Sept. 20, 1938. H. W. START ET AL 2,130,708

STRAIGHT BAR KNITTING MACHINE

Filed Dec. 31, 1937 2 Sheets-Sheet 1

Fig. 1.

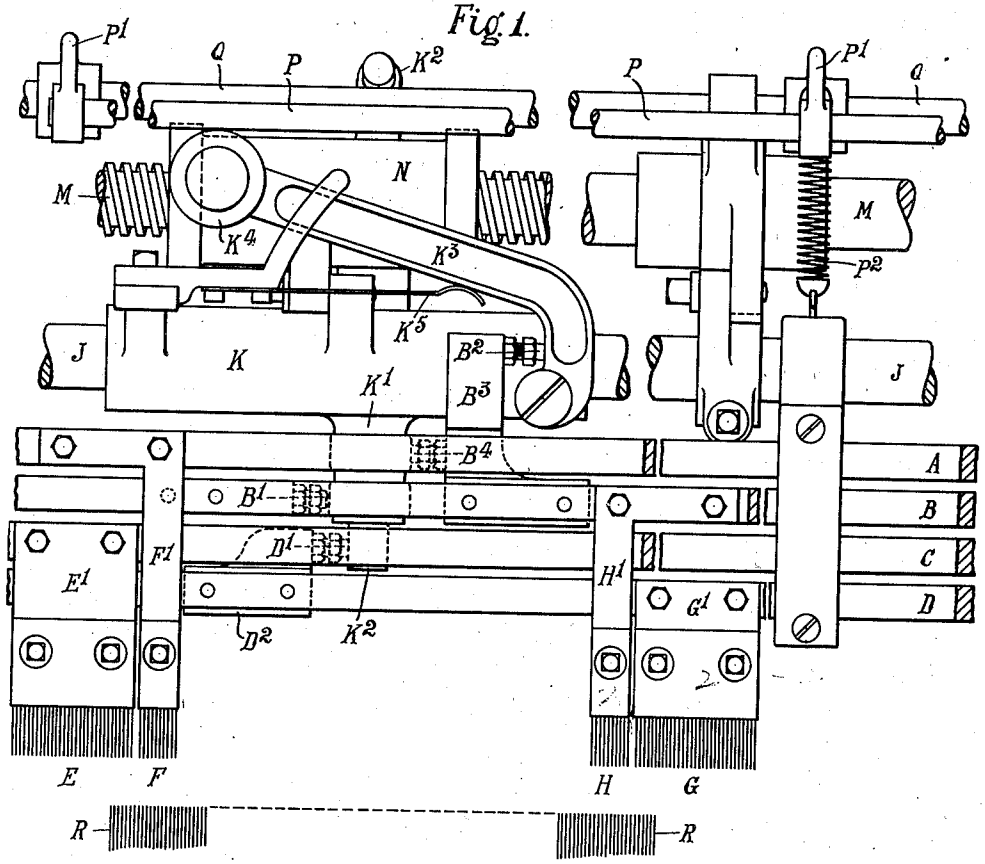
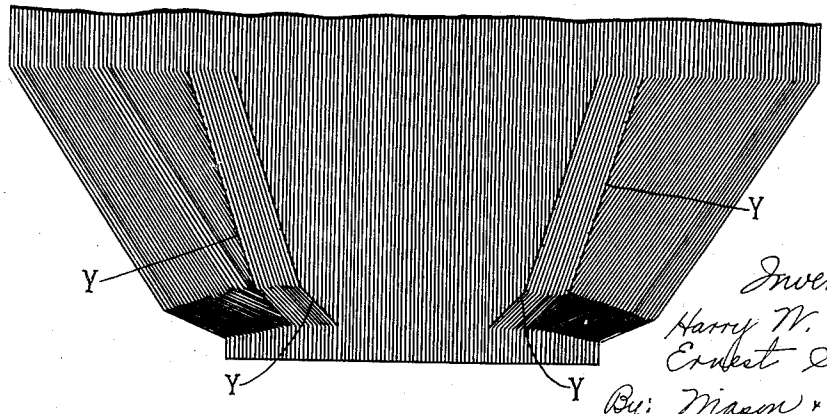


Fig. 5.



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Fig. 2.

