This invention consists in improvements in or relating to reverse-plating mechanism for knitting machines. The mechanism to be described hereinafter, comprises several features, all of which are combined to produce in their mutual co-operation a greatly improved mechanism. Nevertheless, some parts thereof are applicable to machines other than that to be specifically herein described and are to be considered as sub-ordinate integers of the invention capable of individual application to such other machines, not necessarily reverse-plating knitting machines.

One aspect of the invention may be said to relate to machines having feeding means to supply two or more yarns in company to the needles, and reversing yarn-guides which are operable on the yarns at a position between said means and the knitting point, i.e., the needle by which the yarns are being taken. The term “reversing yarn-guides” is to be understood as meaning yarn-guides by which the relative positions of the yarns as they are fed to the needles may be changed from time to time in accordance with the pattern to be produced. These guides serve, in fact, each to act on its own yarn to change the position of that yarn relatively to another or others of them, and either so to guide the yarn that it will be knitted into the fabric so as to appear on the face thereof, or so to reverse its position that it will not appear on the face but will be shown to the back.

There may be any desired number of feeders of any preferred form which will serve to introduce the yarns, two or more at a time, to the needles and to the reversing guides. The yarns may be introduced individually, each by one feeder, or a single feeder may serve to introduce two or more yarns.

In a specific form of the invention, each reversing guide presents a guiding surface over which the yarn is thrown without threading it through an orifice as it passes to the needles. This phase of the invention also includes specially-formed reversing guides, a relatively fixed guide or throat situated in advance of the reversing guides, and a threading device, all of which will be described more fully hereinafter.

According to another phase of the present invention, there is combined with a reverse-plating device, such as has been described above, a movable yarn-presser or -deflector which serves to hold a newly-introduced yarn or yarns in position on the yarn-reversing guides, while a replaced yarn or yarns is or are withdrawn. A “replaced” yarn is one that has been used in the knitting operation and is withdrawn in favour of a newly-introduced yarn to alter the pattern effect.

In other modifications of the invention, another or other yarn-engaging devices or guides may be so situated between reversing means, such as the reversing guides, and the position at which the yarns are being taken by the needles that one at least of the yarns will press against the surface of the guide as the yarns are being taken into the hooks of the needles.

Moreover, in order to improve the reversal on relatively large cylinder machines, there may be provided a needle-deflector which presses serially on the backs of the needles so that the hook of that one that is about to take the yarn is moved outwardly beyond the circle on which the needle-hooks normally are situated.

The foregoing and other features of the invention, or of the subordinate integer portions thereof, will be more clearly understood from the following description of a preferred construction illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of one form of the yarn-feeding, -reversing and -guiding members;

Figure 2 is a view of the parts shown in Figure 1, looking from the left-hand side thereof;

Figure 3 is a view, in elevation, of the reversing guides with the cover removed;

Figure 4 is a plan of the parts illustrated in Figure 3;

Figure 5 is a schematic view showing one feeder and one out of use and illustrating the relative positions of the several guides and the threads;

Figure 6 is an under plan view of a thread-trapper and -severing device;

Figure 7 is a side elevation of the trigger shown in Figure 6, viewed from above in that Figure;

Figure 8 is a section on the line 8—8 of Figure 6;

Figure 9 is a composite view showing a plan looking down on the latch-ring to illustrate the relative positions of the several parts illustrated in Figures 1–8;

Figure 10 illustrates diagrammatically the relative positions of sinker- and stitch-cams controlling the sinkers for the purpose of ensuring accurate yarn-reversal;

Figures 11, 12, 13 and 13a show successive steps in yarn-reversal with the aid of sinker-guiding for at least one of the yarns; these figures illus-
trating respectively substantially the relations between the sinkers and needles at the positions indicated by the lines XI, XII, XIII and XIV on Fig. 10.

Figure 14 is a side elevation, with the cover-plate removed, of a modified form of reversing-guide mechanism for use with three yarns that are simultaneously fed to the needles;

Figures 15 and 16 show alternative positions into which the three yarn-guides can be adjusted;

Figure 17 shows an elevation of the mechanism, similar to Figure 14, but with the cover-plate and adjustable stop-bracket in position;

Figure 18 is an end view, looking from the right of Figure 17, and Figure 19 is a view, similar to Figure 14, of a reversing-guide mechanism capable of operating on four yarns which are to be fed simultaneously to the needles.

