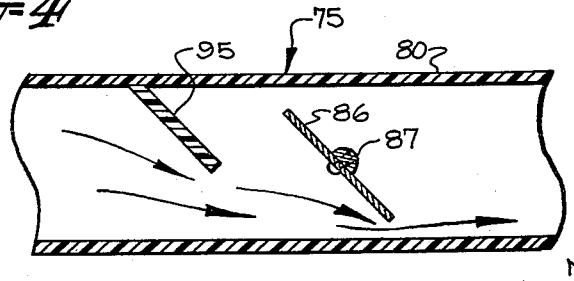


Fig-5

INVENTOR:

McCONA GEORGE

BY Eaton, Bell, Hunt & Deltzee

ATTORNEYS

Dec. 18, 1962 McCONA GEORGE 3,068,814

SUCTION APPARATUS FOR HOSIERY LOOPERS

Filed Aug. 30, 1960 3 Sheets-Sheet 3

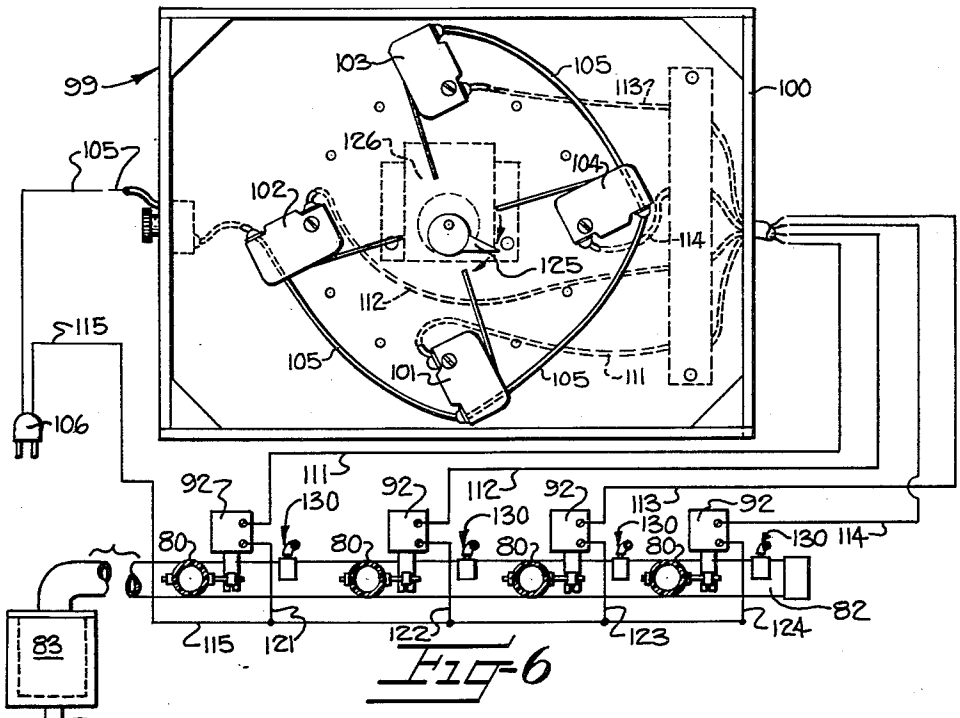


FIG-6

FIG-7

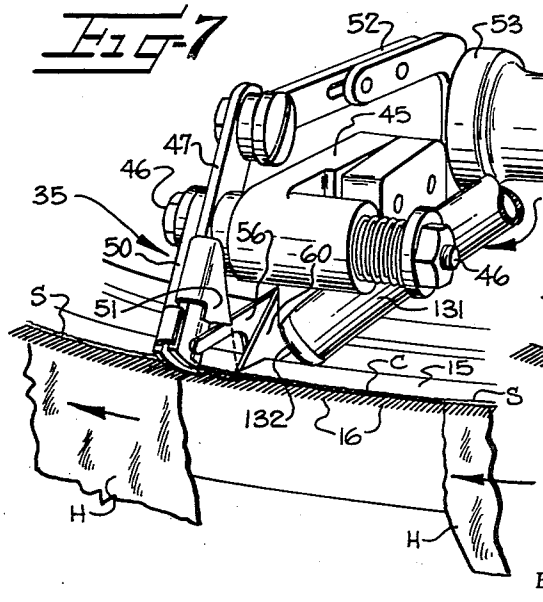
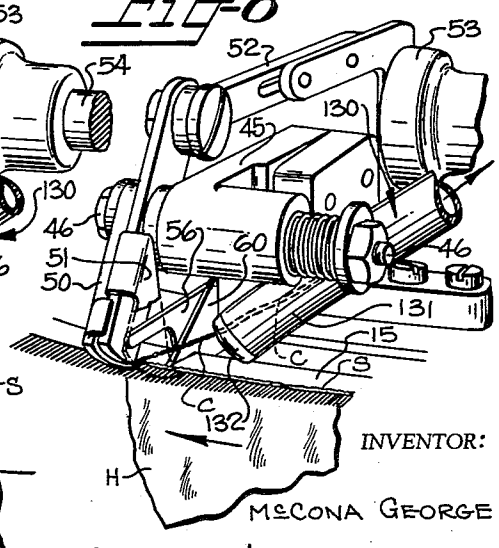


FIG-8



INVENTOR:
McCONA GEORGE
BY Eaton, Bell, Hunt & Bellizzi
ATTORNEYS

United States Patent Office 3,068,814 Patented Dec. 18, 1962

3,068,814

SUCTION APPARATUS FOR HOSIERY LOOPERS

McCona George, Sweetwater, Tenn., assignor to Charles H. Bacon Company, Inc., Lenoir City, Tenn., a corporation of Delaware

Filed Aug. 30, 1960, Ser. No. 52,801
4 Claims. (Cl. 112—25)

This invention relates generally to a suction apparatus adapted to operate in association with hosiery loopers of the type having means for cutting the loopers rounds from hosiery placed on the points of the looper, looping means for forming a seam of chain stitches which penetrate the knit loops carried by the looper points to close the toe of the hose and which looping means also forms a stitch chain which extends between adjacent hose carried by the looper points, and a stitch chain clipper which is normally adapted to sever the stitch chain closely adjacent the trailing end of each hose. More particularly, the present suction apparatus includes first intermittently operable suction means positioned adjacent the loopers rounds clipper and adapted to periodically remove the loopers rounds severed from the hose and second continuously operable suction means positioned adjacent the stitch chain clipper and adapted to tension and guide the stitch chain after it is initially severed to cause the stitch chain to be again clipped by the stitch chain clipper closely adjacent the leading end of each hose and to then remove the intermediate length of stitch chain.