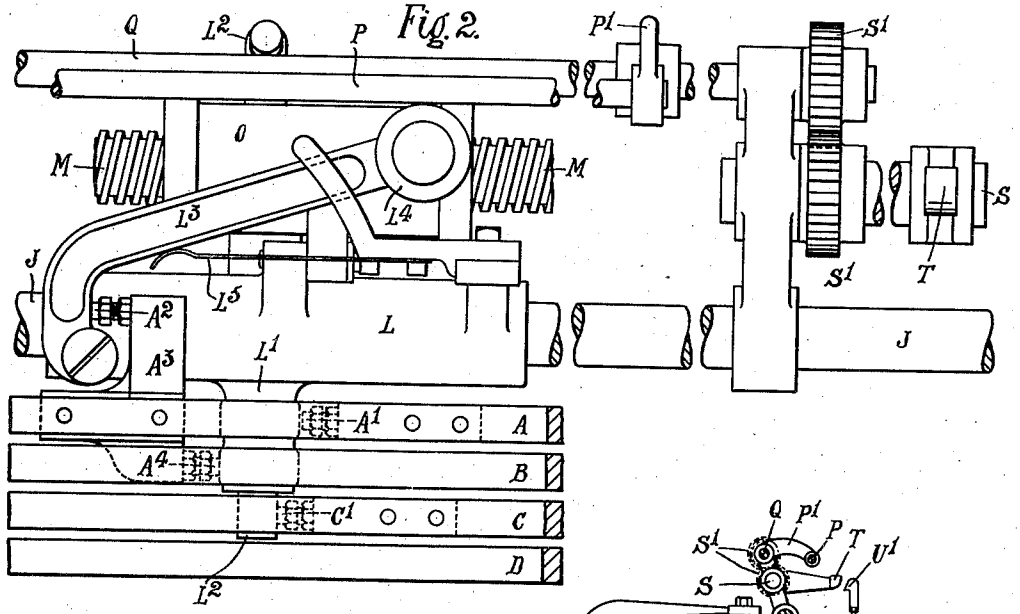


Fig. 3.

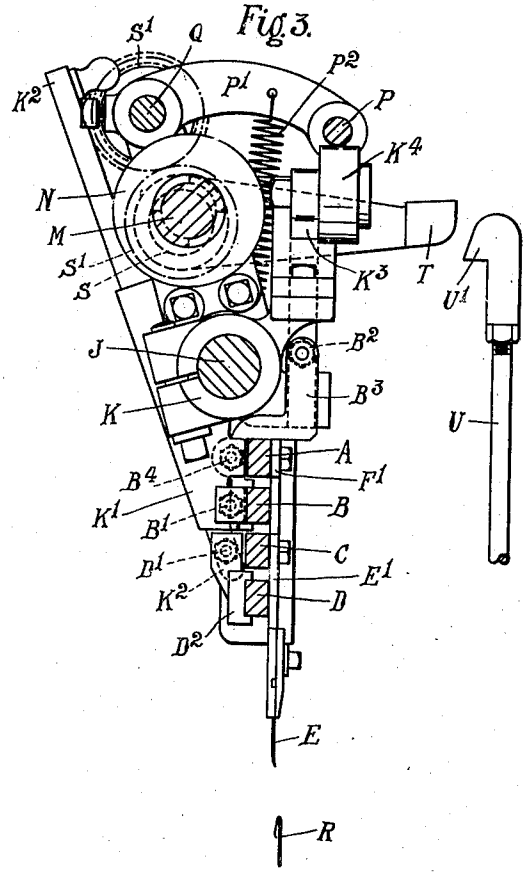
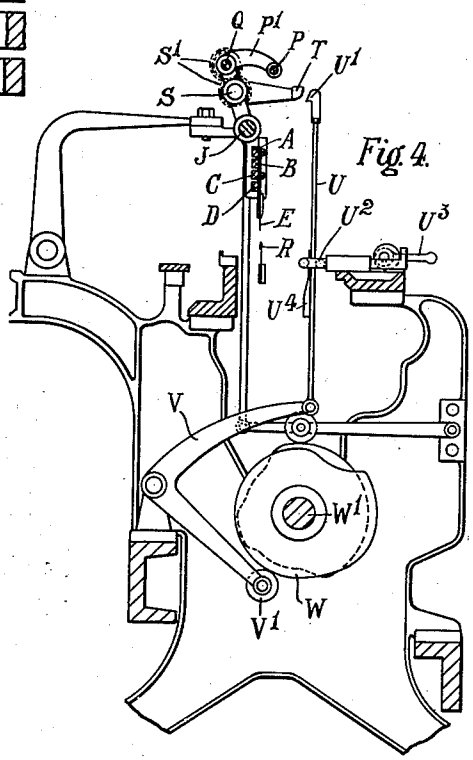


