

Aug. 6, 1929.

E. M. JONES
FEEDING DEVICE

1,723,786

Filed Feb. 11, 1926

3 Sheets-Sheet 2

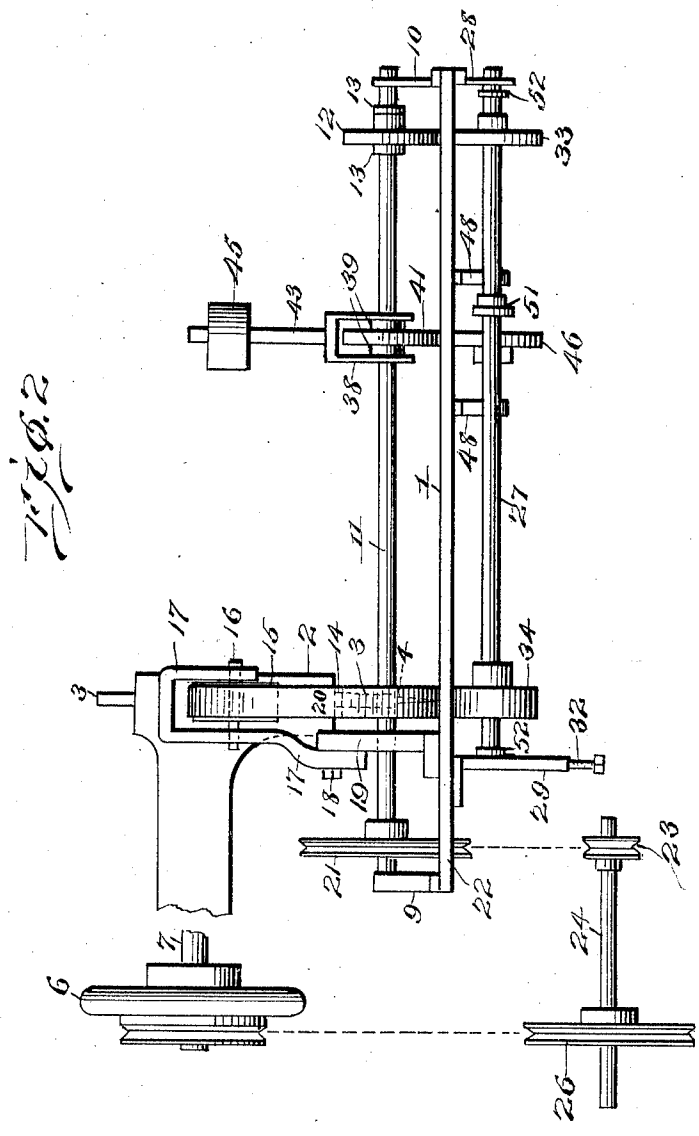


Fig. 2

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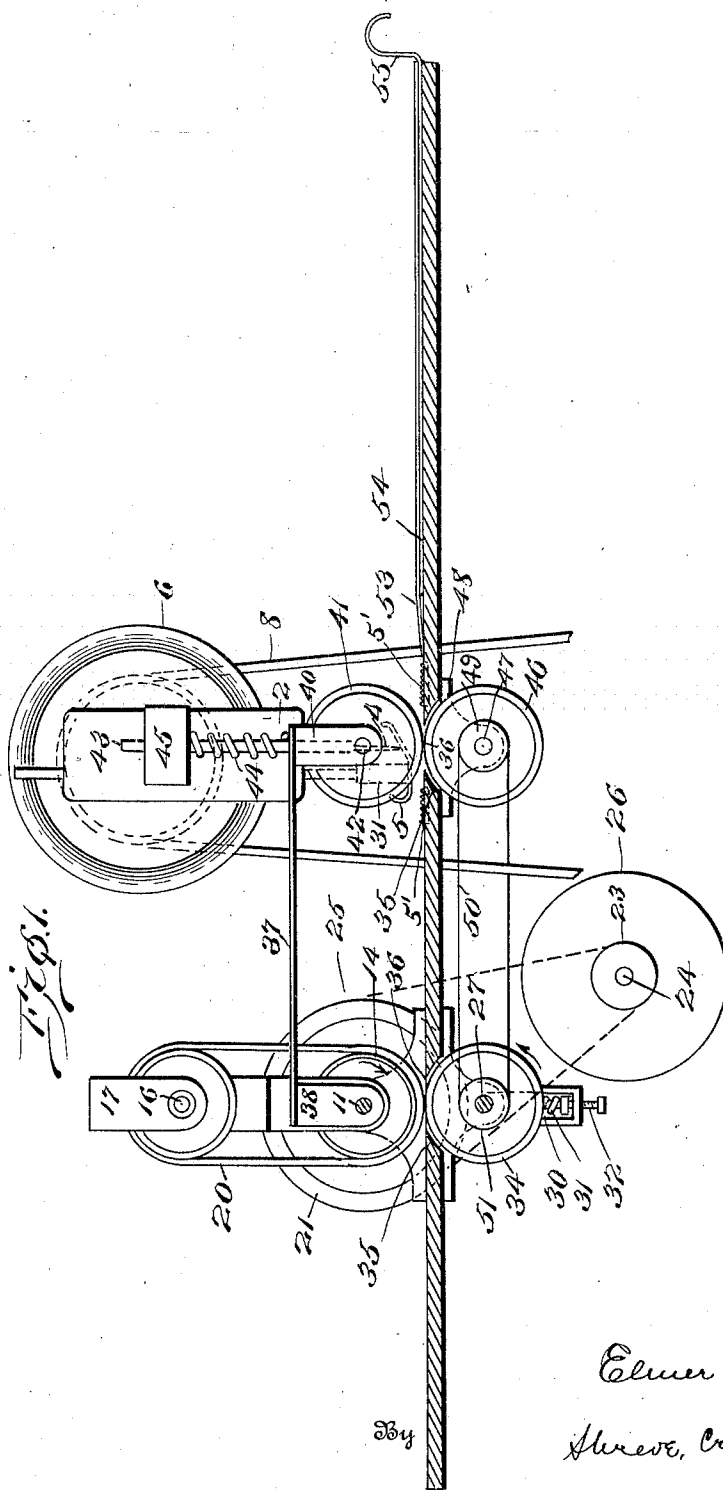