In most of the hosiery loopers presently in use, as the loopers rounds are clipped above the looper points, they are guided outwardly from the points by a doffing blade to fall by gravity into a suitable container positioned therebeneath. Then after the hose is looped, the stitch chain is severed closely adjacent the trailing end of each of each hose to leave a relatively long end of the stitch chain extending to the leading end of the next hose. This means that the long stitch chain must be manually cut to the same length as the short stitch chain in a subsequent operation which adds to the cost of producing the hose. Also, after the leading end of the stitch chain is clipped, the relatively long stitch chain is free to move and in some instances portions of the stitch chain may drop down between the looper points or otherwise move out of the normal path of travel and interfere with normal operation of the hosiery looper.

It has been proposed in the United States Patent No. 2,501,838, issued to William R. Bennett, Sr., on March 28, 1950, to utilize a single suction means positioned adjacent the loopers rounds clipper to remove the loopers rounds as they are clipped from the hose. However, in this patent, the suction means is continously operated and it is connected to a single hosiery looper so that when a plurality of loopers are employed, each looper must have its own independent suction supply device. Also, in the suction device disclosed in Patent No. 2,501,838, there is no suction means provided to control the clipping and removal of the looper stitch chain.

With the foregoing in mind, it is a primary object of the present invention to provide a suction apparatus for hosiery loopers which is adapted to control the stitch chain during movement of the looper dial between adjacent spaced apart hose and to guide the stitch chain into the stitch chain clipper in such a manner that the stitch chain extending from the leading end of each hose will be equal in length to the stitch chain extending from the trailing end of each hose and to then remove the portion of the stitch chain which is cut from between adjacent hose.