Like reference numerals indicate like parts in all the figures of the drawings.

As shown in Figures 1 to 4, a machine intended for reverse-plating two yarns may have a plurality of interchangeable yarn-feeders 10, each of which, as shown, may supply two yarns simultaneously to the needles. The relative positions of the feeders can be interchanged at will for bringing any of the yarns into or out of the feeding position. As shown in Figure 1, all the yarn-feeders are shown in the non-feeding position, but in Figure 5 one feeder, designated by the reference 100, is shown in the feeding position. Associated with these yarn-feeders, which, for reverse-plating, will be moved into the feeding position one at a time (as they each supply two yarns) are reversing guides 11 and 12. The latter are constituted by endwise movable rods guided one above the other and oppositely inclined relatively to a plane that is normal to the lengths of the needles. The lower one 12 is upwardly inclined and the upper one 11 is downwardly inclined so that their extremities, adjacent the needles, are close together. They are interconnected by a swinging and centrally-pivoted link 13 whereby, when one of the guides is moved towards the needles, the other is retracted therefrom. As shown in the drawings, the guide 12 has been moved relatively to the guide 11 so that the yarn passing over the guide 12 will be closer to the line of the needles than will that operated on by guide 11. When their positions are reversed, the relative positions of the yarns to the needles will also be reversed.

Both yarn-guides are shown as having guide-grooves 14 and 15 respectively, which engage the yarns so that the latter may be taken by the guides 11 and 12 respectively and without being threaded through eyes. By the inclination of the reversing guides, not only are the yarns changed as regards their relative proximities to the needles, the thickness of the yarns as they pass over the guides, considered lengthwise of the needles may also be reversed on each change of the relative positions of the guides.

Alongside the reversing guides 11 and 12 and situated between them and the feeders is a fixed guide or throat containing channel 16 facing the needles and formed in a relatively stationary part adjacent the guides 11 and 12. This channel 16 serves to assist in maintaining the yarns in contact at all times with their respective interchangeable guides 11 and 12.

The mechanism for controlling the actuation of the yarn-feeders 10 is contained in a casing 17 and is similar, for instance, to that described in the specification of prior British Letters Patent No. 213,609. Briefly, such mechanism comprises, for each feeder 10, a slider of which the tail end 18 extends into the path of an abutment. The ends 18 are of different heights and the abutment (which is not illustrated) is adjustable to any one of the heights of the tails under the control of a pattern-chain or its equivalent. Between the parts 18 and the abutment, there will be relative rotation about the axis of the machine.

Each of the yarn-feeders is normally held in the non-feeding position shown by means of a spring 19, one end of which is anchored to a fixed part of the mechanism and the other end of which is anchored to an upwardly springing finger 20 formed by slotting the edge of the yarn-guide. Each of the latter is in the form of an open frame having yarn-delivery guide-eyes 21 at the bottom end and other guide-eyes 22 at the top end. They are each pivoted to swing at 23 approximately midway in its length, between the side members of the frame 17.

When one of the tail members 18 is pressed inwardly by engagement with the adjustable abutment above mentioned, a slider, of which the tail 18 constitutes a part, will be moved to the left as indicated by the lines in dotted lines at 24, will press against the yarn-feeder and swing it about its pivot 23 so as to 105 move the guiding eyes 22 of the feeder thus selected to the left in Figure 1, and the delivery eyes 21 to the right. The selection of any one feeder (or more than one feeder simultaneously) serves, by the mechanism described in the earlier 110 British Specification No. 213,609, to release the yarn-feeders that have hitherto been retained in the feeding position. At the same time, the newly-selected feeder or feeders will be held by means of a catch, the outer extremity of which is shown at 300 in the feeding position.