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3 Sheets-Sheet 1



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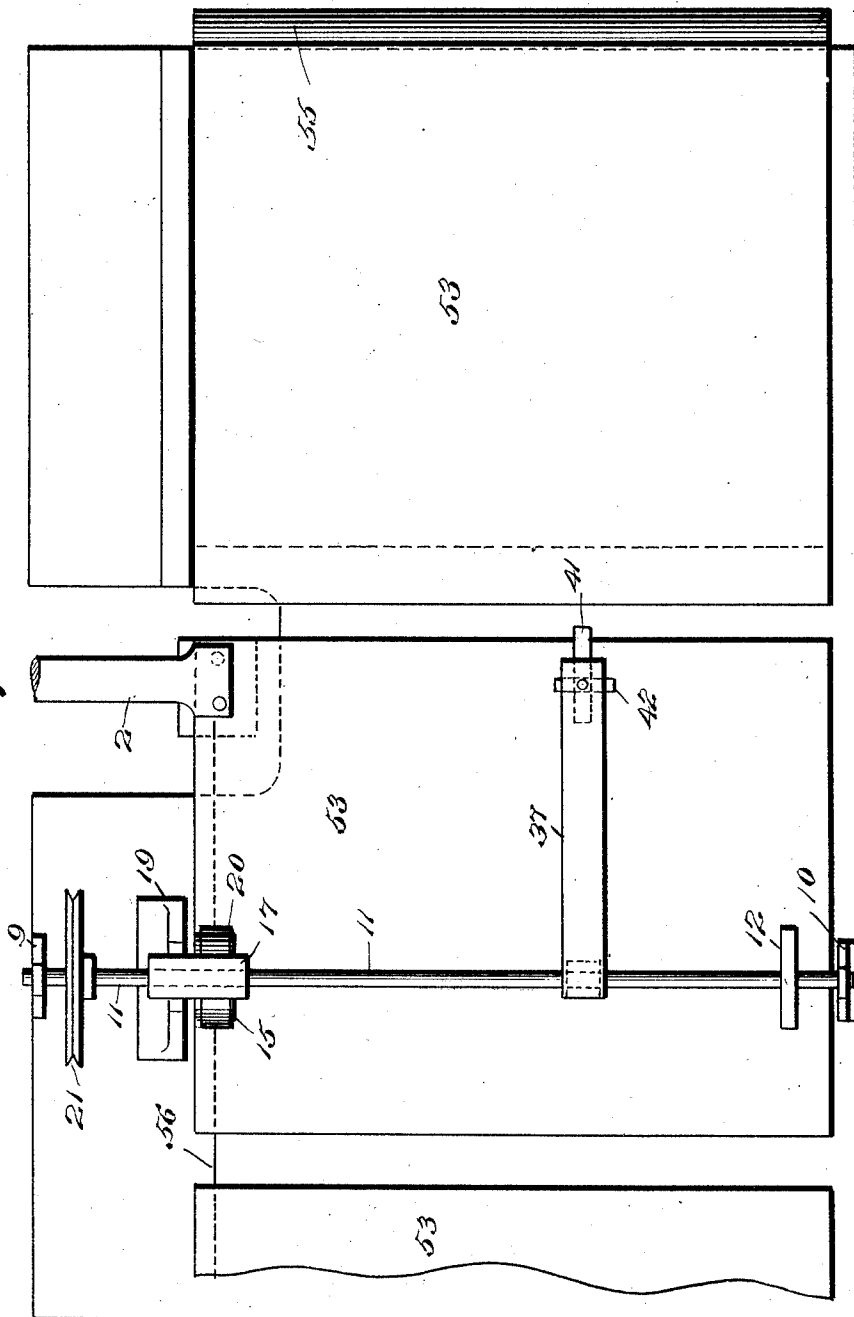
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3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