It is another object of the present invention to provide a suction apparatus for hosiery loopers which includes an intermittently operable suction means positioned adjacent the loopers rounds clipper and which suction means operates to periodically remove the loopers rounds and carry the same to a collection unit.

It is another object of the present invention to provide a combination suction apparatus for hosiery loopers in which one suction device is positioned adjacent the loopers rounds clipper for removing the loopers rounds periodically while another suction device is positioned adjacent the looper stitch chain clipper for controlling and guiding the stitch chain so that it is clipped closely adjacent each end of the hose and for then removing the portion of stitch chain after both ends have been clipped.

It is still another object of the present invention to provide a suction apparatus for hosiery loopers and which suction apparatus includes a single suction supply source connected to a plurality of separate hosiery loopers, each of which is provided with first intermittently operable suction means for removing the loopers rounds and second continually operable suction means for controlling and removing the stitch chain clipped from between adjacent hose, and a timing mechanism for controlling the operation of the first suction means of the loopers in the proper sequence to thereby permit a suction producing unit of a relatively small size to be used to efficiently remove the loopers rounds from a plurality of hosiery loopers.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a somewhat schematic top plan view illustrating a looper table with a plurality of spaced apart hosiery loopers attached thereto and showing the suction apparatus of the present invention associated therewith;

FIGURE 2 is an enlarged top plan view of one of the hosiery loopers shown in FIGURE 1 and illustrating the manner in which the suction apparatus is connected thereto;

FIGURE 3 is an enlarged fragmentary elevation looking inwardly at the right-hand side of the hosiery looper shown in FIGURE 2 and in the direction indicated by the arrow 3;

FIGURE 4 is an enlarged fragmentary elevation taken along the line 4—4 in FIGURE 2 and illustrating the mechanism for intermittently operating the first suction means to remove the loopers rounds;

FIGURE 5 is an enlarged vertical sectional view taken along the line 5—5 in FIGURE 2 and illustrating the valve in partially open position;

FIGURE 6 is a schematic diagram illustrating the timing mechanism which controls the sequential operation of the loopers rounds suction removal mean associated with each of the hosiery loopers;

FIGURE 7 is an isometric view of a portion of the hosiery looper looking inwardly at the stitch chain clipper with the clipper positioned to clip the stitch chain closely adjacent the trailing end of a hose;

FIGURE 8 is a view similar to FIGURE 7 except showing the dial and transfer points advanced with the looper stitch chain clipper positioned to clip the stitch chain closely adjacent the leading end of a hose and showing the free end of the stitch chain drawn up into the stitch chain suction tube.

Referring to FIGURE 2, the hosiery looper includes a stationary disk **10** which is supported on the lower forward end of an upper support frame **12** and the rear end of which is provided with a base **13** which is secured to the looper table **14**. The looper is also provided with a conventional rotary disk or dial ring **15** which supports a circular series of radially projecting spaced apart dial looper points indicated at **16**. The dial ring **15** is rotated in a clockwise direction in FIGURE 2

through conventional gearing, not shown, by means of a main drive shaft **20**. The main drive shaft **20** has a pulley **21** fixed on one end which is driven by the upper end of a belt **22** and the lower end of the belt **22** may be driven be any suitable means such as a drive shaft positioned below the table **14**.

In the looping operation the operator first flattens the toe portion of the hose and alines the elongated complementary stitches of opposite halves of the hose, then the complementary stitches are placed or impaled on the looper points **16** as they move by the front portion of the looper. As each successive hose is placed on the points **16**, they will be spaced apart a predetermined distance, depending upon the speed of the operator in placing the succeeding hose on the looper points. As the points **16** carry the spaced apart hose around the stationary disk **10**, they successively pass a conventional loopers rounds trimmer, broadly indicated at **25**, a brush **26**, a chain stitcher or sewing mechanism, broadly indicated at **30**, and a looper chain stitch clipper, broadly indicated at **35**.