Reversal of the guides 11 and 12 is effected by means of an endwise-movable plunger 25 that is operated by bits 26 which, for example, may be interchangeably in pattern-rings 27 also as described in the prior specification. When the plunger is in the raised position illustrated in Figures 1 and 2, an abutment 28 carried by it is raised above the tail end of the guide 11 to allow springs 29, operative on each guide 11 and 12, to move the 120 guides automatically to the positions shown in Figures 1 and 3. When the plunger falls from a bit such as 26, the abutment 28 presses on the end of the guide 11 and moves it endwise to the left in Figures 1 and 3, and this movement, by 130 means of the link 13, retracts the guide 12 in the opposite direction. It will thus be appreciated that the endwise movements of the plunger 25 effect reversal in the yarn-feeding positions of the reversing guides 11 and 12.

As a means for producing bands of plain knitting, the heights of the yarns as they extend into a slot in a crank or arm 31 rotatably mounted on the upper end of the plunger 25 or of an extension rod 350 coupled thereto, as shown in Fig. 1. By a taping cut 31, the feed of the rod 250 cannot move relatively thereto in the direction of the length of the rod. As this slider is moved, the pin 39 rotates the arm 31 so that a cam surface 32, carried on that extension, co-operates with another cam surface 33 on a fixed part of the attachment first to raise the rod 325 and thereafter the base of the cam 22 is brought into contact with the pin 39 and the entire arm 31 is lifted. In a similar manner, the pin 39 is rotated on the arm 31 so that the cam surface 34 engages the pin 39 and lowers the arm 31. The cam surfaces 32 and 34 are formed on the upper end of the plunger 25 which may be rotated in the relative direction of the rod 350.
brought by angular movement on to the horizontal surface bordering the cam 33. The latter will be held so raised during the time that the particular slider is retained in a position to hold its associated feeder in the feeding position. The operation of the plunger 25 is therefore nullified during that period of time as the rod 250 is held clear of any movement imparted to the plunger 25. If the rods 25 and 250 are in place the latter will be held against selective movement which would otherwise have been imparted to it by the bits 26.

The trapping device which is illustrated in detail in Figure 5, 6 and 7 comprises vice-like jaws 54 and 56 of which the jaw 54 is fixed on the latchring. Guide-pins 36, secured to the fixed jaw, extend through holes in the movable jaw to guide the movements of the latter and also to guide one or more intermediate plates 37. A spring 38 on one of the guide-rods 38 (or on each of them if preferred), tends always to maintain the jaws closed together. The movable jaw is actuated by means of an endwise movable plunger 39 which carries a finger 40, the end of which, when the plunger 25 is moved to the left in Figures 5, 6 and 7, will engage with the adjacent face of the movable jaw and open it against the compression of the spring 38.

A pin 41, extending laterally from the plunger 39, has pivotally mounted on it a yarn-finger 42 which will move in company with the movable jaw 34. The yarn-finger has a downw ardly extended lip 43 which, as it is moved forwardly, will engage the tip of the yarn to be trapped. The finger 42 also has in it a guide-slot 44 which engages a relatively fixed pin 45 so that after the finger 42 has been moved forwardly beneath the yarn to be trapped, its lip 43 will then be raised upwardly to lift the yarns in between the jaw-plates and to prevent those threads which are still to be retained in the trapper, and newly-introduced yarns that have just been severed, from falling out from between the plates before the latter are closed. The intermediate plate or plates 37 are for the purpose of the better engagement of the jaws and for the reason that, by chance between one or the other of the intermediate plates or between them and the jaw-plates.

Associated with the trapper is also a cutter comprising a fixed knife-blade 46 and a movable blade 47 swinging about the axis of the pin 48. Endwise movement imparted to another slider 49, parallel with the slider 39, of which the forward end 50 engages and moves the swinging blade 47, serves to operate the cutter.