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FEEDING DEVICE.

Application filed February 11, 1926. Serial No. 87,533.

This invention broadly relates to automatic feeding devices, but it more especially comprehends the type of device employed to automatically feed fabric and the like to, say, a sewing machine in such manner that a straight line stitch may be run along parallel to the edge without the usual assistance of a guiding human hand, and is especially adaptable in the manufacture of sheets, pillow-cases, table-cloths, bags, and the like.

An important object of this invention is the provision of coacting rotatable (driving and driven) means for uniformly advancing the entire fabric, that is, the free edge as well as the edge being stitched, in unison with the feeding action of the feeding mechanism of the sewing machine.

Another important object of this invention is the provision of means of this character for uniformly advancing the fabric to effect a straight line stitch, said means being controlled by the fabric itself to conform in speed and variations exactly with the feeding action of the feeding mechanism of the sewing machine.

A further object of this invention is the provision of means adapted to rotatably engage the fabric to uniformly advance the entire piece, and additional means coacting with certain of said rotatable means to regulate the travel of the fabric in unison with the variable feeding action of the feeding mechanism of the sewing machine.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a side elevation partly in section of my improved feeding device;

Fig. 2 is an end elevation of same; and

Fig. 3 is a top plan view with parts broken away.

Due to the fact that the sewing rate, or feeding action of a sewing machine is not constant, satisfactory results cannot be obtained by the use of a wide traveling belt to carry flat work across the sewing table of a machine. The variation here spoken of is of a very erratic nature and it may

show up once or twice in a single piece of work. It is this uncontrollable variation alone that has heretofore rendered it impractical to automatically feed cloth to a machine and run a stitch along the edge except by hand.

By this invention I provide a means whereby a large piece, say, a sheet, may be flatly carried across a sewing table and a stitch be run uniformly along one edge, and whatever variation may take place in the action of the feeding mechanism will be simultaneously transmitted to the entire piece of goods. It is clear that unless the fabric is controlled with reference to the feeding mechanism that the stitch will run wild as to margin.