As is well known, during the knitting of hosiery, a course of loose or elongated stitches is knit adjacent the toe end of the hose to form a "looper line" and then a few more plain courses of regular length stitches are knit to form what are known as loopers rounds. The loopers rounds aid the operator in placing the loose course on the points of the looper and these loopers rounds, indicated at **40** in FIGURE 2, are trimmed or cut off by the loopers rounds trimmer **25** as the points **16** carry the loopers rounds past the trimmer **25**. Thereafter, the hose passes beneath the brush **26** which is rotated in a conventional manner to brush the loose threads from the loops impaled on the points. As the loopers rounds **40** are trimmed by the trimmer **25**, they are guided outwardly away from above the points **16** by a conventional doffing blade **41** and normally fall onto the floor or into a suitable container positioned therebeneath. However, in the present invention, these loopers rounds are collected by the suction apparatus of the present invention, in a manner to be later described.

As the points **16** carry the succeeding hose H beneath the chain stitcher **30**, a seam S is formed (FIGURE 7) to sew together the complementary pairs of knit stitches carried by the points **16** and a loose stitch chain C is formed between the spaced apart hose. The stitch chain C extends between adjacent hose H and lies on top of the points **16**.

The points **16** then carry the successive seamed hose and the stitch chain C past the conventional looper chain stitch clipper **35** where the stitch chain C is clipped closely adjacent the leading and trailing edges of the hose H. The looper chain stitch clipper **35** includes a support bracket **45** (FIGURES 7 and 8) which is suitably secured to the stationary disk **10** and extends outwardly and overlies the path of travel of the dial points **16**. The outer end of the bracket **45** has a horizontally disposed stud **46** mounted therein to support the medial portion of an oscillatable upper knife **47**. The stud **46** also pivotally supports the upper ends of outside and inside chain kickers **50** and **51** which are positioned on opposite sides of the lower end of the upper knife **47** and cooperate therewith in a conventional manner.

Oscillation is imparted to the upper knife **47** by an adjustable link **52**, one end of which is pivotally connected to the upper end of the upper knife **47** and the opposite end of which is pivotally connected to a rotating eccentric **53**. The eccentric **53** is fixed on the front end of a drive shaft **54** which is rotated in timed relationship with rotation of the dial ring **15**. The upper knife **47** cooperates with a lower stationary knife blade **56** (FIGURES 7 and 8) which extends outwardly and above the path of travel of the looper points **16** and is supported on the bracket **45**. A stitch chain guide **60** is positioned closely adjacent the lower blade **56** and cooperates with the outside and inside chain kickers **50** and **51** to position the stitch chain C in the proper location to be cut between the upper and lower knives **47** and **56** in a conventional manner, to be presently described.

In normal operation, the loopers rounds **40** are trimmed above the points **16** and are moved outwardly from above the points **16** by the doffing blade **41** as each successive hose H passes the loopers rounds trimmer **25**. Then as the hose H pass the chain stitcher **30**, a seam S is formed to join the loops impaled on the points **16** and a stitch chain C extends from the trailing edge or end of one hose to the leading edge or end of the next succeeding hose carried on the points **16** (FIGURE 7). Finally, as the successive hose pass the looper chain stitch clipper **35**, the stitch chain C will be cut between adjacent hose H and closely adjacent the trailing end of each hose.

During operation of the looper, the upper knife **47** oscillates continuously so that the lower end of the knife **47** cooperates with the lower knife **56**, however, when a seam S is passing therebeneath, the lower edge of the upper knife **47** passes above the seam S so that it will not cut the same. The outside and inside kickers **50** and **51** are spring biased so that they merely engage and press against the seam S as the lower end of the knife **47** moves inwardly. As the seam S passes the looper chain stitch clipper **35**, the lower ends of the kickers **50** and **51** pass beneath the stitch chain C to move the same inwardly where it is guided upwardly by the chain guide **60** into position to be cut between the upper knife **47** and the lower knife **56** and form a relatively short tail (FIGURE 3). The short tails at the trailing edge of each successive hose are of uniform length since the clipper **35** operates at the same predetermined point following the passage of each hose H therebeneath. However, the portion of the chain C extending to the leading edge of the next succeeding hose forms a relatively long tail and therefore the tail at the leading edge of the hose is much longer than the tail at the trailing edge thereof. This long tail must be cut later by the inspector and this adds to the already heavy burden of the inspector's job.