The sliders 39 and 49 are operated in sequence by means of an adjustable abutment indicated at 360, between which and the slides there is relative rotation about the axis of the needle-cylinder. The abutment 360 is adjusted from the inactive position illustrated into a position in which it engages the slider 39 at a number of times. The sequence of operations will be as follows:

When it is desired to replace, for instance, two threads by which reverse-plating has been effected by two others for a change of pattern, the thread rolls of the sinker, which is so situated between the reversing guides and the position of the needles that, as has been before stated, at least one of the yarns will press against the surface of that guide. When a sinker is employed for this purpose, it is preferably in the form illustrated fragmentarily at 87 in Figures 11 to 13. The guide is constituted...
by a forwardly-directed and inclined edge 58 of the sinker. By the term "forwardly directed and inclined" is meant an edge which is directed towards the needle and is inclined with respect to the lengths of the latter. The sinkers are operated or moved in timed relation to the loop-forming movements of the needles as will be understood from the relative positions of the stitch-cam 59 and sinker-cam 60 illustrated in Figure 10 in which a section of the cam-tracks is indicated at the left of that figure with a portion of a sinker diagrammatically shown in place. While the needle is being raised to a clearing height, the sinkers are in their forward or web-holding position; and they are retained in this position during the time that the needles are being drawn downwardly by the edge 59 of the stitch-cam 159. Immediately preceding the lowest point of the stitch-cam, a rise 61 in the sinker-cam 60 serves to move a sinker, (by engaging the butt 157 thereof) which is immediately in rear of the needle at which reversal is to take place, so that the sinker is drawn rapidly backwards away from the needle. The maximum outward movement of the sinker is completed just as the needle is reaching its lowest position as indicated in Figs. 10 and 10a. The sinker-cam operating on a shoulder 158 of the sinker serves, after this sudden retraction, to return the sinker to its normal position.

Figure 11 illustrates the position of the needle in relation to the sinker just prior to the latter reaching the rise 61. Figure 12 shows the relative movements that have taken place in the needle and the sinker shortly after the commencement of the outward movement of the latter, and it will be seen that during the entire outward movement of the sinker, that one of the yarns which is lowermost of the two that are being fed simultaneously to the needles is pressed against the edge 56. It will be understood that during this movement, the yarns are under tension, and the thread which engages the edge 56 will press and rub against that edge as the sinker retreats. This gives a relative but controlled movement of the two threads which positively draws the lowermost thread in front of the uppermost one in the needle-hole (Figs. 12, 13 and 13a).

It is found that unless there is yarn-control at the needles, as by sinkers for example, the fibres of the two yarns, particularly in the case of woolen yarns, are apt to become entangled and to interfere with accurate reversal and separation. This inaccuracy is now overcome by means of this guiding by sinkers or equivalent. It will be appreciated that the withdrawal of the sinkers, in the region immediately in advance of the needle that is taking the yarn, is delayed more than is usual for the normal operation of the sinkers.

It is not essential to this phase of the invention to use sinkers as guides for the above purpose, and a feature of the invention may therefore be said to comprise a system of knitting by reverse plating, which system includes the interchange of the relative feeding positions of the yarns by means of interchangeable yarn-feeders or reversing guides and the employment of sinkers or other elements which are disposed between the interchangeable feeders or reversing guides and the needle taking the yarns and which affords one or more guiding edges against which at least one of the yarns is pressed as the yarns are drawn by the hook of the needle. It will be understood that the yarn-guides 11 and 12 should be situated as closely as possible to the needle.

It is found that on circular knitting machines of relatively small diameter, little difficulty is experienced in feeding two yarns to the needles so that they are readily taken by the hooks. On large diameter machines, however, as for example in 200 inch machines, reverse-plating on any particular needle is considerably more difficult owing to the interference of neighboring needles with the stretch of yarn coming from the feeder. There is only a very small angle between the line of the yarn and a tangent to the needle-circle at the point at which the yarn is being taken. On smaller machines, this angle is much greater and consequently yarns can be fed directly into the hooks of individual needles.

According to this last phase of the present invention, the difficulty with relatively large machines is overcome by the provision of a needle-deflector which presses seriatim on the backs of the needles. In the present example, the needle-deflector comprises a finger 62 which can be adjusted to press on the backs of the needles and which remains in fixed relationship with the yarn-feeding plates or yarn guides 11 and 12 as the needle is carried by the same bracket on which the reversing guides and feeders are supported. The amount of deflection to be effected by the finger is adjusted by setting the latter further towards or away from the axis of the needle-cylinder until the best adjustment is obtained.