To accomplish this I provide what we will call, for convenience, a set of pull rollers, (this later to be shown a belted attachment). One of these is driven from some suitable source of power and the second is frictionally driven by the first, the two being in working alignment with the feeding mechanism of the sewing machine, the fabric passing between the two. It is very clear that the travel of the driven roller can not be greater than the rate of travel of the fabric passing between the two. Also, it is clear that if a tension on the fabric is to exist between the rollers and the feeding mechanism, that the driver-roller must have a face travel slightly in excess of the rate at which the fabric is fed forward by the feeding mechanism. The dissipation of this excess speed takes place in the nature of a "slip" between the driver roller and the fabric. I provide means whereby this tension may be adjusted and not throw an undesirable strain upon the feeding mechanism or needle which might result in throwing the needle out of working relation with the looper of the sewing machine. The fabric is not drawn from the feeding mechanism at a fixed rate but is urged forward. In other words, there is a tendency on the part of the fabric, after it passes the feeding mechanism, to speed up, but this is a tendency only, as such mechanism is the predominating factor.

It will be recognized that there is one member, the driven pull roller, which has a speed exactly corresponding with the sewing rate. It will also be recognized that the

rate of travel of this roller is sensitive to the slightest variation in the feeding mechanism action.

While the amount of pressure between the two pull-rollers is slight, there is sufficient torque imparted to the driven to render it a driver of other rollers.

In the illustrated embodiment characterizing this invention there is shown a table or work-support 1, a sewing machine head 2, needle bar 3, needle 4, presser-foot 5, belt or drive-wheel 6, drive shaft 7, feed plate 5' and belt 8, of conventional design.

Suitably secured on the table or work-support 1 spaced rearwardly from the presser foot 5 are vertical standards or bearings 9 and 10, respectively, in the upper ends of which is mounted shaft 11. A rubber or rubber-surfaced roller 12 is loosely mounted on shaft 11 intermediate the guide rings 13 suitably secured to said shaft spaced from bearing 10, and also mounted on shaft 11 suitably secured thereto in alignment with the presser-foot of the sewing machine is a drive-roller or pulley 14 having a polished surface. Vertically spaced above the pulley 14 is an idler pulley 15 loosely mounted on shaft 16 carried by the substantially U-shaped member 17 adjustably secured as at 18 to the standard 19 supported by and suitably secured to the table 1. A rubber or other flexible belt 20 is adapted to travel over pulleys 14 and 15 for a purpose which will hereinafter more fully appear. The said standard 19 also constitutes an additional bearing for shaft 11.

Mounted on shaft 11 intermediate standards 9 and 19 and suitably secured thereto is a drive-wheel or pulley 21, the lower portion of which extends through slot 22 in the table 1, and positioned beneath said table in vertical spaced relation is small pulley 23 secured on counter-shaft 24, and connected with pulley 21 by a belt 25. Mounted on the other end of shaft 24 rigidly secured thereto is drive pulley 26 adapted to be driven by main drive belt 8 connected to balance wheel 6 and a source of power not shown.

Positioned under the table 1 in vertical parallelism with shaft 11 is shaft 27 mounted in bearing hangers 28 and 29. The hanger 29 is formed with a vertical recess 30 in which is positioned compression spring 31 adapted to support shaft 27, the lower end seating on screw 32 threadedly adjustable through the lower extremity of said hanger for effecting vertical adjustment of said shaft 27.

Rigidly mounted on shaft 27 in vertical alignment with the rollers 12 and 14 are the rubber or rubber-surfaced rollers 33 and 34, respectively.

The under side of the table 1 is formed with recesses 35 adapted to receive the up-

per portions of rollers 33 and 34 and terminating in openings 36 to permit the upper surfaces of said rollers to extend slightly above the surface of the said table 1 and almost touching the lower surfaces of belt 20 and roller 12, respectively, for a purpose hereinafter apparent.

The frame member 37 terminates at one end in a depending yoke 38 loosely or hingedly mounted on the shaft 11 intermediate the rollers 12 and 14; maintained in proper position by spacer washers 39, and its other end terminates in a similar yoke 40 in which is adapted to rotate the rubber or rubber-surfaced nip roller 41 loosely mounted on shaft 42 carried by the free end of the said yoke 40, the said roller being in spaced lateral alignment with the feeding mechanism of the machine.

In order to insure a constant pressure of nip roller 41 irrespective of machine vibrations the member 37 is provided with an absorbing mechanism comprising an upright stand 43 on which is mounted a compression or cushion coil spring 44 and slip weight 45 seating on said spring.