The parts of the looper heretofore described are conventional parts of the so-called steady dial loopers which are known as Wright & Sotco models manufactured by Southern Textile Machinery Company, Inc. of Paducah, Kentucky. Although the present invention is particularly adapted for use with this type of looper, it is to be understood that the present invention may also be employed with other types of loopers.

As indicated in FIGURE 1, the suction apparatus of the present invention is adapted to be connected to a group of loopers indicated at L–1, L–2, L–3 and L–4. Each looper has first intermittently operable suction means broadly indicated at **75** which is positioned adjacent the doffing blade **41** to remove the loopers rounds **40** as they are trimmed from the top of successive hose H carried therebeneath by the loopers points **16**. Each intermittently operable suction means **75** includes a tube or branch pipe **80** (FIGURE 2), the forward end of which terminates closely adjacent the path of travel of the looper points **16** and the loopers rounds **40** are deposited in the open end of the tube **80** by the doffing blade **41**. The rear end of the tube **80** is connected to a main suction pipe **82** which is in turn connected at one end to a receptacle **83** (FIGURES 1 and 6) adapted to collect the loopers rounds drawn thereinto by suction currents created by a suction pump **84**.

Suction is constantly maintained in the main pipe **82** by the suction pump **84** and suction currents are intermittently created at the open end of the tube **80** by a butterfly type valve **86** (FIGURES 4 and 6) positioned intermediate the ends of the tube **80**. The valve **86** is supported on a control shaft **87** which is in turn oscillatably supported in the tube **80**. One end of the shaft **87** has one end of an actuator arm **90** fixed thereto and the

other end of the arm 90 is connected to the lower end of a solenoid plunger 91 (FIGURE 4). The valve 86 is normally held in a closed position, as shown in FIGURE 4, by the weight of the solenoid plunger 91 and then electrical energy is completed to a solenoid coil 92, in a manner to be later described, the solenoid plunger 91 will be raised upwardly to open the valve 86 to substantially the position shown in FIGURE 5.

Opening the valve 86 will allow air to rush into the open end of the tube 80 and pull any loopers rounds 40 deposited therein through the tube 80 and main tube 82 to the receptacle 83 where all of the loopers rounds will be collected. It will be noted in FIGURES 2 and 5 that the tube 80 is provided with an inclined baffle plate 95 which is secured in the tube 80 ahead of the valve 86 and the plate 95 acts to direct the loopers rounds downwardly to the lower portion of the tube so that they will pass beneath the valve 96 without becoming clogged in the tube 80. It is preferred that each of the branch tubes 80 and the main pipe 82 be formed of clear plastic material so that it may be readily observed if any clogging takes place, however, it is to be understood that the pipes could be formed of any other suitable material.

In order to control the sequential operation of the valves 86 in the tubes 80 of the loopers L–1 through L–4, an electrical timer broadly indicated at 99 is provided (FIGURE 6). The timer 99 includes a housing 100 in which a plurality of normally open switches 101 through 104 are mounted. One side of each of the switches 101 through 104 is connected to one end of a main wire 105 which is connected at its other end to a plug 106 adapted to be connected to any suitable source of electrical energy. The opposite sides of the switches 101 through 104 are connected by respective wires 111 through 114 to one side of the solenoid coils 92 associated with the respective loopers L–1 through L–4. The opposite sides of the solenoid coils 92 are connected to one end of a main wire 115 by branch wires 121 through 124 and the opposite end of the main wire 115 is connected to the plug 106.

The timer 100 is also provided with a switch actuator 125 which is connected to the rotating shaft of a constantly rotating electric motor 126. As rotation is imparted to the actuator 125, its free end successively engages the switch arms of the switches 101 through 104 to thereby sequentially energize the coils 92 and successively open the valves 86 of the loopers L–1 through L–4. This timing arrangement thus permits only one of the valves 86 to be opened at a time so that a relatively small suction pump 84 can be utilized to operate suction means associated with a plurality of loopers. Although only four loopers are illustrated in the drawings, it is to be understood that a greater number of loopers may be connected to the suction apparatus of the present invention.