It is obvious that many modifications in the details of construction may be made without departing from the nature or spirit of the invention or any one of its subordinate integer parts, and the invention is not to be limited by the details described. For instance, the means for retaining the plunger or bob-pin 25 inoperative at will is obviously subject to modification. The yarn-feeders may be of other forms than that described herein, and their interchangeability may be controlled in any other desired manner.

As regards relatively minor details of construction of the machine illustrated, it will be seen that an additional yarn-guide in the form of a wire loop 63 is preferably provided. The function of this guide is two-fold and is best understood from an examination of Figure 5. When a feeder is taken out of action, the yarns fed by it are engaged by the member 63, and the stretch of the yarns between the feeder and the knitting point is so deflected by 63 as to enter the tractor 54. Additionally, when a feeder is moved into the feeding position, the backward movement of the feeder-eye 21 causes the yarn to slide back along the horizontal portion of 63 and to be thus guided to the throat 16.

It will be further seen that the movements of the guides 11 and 12 are limited by means of a pin 111 passing through a slot 112 in the cover-plate 113 which encloses the guides, and this pin can travel between adjustable stops 114 and 115 carried in the arms of a U-shaped bracket 116 attached to a fixed part of the device.
ample, in prior British Patents Nos. 308,240 or 293,059. More particularly such jacquard means preferably comprises a perforated Jacquard band or card carried by a grooved platen into which grooves projections from selector-members pass when openings are presented to them by the Jacquard card or band. The platen rollers, as they are rotated step-by-step, serve to move the selector-members so that projections pass equivalent to the studs 26 carried by or coupled to the selector-members, are moved into and out from the path of the plunger in accordance with the pattern to be produced.

The modification of the reversing yarn-guides, illustrated in Figures 14 to 18, shows a construction in which the two reversing guides 11 and 12 are replaced by three reversing guides 70, 71 and 72. The guide 70 is pivotally mounted at 73 in a supporting plate 74, and the guides 71 and 72 are both pivotally mounted therein at 75. The guides 70 and 71 are interconneced by means of a projection 76 formed out of the metal sheet from which the guide 70 is itself cut and a slot 77 into which the projection extends. The guide 70 is rocked on its pivot by means of a rod 87 having a pin 79 entering a slot 80 in the guide 70. The two extreme positions of the rod 78 are shown respectively in Figures 14 and 15. In the former, the yarn-guiding extremity 170 of the guide 70 is shown in advance of the similar extremity 171 of the guide 71; but in Figure 15, these positions are reversed.

The third guide 72 is a yarn-guiding extremity 172, is pivotally connected by means of a pin-and-slot connection, indicated generally at 81 (Figure 14), with another endwise-moving rod 82 which is parallel with the rod 78. By means of the rod 82 the guide 72 can be moved from its extreme rearward position, shown in Figure 14, to its extreme forward position shown in Figure 16.

The rods 78 and 82 are controlled by springs 83 and 84 respectively, tending always to move the rods to their extreme positions towards the right of projection 76 of Figure 14. Laterally-projecting pins 85 and 86 pass respectively through slots 87 and 88 in an adjustable stop-bracket 89. Adjustable stops or screws 90 serve to limit the movements of the rods 78 and 82 by engagement of the pins 85 and 86 respectively with the screws 90.

In order to adjust the positions of the feeders, the rods 78 and 82 are controlled by abutments 28 and 128 actuated respectively by bob-pins 25 and 125. The parts 28 and 128 are similar, respectively, in their action to the part 29 described in connection with Figure 1 and the companion drawings, and the bob-pins 25 and 125 are similar to the bob-pin 25 of the previous example and may be controlled in the same way from projections 26 either constituted by bits in a bit-ring or by projections adjustable into positions beneath the bob-pins by means of Jacquard controlling mechanism.

When the parts are in the position shown in Figure 14, it will be appreciated that the yarn led over the surface 170 of the guide 70 will be laid into the needles in front of the yarns guided by the guides 71 and 72 and will be knitted into the fabric so as to appear on the face thereof.

When the guides are in the position shown in Figure 15, the yarn guided by the guide 71 will be brought to the front of the fabric, whereas in the position of the parts illustrated in Figure 16, the two guides 70 and 71 have been brought to a mid-position, while the guide 72 is moved to its most forward position so that its yarn will be brought to the face of the fabric. The mid-position of the guides 70 and 71 can be brought about by adjusting the abutment 38 to such a height that it does not press the rod 78 fully home.