Positioned beneath the roller 41 in vertical alignment therewith and adapted to rotate in recess 35 with its uppermost surface extending through opening 36 slightly above the surface of the table 1 similar to roller 33 is a rubber or rubber-surfaced roller 46 rigidly mounted on shaft 47 mounted in the bearing hangers 48 suitably secured to the under surface of table 1. Also mounted on shaft 47 adjacent roller 46 is pulley 49 connected by belt 50 with drive pulley 51 rigidly secured on the shaft 27. End play of the shaft 27 is prevented by rings 52 rigidly secured to said shaft adjacent the inner sides of hangers 28 and 29.

Initially, the fabric 53 to be sewed is placed on shift-plate 54 formed with operating handle 55, for manually (or it may be done automatically) sliding said plate between suitable guide strips (not shown) to introduce the fabric to said rollers, said fabric effecting working coaction between the upper and lower roller units, which in turn operate to uniformly advance the fabric in accordance with the feeding action of the feeding mechanism of the sewing machine. In this connection it will be noted that each fabric piece as it leaves the stitching or feeding mechanism is connected to the preceding piece by a thread-chain 56.

While the above described mechanism may be driven from any suitable source, it has been found in practice that the best result may be obtained by driving it from the sewing machine belt 8 by means of counter-shaft 24, and belt 25. It will therefore be apparent, that though shaft 11, and pulley 14 rotate continuously, the remaining rollers rotate only when the fabric is fed forwardly

and between said rollers by the feeding action of the sewing machine. The principal driving force is imparted to shafts 27 and 47 by pulley 14, belt 20, friction roller 34, and belt 50, through the medium of the fabric itself as it passes between belt 20 and roller 34, the desired pressure on the fabric being regulated by adjusting screw 32. The belt 20 is sufficiently taut over pulley 14 to ordinarily advance the cloth or fabric but slack enough to slip on the polished surface of the roller under the slightest retarding of the fabric, and being thus sensitive to the slightest variation in the feed of the fabric effects a continuous or intermittent feeding action exactly corresponding to the variations in the feeding action of the feeding mechanism of the machine, and in view of the fact that the fabrics are succeedingly connected by thread-chain 56 effecting continuous travel of material between the belt 20 and roller 34, the constancy of the other rollers is thereby maintained.

In conclusion, it will be noted that movement is imparted to roller 34 through belt 20 by means of the travel of the fabric therebetween. Pulley 14 has a polished face and the friction between it and the belt 20 is governed by the pressure exerted upon it by the roller 34 which pressure is regulated by means of a spring and screw 32. As such movement as roller 34 receives is imparted to it by belt 20 with the cloth as an intermediary moving member it is evident that roller 34 will have a face travel exactly corresponding with the rate at which the feeding mechanism delivers the fabric. Therefore, should the feeding mechanism for any reason fail to move the cloth forward at the usual rate a similar retardation will take place in roller 34 and the other rollers driven thereby, and also should the feeding mechanism for any reason allow the cloth to move forward more than its usual amount, the excess speed of belt 20 will at once compensate for it.

It is found in actual use that the high speed of a sewing machine imparts a chatter in the machine table, and to prevent this chatter acting to interrupt the constancy of the pressure between the nip rollers, I provide the absorber mechanism composed of stud 43, slip weight 45 and spring 44. It is very important that this pressure be maintained uniformly, otherwise the feeding mechanism will feed the cloth forward faster than the nip rollers carry their portion, causing the stitch to run wild as to straightness. It will also be noted in this connection that due to the excess speed of pulley 14 and normally of belt 20, the length of stitch may be considerably varied without changing the speed of the counter shaft 24.

It will be further observed, as hereinbefore stated, that the face travel of pulley 14 is slightly in excess of the rate at which the fabric is fed forward so that a slight pull thereon may be effected at all times, the excess speed being compensated for by a slip between the said pulley and belt 20 when the fabric is traveling therebetween, the speed of the belt being limited to and conforming with the speed of the fabric as it leaves the feeding mechanism of the machine, while the speed of the pulley 14 is at all times constant.