Each of the loopers L–1 through L–4 is also provided with a second continually operable suction means indicated broadly at 130 (FIGURES 2, 3, 7 and 8) which is positioned to control the stitch chain after it is initially clipped adjacent the leading edge of the next succeeding hose and to then remove the portion of the stitch chain C between the clipped tails at the trailing and leading edges of succeeding hose. The second suction means 130 includes a branch suction tube 131 which is preferably of smaller diameter than the tube 80. The forward free open end of the tube 131 is positioned closely adjacent the upper surface of the looper points 16 and the rear end of the tube 131 is suitably connected to the main pipe 82.

It is preferred that the tube 131 also be of a clear plastic material and the leading or free end of the tube 131 has a smooth grommet 132 fixed therein. The grommet 132 guides the stitch chain C as it is drawn up into the tube 131, following the initial cutting by the clipper 35 (FIGURE 3). The forward or free end of the tube 131 is supported rearwardly or in advance of the clipper blade 56 by a brace 133 (FIGURES 2 and 3) which is connected at its lower end to the bracket 45 and its upper end is clamped around the pipe 131. Since the free end of the tube 131 is positioned closely adjacent the upper surface of the points 16 and is continuously drawing air thereinto, any lint on the points will be removed to keep the points free and clear of lint and the like.

The main function of the tube 131 is to maintain, tension and position the stitch chain C so that it will again be clipped closely adjacent the leading edge of each hose H. As shown in FIGURE 7, with the next oscillation of the upper knife 47, the outside and inside kickers 50 and 51 will move inwardly beneath the loose stitch chain C and move the same inwardly and upwardly along the upper surface of the guide 60 so that the upper knife 47 will cut the same against the lower knife 56. Because of the suction currents created at the end of the tube 131, the free end of the stitch chain C will be drawn up into the tube 131 and maintained under tension as the points bring the leading edge of the next succeeding hose H beneath the clipper 35 (FIGURES 3 and 8). It will be noted that the stitch chain C extends upwardly and rearwardly from the leading edge of the hose at an angle above the seam S so that it will be properly positioned to be clipped between the upper knife 47 and the lower knife 56. This angular position of the stitch chain C is shown in FIGURE 8 and with the next oscillation of the knife 47, the chain C will be clipped, leaving a relatively short tail extending to the seam S, at the leading edge of the hose H. The length of the tails at both the leading edges and the trailing edges will be the same on all hose. After the chain C is clipped, the residual portion of the chain C will be drawn into the tube 131, through the main pipe 82 and deposited in the receptacle 83.

It is thus seen that the suction apparatus of the present invention provides an intermittently operable suction means which is positioned adjacent the loopers rounds clipper and periodically removes the loopers rounds severed from the hose and a continuously operable suction means which is positioned adjacent the looper chain clipper to control and guide the stitch chain into the clipper whereby uniform ends will be clipped at both the trailing and leading edges of a hose. Also, the second suction means helps maintain the points clean and free from lint and the like and also prevents accumulations of lint on the knife blades of the looper chain clipper.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a hosiery looper having a series of radially extending looper points movable about a vertical axis, said looper points adapted to receive complementary loops adjacent an open end of successive hose placed thereon, said hose being randomly spaced apart and having loopers rounds extending above the points, first cutting means for severing the hose immediately above the points to separate the loopers rounds therefrom, looping means adapted to form a seam joining together complementary loops impaled on said looper points and a loose stitch chain lying on the points and connecting the trailing and leading edges of successive hose together, and second cutting means adapted to sever the loose stitch chain closely adjacent the trailing edge of each successive hose; the combination therewith of first suction means positioned adjacent said first cutting means, control means associated with said first suction means for intermittently rendering said first suction means operable to periodically remove the loopers rounds severed from the hose and transfer the same to a receptacle, and second suction means positioned adjacent said second cutting means for receiving the free end of the stitch chain which extends to the leading edge of each

successive hose, said second suction means adapted to maintain the stitch chain above the seam of the next succeeding hose to guide the same into said second cutting means to cut the stitch chain closely adjacent the leading edge of each successive hose and then remove the terminal portion of the stitch chain.