Fig. 4.



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UNITED STATES PATENT OFFICE

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STRAIGHT-BAR KNITTING MACHINE

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Application December 31, 1937, Serial No. 182,874
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4 Claims. (Cl. 66—89)

This invention relates to straight-bar knitting machines of the "Cotton" type, and it refers to improvements in the means which are employed in such machines for fashioning garments such as hose. Its object is to get more perfect results in the fashioned garments produced on such machines.

The fashioning of garments on such machines is effected by transferring loops, and this process is effected by means of what are termed transfer points, which are adapted to take loops from a certain number of needles at both edges of a garment, move these loops inwards one or more needles as required, and then replace them on the needles again in the new position.

In order to effect this operation, a set of transfer points is provided at each edge of the work, and each set is, when loops have to be transferred a space of two needles at a time, divided into inner and outer groups, that is, an inner group of about fifteen points and an outer group of say three or four times that number. Each inner group of points can be closed-up to the outer group to form one continuous set, or the inner group can be moved away from its outer group, so as to leave a gap between the two groups which is usually the width of one needle space.

Two of these sets of points are provided in each division of the machine, and the inner and outer groups of transfer points in one set in each division, are carried on independent brackets secured to two longitudinal bars, and the inner and outer groups in the other set in each division, are also carried by brackets secured to two further longitudinal bars, and these four longitudinal bars which are carried along the full length of the machine are disposed in the narrowing frame, and are adjustable longitudinally in order to provide means whereby the two outer groups of transfer points in each division of the machine can be adjusted independently of the two inner groups.

For instance at the commencement of a loop transferring operation, the inner groups of transfer points in each set, are disposed one needle space away from the outer group in the same set, and after descending and taking a series of loops from the needles, the outer group must be moved inwards two needles and the inner set moved inwards one needle, thus closing up the space betwen the two groups of transfer points before replacing the loops on the needles again.

The object of this action is to avoid the placing of the two superfluous loops on two adjacent needles, and thereby forming a prominent suture in the work. With the arrangement described, the two superfluous loops are placed on two needles which are some distance apart, and two sutures are formed, which are not so prominent as one suture and the garment has a much better appearance.

In order to provide for this action, the longitudinal bars which carry the inner groups of points must be controlled by mechanism which is independent of that employed for controlling the bars which carry the outer groups of points, and the problem has hitherto been met by duplicating the screw mechanism which is ordinarily used for adjusting the longitudinal bars.

According to the present invention, one screw mechanism only is employed for adjusting the four longitudinal bars, and the closing together of the inner and outer group of points in each set is controlled by levers, which are associated with the two screw nuts on the right and left hand threaded portions of the one screw shaft. The action of these levers which are connected by means of tappets to two of the longitudinal bars is controlled by a bar which normally holds down the free ends of the said levers and is raised at the required time when loops are being transferred.

The invention will now be more particular described with reference to the accompanying drawings in which

Fig. 1 is a front elevation showing two of the sets of transfer points which are employed in each division of the machine, and the left-hand portion of the controlling mechanism constructed according to our invention.

Fig. 2 is a front elevation showing the right hand portion of the controlling mechanism.

Fig. 3 is a vertical cross section of the loop transfer mechanism to which our invention is applied.

Fig. 4 is a vertical cross section of the machine drawn to a smaller scale than Figs. 1 to 3.

Fig. 5 is a view of the toe part of a stocking foot which is fashioned in the manner hereinbefore described.

Like letters indicate like parts throughout the drawings.