Though I have referred to the complementary fabric engaging means or rollers as being minutely spaced, it will be understood that said rollers may contact to effect continuous coaction between the positively driven and frictionally driven rollers, which may often be desirable, the thickness of the fabric being compensated for by the compressibility of the resilient contact surfaces of the rollers.

From the above it will be apparent that I have designed a novel device for uniformly feeding or advancing a fabric piece in unison with the feeding action of the feeding mechanism of a sewing machine to insure a straight line stitch, so constructed that the operating mechanism of the device is synchronized with the feeding action of the sewing machine through the instrumentality of the fabric itself, which latter in turn is acted on by the device it thus controls.

Although in practice I have found that the form of my invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment is the most efficient and practical; yet realizing the conditions concurrent with the adoption of my invention will necessarily vary, I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described my invention, and without enumerating variations and equivalents, what I desire protected by Letters Patent is as set forth in the following claims:

1. The combination with a sewing machine having a feeding mechanism, of coacting rotatable fabric engaging means adapted to operate in unison with the feeding mechanism to uniformly advance the entire fabric, such means including primary and secondary gripping units, said primary unit adapted to engage the fabric concomitantly with its engagement by the feeding mechanism and in such spaced relation thereto as to offset the action of the feeding mechanism to disrupt the rectilinear move-

ment of the fabric, said secondary unit including a gripping couple and a driven member, a slip connection between the driven member and one member of the gripping couple, and means associated with the driven member of the gripping couple to regulate the gripping tension of the slip connection, said slip connection adapted to effect through the instrumentality of the fabric, synchronization of the primary and secondary units with that of the feeding mechanism of the sewing machine.

2. The combination with a sewing machine having a feeding mechanism, of coacting rotatable fabric engaging means adapted to operate in unison with the feeding mechanism to uniformly advance the entire fabric, such means including primary and secondary gripping units said primary unit adapted to engage the fabric concomitantly with its engagement by the feeding mechanism and in such spaced relation thereto as to offset the tendency of the feeding mechanism to disrupt the rectilinear movement of the fabric, said secondary unit including a gripping couple and a driven member, a slip connection between the driven member and one member of the gripping couple, and means associated with the driven member of the gripping couple to regulate the gripping tension of the slip connection, said slip connection adapted, through the instrumentality of the fabric, to effect synchronization of the primary and secondary units with the feeding mechanism of the sewing machine, one of the rotatable rollers of the primary unit adapted to be hingedly connected to the secondary unit, means associated with said roller for maintaining its pressure constant, such means also constituting a shock absorbing mechanism.

3. The combination with a sewing machine having a feeding mechanism, of coacting fabric engaging means adapted to operate in unison with the feeding mechanism to uniformly advance the entire fabric, such

means including primary and secondary gripping units, said primary unit adapted to engage the fabric concomitantly with its engagement by the feeding mechanism and in such spaced relation thereto as to offset the tendency of the feeding mechanism to disrupt the rectilinear movement of the fabric, such secondary unit including a driving and driven roller longitudinally spaced from said feeding mechanism, a slip connection between said rollers, a gripping couple laterally spaced from said gripping rollers, said last mentioned couple adapted to contact the fabric at a point spaced from the longitudinal plane of the primary gripping unit, and cooperating with the primary unit in maintaining the rectilinear movement of the fabric constant, and means associated with the driven roller to regulate the gripping tension of the slip connection, said slip connection adapted to effect, through the instrumentality of the fabric, synchronization of the primary and secondary units with that of the feeding mechanism of the sewing machine.

4. The combination with a sewing machine having a feeding mechanism, of coacting rotatable fabric engaging means adapted to operate in unison with the feeding mechanism to uniformly advance the entire fabric, such means including primary and secondary gripping units, said primary unit adapted to engage the fabric concomitantly with its engagement by the feeding mechanism, said secondary unit including a gripping couple and a driven member, a slip connection between the driven member and one member of the gripping couple, and means associated with the driven member of the gripping couple to regulate the gripping tension of the slip connection, said slip connection adapted to effect through the instrumentality of the fabric, synchronization of the primary and secondary units with that of the feeding mechanism of the sewing machine.

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