2. In a hosiery looper having a series of radially extending looper points movable about a vertical axis, said looper points adapted to receive complementary loops adjacent an open end of successive hose placed thereon, said hose being randomly spaced apart and having loopers rounds extending above the points, first cutting means for severing the hose immediately above the points to separate the loopers rounds therefrom, looping means adapted to form a seam joining together complementary loops impaled on said looper points and a loose stitch chain lying on the points and connecting the trailing and leading edges of successive hose together, and second cutting means adapted to sever the loose stitch chain closely adjacent the trailing edge of each successive hose; the combination therewith of a first suction tube having a free end positioned adjacent said first cutting means for receiving the loopers rounds severed from the hose, a second suction tube having a free end positioned adjacent said second cutting means for receiving the free end of the stitch chain which extends to the leading edge of each successive hose, a main suction pipe communicating with the ends of said first and second suction tubes remote from their free ends, and suction producing means communicating with said main suction pipe.

3. In a hosiery looper having a series of radially extending looper points movable about a vertical axis, said looper points adapted to receive complementary loops adjacent an open end of successive hose placed thereon, said hose being randomly spaced apart and having loopers rounds extending above the points, and cutting means for severing the hose immediately above the points to separate the loopers rounds therefrom; the combination therewith of a suction tube having a free end positioned adjacent said first cutting means for receiving the loopers rounds severed from the hose, suction producing means communicating with the end of said suction tube remote from its free end, valve means positioned intermediate the ends of said suction tube said valve means including a butterfly valve positioned in said suction tube, and a baffle positioned in said tube and closing half of the tube in advance of said butterfly valve, said baffle being connected to substantially half of the interior of said tube and inclined in a direction toward said butterfly valve to direct the loopers rounds to one side of said butterfly valve as the loopers rounds are drawn through said tube, and control means for actuating said butterfly valve at predetermined intervals to periodically remove the loopers rounds deposited in the free end of said suction tube.

4. A suction apparatus for a plurality of adjacent hosiery loopers, each of said loopers having a series of radially extending looper points movable about a vertical axis, said looper points adapted to receive complementary loops adjacent an open end of successive hose placed thereon, said hose being randomly spaced apart and having loopers rounds extending above the points, first cutting means for severing the hose immediately above the points to separate the loopers rounds therefrom, looping means adapted to form a seam joining together complementary loops impaled on said looper points and a loose stitch chain lying on the points and connecting the trailing and leading edges of successive hose together, and second cutting means adapted to sever the loose stitch chain closely adjacent the trailing edge of each successive hose, said suction apparatus comprising a suction producing pump, a main suction pipe connected to said pump and extending adjacent each of said hosiery loopers, a receptacle interposed in said main pipe, first suction tubes connected at one end to said main pipe and having free ends positioned adjacent said first cutting means of each of said loopers, valve means positioned in and intermediate the ends of each of the said first suction tubes, control means for successively actuating said valve means in a predetermined sequence, said control means comprising an electric solenoid operatively connected to each of said valve means, switch means electrically connected to each of said solenoids, a switch actuator successively engageable with said switches to successively actuate the same and operate corresponding valve means in a predetermined sequence, said first suction tubes adapted to remove the loopers rounds from corresponding loopers and transfer the same to said common receptable in response to operation of corresponding valve means, and second suction tubes connected at one end to said main pipe and having free ends positioned adjacent said second cutting means of each of said loopers, said second suction tubes adapted to receive and maintain the free end of the stitch chain above the seam of the next succeeding hose to guide the same into said second cutting means to cut the stitch chain closely adjacent the leading edge of each successive hose and then remove the terminal portion of the stitch chain from corresponding loopers and transfer the same to said receptacle.

References Cited in the file of this patent

UNITED STATES PATENTS

1,205,107	Randall	Nov. 14, 1916
2,501,838	Bennett	Mar. 25, 1950
2,824,436	Stack et al.	Feb. 25, 1958
2,908,154	Butler	Oct. 13, 1959
2,989,935	Butler	June 27, 1961