As shown in Figs. 1 and 2 of the drawings, the two sets of transfer points in each division of the machine are carried as usual on four longitudinal bars A, B, C, and D extending along the full length of the machine, and these bars are carried in the narrowing frame in the usual manner and are longitudinally adjustable.

The outer group of transfer points E at the left of each division in the machine are carried by a bracket E^1 secured to the bar C, and the inner group F of points in this set are carried by a bracket F^1 secured to the bar A.

The outer group of points G in the set at the right of each division are carried by a bracket G^1 secured to the bar D, and the inner group of points H in this set are carried by a bracket H^1 secured to the bar B. The two inner sets of transfer points F and H are thus controlled by the longitudinal bars A and B, and the two outer sets E and G are controlled by the longitudinal bars C and D.

Above the longitudinal bars described is a screw threaded shaft M, and disposed on this screw shaft are two screw threaded nuts N and O. This screw threaded shaft is actuated as is usual by ratchet wheel and pawl mechanism controlled by a pattern chain or like mechanism.

In the present arrangement a shaft J is disposed below the screw threaded shaft M, and on this shaft are two sliding members K and L.

The sliding member K on the shaft J is connected to the screw nut N which is on a right-hand screw threaded part of the screw shaft M, while the sliding member L on the shaft J is connected to the screw nut O which is on a left-hand screw threaded part of the screw shaft M, and as a result, rotation of this screw shaft M moves the sliding members K and L on the shaft J in reverse directions.

The sliding member K on the shaft J has a downwardly projecting tappet member K^1, and at the back of this member K^1 is a sliding bolt K^2. The tappet member K^1 on the slide K engages with a normal tappet B^1 at the back of the longitudinal bar B, while the lower end of the bolt K^2 engages with a normal tappet D^1 on a bracket D^2 secured to the back of the longitudinal bar D. Both of these bars B and D and the inner and outer groups of points H and G on the right of each division, are thus connected to and can be moved to the left or inwards by the screw nut N on the screw threaded shaft M.

The other sliding member L on the shaft J (see Fig. 2) has a downwardly projecting tappet member L^1, and at the back of this extension is a sliding bolt L^2, and the tappet member L^1 engages with a normal tappet A^1 at the back of the longitudinal bar A, whilst the lower end of the bolt L^2 engages with a normal tappet C^1 at the back of the longitudinal bar C, and these two bars A and C and the inner and outer groups of points F and E on the left of each division in the machine, are thus connected to and can be moved to the right or inwards by the screw nut O on the screw threaded shaft M.

By raising the bolts K^2 and L^2 which engages with the normal tappets D^1 and C^1 on the longitudinal bars D and C, these two bars and the outer groups of points E and G which are connected thereto, can be put out of action when they are not required, for instance when fashioning a stocking leg.

The longitudinal bar B is further connected to the sliding member K and the longitudinal bar A connected to the slide K by the following arrangement.

Pivoted on the sliding member K is a lever K^3 provided with an anti-friction roller K^4 at its upper end which is disposed under a lever depressing bar P. This bar P is carried by arms P^1 on a rocking shaft Q, which is like the previously mentioned shafts M and J, carried in bearings in the narrowing frame. The depressing bar P is normally held down by a spring P^2 so as to hold the upper end of the lever K^3 down as shown in Fig. 1 of the drawings. This lever K^3 when held down as described, acts upon an extra tappet B^2 on a bracket B^3 which is secured to the longitudinal bar B, and holds the inner group of transfer points H on the right of each division a short distance away from the outer group of points G, and at the same time holds the normal tappet B^1 on the bar B a corresponding distance from the tappet member K^1 on the sliding member K as shown in Fig. 1.

This distance which corresponds to one needle space, is regulated by an adjustable stop B^4 on the bracket B^3 which is moved up to the tappet member K^1 on the sliding member K, and held there by the depressed lever K^3.

The two groups of points E and F on the left of each division, are controlled by a duplicate arrangement to that provided in connection with the two groups of points H and G, and this duplicate arrangement which will not be described is shown in Fig. 2.

Pivoted on the sliding member L on the shaft J is a lever L^3 which corresponds to that K^3 on the sliding member K, but this lever is in the reverse position to the lever K^3. The upper end of this lever L^3 is provided with an anti-friction roller L^4 disposed under the depressing bar P previously described, and when the upper end of this lever L^2 is held down by the said bar P as shown in Fig. 2, it acts upon an extra tappet A^2 on a bracket A^3 secured to the bar A, and holds the inner group of points F on the left of the division, which is secured to this bar A, the required distance from the outer group E, as shown in Fig. 1, and at the same time holds the normal tappet A^1 on this bar A the same distance from the tappet member L^1 on the sliding member L, as shown in Fig. 2. The space between the two groups of points E and F is in this case regulated by an adjustable stop A^4 in the bracket A^3 which is held up to the tappet member L^1 on the sliding member L by the depressed lever L^3.

The action of the arrangement described will now be described with reference to one set of transfer points H and G, but it will be understood that the other set of points E and F will be at the same time actuated in precisely the same manner.

It will be seen that the longitudinal bar B to which the inner groups of transfer points H is connected is provided with two tappets and a stop, that is, a normal tappet B^1 on one side of the tappet member K^1 on the slide K, another extra tappet B^2 for the lever K^3 to engage with on the other side of the tappet member K^1, and a stop B^4 which is when the lever K^3, is depressed held up to the tappet member K^1, whilst the normal tappet B^1 is held a short distance away from the tappet member K^1 on the slide K.

Now if while the lever K^3 is held down by the depressing bar P, the slide K is moved to the left by the screw shaft M a distance equal to the space of two needles, both groups of points H and G will move the same distance, as the lever K^3 will continue to hold the stop B^4 on the bar B up to the tappet member K^1 of the slide K, and the member K^1 will also engage with the tappet D^1 on the bar D to which the group of needles G are connected. In this case the space between the two groups of points H and G will not be closed-up. On the other hand if the slide K is moved to the left when the lever K^3 is

released and raised by its spring K^5, the tappet member K^1 on the slide K, will have to move to the left one needle space, before it engages with the normal tappet B^1 on the bar B, and as a result the group of points H will only be moved one needle space to the left, whilst the group of needles G will be moved two needle spaces to the left as before, and the space between the two groups of points H and G will be closed up.

In actual loop transferring operations, the inner groups of transfer points H, are normally held one needle space away from the outer group G by the lever K^2, but after descending and taking a series of loops from the needles R, the lever K^3 is released by the depressing bar P, before the slide K is moved by the screw M, so that the group of points G is moved inwards two needle spaces and the group of needles H moved inwards only one space as previously described, before the removed loops are placed by the points on the fresh needles. On the completion of this operation, the outer group of points is moved outwardly one needle space in the same manner as stated above and the bar P is released and depressed by its spring P^2 again and the lever K^3 then moves the inner group of points H one needle space away from the outer group of points G ready for the next loop transferring operation.

It will also be understood that the other set of points on the left hand of the division comprising the two groups E and F will be operated in precisely the same manner by the previously described duplicate arrangement in connection therewith.

The object of the adjustments described is to avoid the disposition of the two superfluous loops on two contiguous needles, and thereby forming a single prominent suture in the work. With the arrangement described the two superfluous loops are placed on two needles, but these needles are some distance apart, and two sutures Y instead of one are formed in each side of the work as shown in Fig. 5, which are not so prominent as a single suture would be and the garment has a much better appearance.

In order to raise the holding down bar P at the proper time, the following arrangement is preferably adopted. The rocking shaft Q which carries the holding down bar P (see Figs. 2 and 4), is geared to a second shaft S at one end of the machine, by means of a pair of toothed wheels S^1, and this second shaft is provided with an arm T which extends towards the front of the machine, where a vertical link U provided with a catch U^1 at its upper end is disposed. The lower end of this link is connected to one end of a bell crank lever V and the other end of this lever is provided with an antifriction lever V^1 bearing on a cam W on the main cam shaft W^1 of the machine.

When the narrowing frame on which the mechanism described is disposed, is raised after taking the loops from the needles, the free end of the arm T on the second shaft S engages with the catch U^1 on the vertical link U, and the respective parts are so disposed, that the shaft Q which carries the holding down bar P is then turned so as to raise the said bar P at the proper time, so that the two levers K^3 and L^3 previously described are released, in order to permit of the outer groups of points being moved up to their inner groups of points as previously described just before the loops are returned to the needles R.

The link U with the catch U^1 at its upper end is raised and lowered by the cam W, in order to provide means for timing with accuracy the release of the arm T from the catch U^1, and the latter is held in the path of the free end of the arm T by means of a slide U^2 which also serves to draw the catch back out of action when not required.

The link U passes between two projections on the slide U^2 and the projection that holds the catch U^1 in its operative position is spring supported, so that it will yield and permit of the end of the arm T moving past the catch U^1 when the said arm is moving down with the narrowing frame. The slide U^2 is preferably moved into and out of its operative position by means of a cam lever U^3 which is pivoted on the casing in which the slide is disposed, and a cam member U^4 may if desired be provided on the link U, in order to move the catch U^1 back clear of the arm T each time the link U is raised up to a certain point by the cam W.

What we claim as our invention is:—

1. In straight-bar knitting machine loop transferring mechanism in which each set of points is comprised of two groups which are adjusted by screw nuts on right and left hand screw threaded portions of a shaft, the combination of two pairs of longitudinally adjustable bars, inner groups of points carried by brackets secured to one pair of bars, outer groups of points carried by brackets secured to the other pair, slides connected to the screw nuts with parts which are adapted to engage with tappets on and move the longitudinal bars carrying one set of points in the reverse direction to those carrying the other set, levers pivoted on the slides, means for connecting these levers to the longitudinal bars which carry the inner groups of points, means for holding down these levers in order to hold the inner groups of points the required distance from the outer groups, and means for releasing these levers. after the loops have been removed from and before they are returned to the needles, substantially as described.

2. In straight-bar knitting machine loop transferring mechanism in which each set of points is comprised of two groups which are adjusted by screw nuts on right and left hand screw threaded portions of a shaft, the combination of two pairs of longitudinally adjustable bars, inner groups of points carried by brackets secured to one pair of bars, outer groups of points carried by brackets secured to the other pair, slides connected to the screw nuts with parts which are adapted to engage with tappets on and move the longitudinal bars carrying one set of points in the reverse direction to those carrying the other set, levers pivoted on the slides, means for connecting these levers to the longitudinal bars which carry the inner groups of points, a bar for holding down these levers carried by arms on a rocking shaft, a spring for holding the bar down, and means for raising this bar and releasing these levers, after the loops have been removed from and before they are returned to the needles, substantially as described.

3. In straight-bar knitting machine loop transferring mechanism in which each set of points is comprised of two groups which are adjusted by screw nuts on the right and left hand screw threaded portions of a shaft, the combination of two pairs of longitudinally adjustable bars, inner groups of points carried by brackets secured to one pair of bars, outer groups of points carried by brackets secured to the other pair, slides connected to the screw nuts with parts which are adapted to

engage with tappets on and move the longitudinal bars carrying one set of points in the reverse direction to those carrying the other set, levers pivoted on the slides, means for connecting these levers to the longitudinal bars which carry the inner groups of points, a bar for holding down the free ends of these levers carried by arms on a rocking shaft, a spring for holding this bar down, means for raising the bar comprising a second shaft to which the rocking shaft is geared, an arm on this second shaft disposed so that its free end engages with a catch when the narrowing frame rises, and a cam on the main shaft for controlling the catch, substantially as described.

4. In straight-bar knitting machine loop transferring mechanism in which each set of points is comprised of two groups which are adjusted by screw nuts on the right and left hand screw threaded portions of a shaft, the combination of two pairs of longitudinally adjustable bars, inner groups of points carried by brackets secured to one pair of bars, outer groups of points carried by brackets secured to the other pair, slides connected to the screw nuts with parts which are adapted to engage with tappets on and move the longitudinal bars carrying one set of points in the reverse direction to those carrying the other set, levers pivoted on the slides, means for connecting these levers to the longitudinal bars which carry the inner groups of points, a bar for holding down the free ends of these levers carried by arms on a rocking shaft, a spring for holding this bar down, means for raising the bar comprising a second shaft to which the rocking shaft is geared, an arm on this second shaft disposed so that its free end engages with a catch when the narrowing frame rises, a cam on the main shaft for controlling the catch, and means for moving the catch into and out of its operative position, substantially as described.

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