In Figure 19, a further modification is shown in which instead of a single separately-controlled guide, such as 72, two similar and separately-controlled guides 72 and 91 are provided, and these are controlled respectively by rods 82 and 92. The control of the guide 91 may be brought about by an adjustable abutment 228, similar in its action to the abutments 28 or 128.

It will be seen in this construction that there are four reversing yarn-guides so that it is possible to control the position of four yarns simultaneously fed to the needles.

With either of the constructions illustrated in Figures 14 to 18, or in Figure 19, respectively, it is possible, if desired, to bring two yarns simultaneously to the forward position so that while they will be jointly plated on the other yarn or yarns, it will be a matter of chance, from stitch to stitch, which one of the yarns of the forward pair will show on the front of the fabric, and a further knitting effect can be produced in this manner.

The machine hereinbefore described is one in which the needle-cylinder is intended to remain stationary and the yarn-feeders and their associated parts to revolve around the cylinder axis. It is obvious, however, that with modifications we will understand the cylinder may be made to revolve and the yarn-feed and associated parts remain stationary. Moreover, there may be any desired number of reversing yarn-feeders according to the size of the machine.

We claim:

1. In a knitting machine having a bank of needles, the combination of two or more yarn-feeders movable to and from positions in which they deliver their yarns substantially in position to be taken into the needles, reversing yarn-guides operable to the position of the yarns between the feeds and the knitting point, said reversing yarn-guides being movable relative to each other to change the positions of the yarns, one with respect to another, and means to move said bank of needles on the one hand and, as a unit, said group of yarn-feeders and group of reversing yarn-guides on the other hand, one with respect to the other, to, in effect, carry said group of yarn-feeders and group of reversing yarn-guides along said needle bank in a direction to supply yarn to the needles successively.

2. In a knitting machine having a bank of needles, the combination of more than two yarn-feeders movable to and from positions in which they deliver their yarns substantially in position to be taken into the needles, means for moving a part of all said yarn-feeders at a time, as will, to said positions, reversing yarn-guides operable on the yarns delivered by said yarn-feeders at a position between said yarn-feeders and the knitting point, said reversing yarn-guides being movable relative to each other to change the positions of their yarns, one with respect to another, and means to move said bank of needles on the one hand and, as a unit, said group of yarn-feeders and group of reversing yarn-guides along said needle bank in a direction to supply yarn to the needles successively.
3. In a knitting machine having a bank of needles, a plurality of yarn feeders, a plurality of reversing yarn-guides having yarn-engaging portions located between the respective feeders and the knitting point and being movable relatively to each other to change the positions of their yarns, one with respect to another, said yarn feeders being movable to present their yarns to said reversing yarn guides and to remove their yarns therefrom, and means to move said bank of needles on the one hand and, as a unit, said group of yarn feeders and group of reversing yarn-guides on the other hand, and the other, to, in effect, carry said group of yarn feeders and group of reversing yarn-guides along said needle bank in a direction to lay yarn at the needles successively.

4. In a knitting machine having a bank of needles, more than two yarn-feeders movable to and from positions in which they present their yarns to the reversing yarn-guides hereinafter mentioned and from whence the yarns pass to the knitting point, means for moving a part of all said yarn feeders at a time, at will, to said positions, reversing yarn-guides operable on the yarns delivered by said yarn feeders at a position between the respective yarn feeders and the knitting point, said reversing yarn-guides being movable relative to each other to change the positions of their yarns, one with respect to another, and means to move said bank of needles on the one hand and, as a unit, said group of yarn feeders and group of reversing yarn-guides on the other, one with respect to the other, to, in effect, carry said group of yarn feeders and group of reversing yarn-guides along said needle bank in a direction to lay yarn at the needles successively.

5. Reverse-plating mechanism according to claim 1 wherein at least one of the reversing guides moves in a path that is inclined with respect to a plane that is normal to the lengths of the needles.

6. Reverse-plating mechanism according to claim 1, wherein each one of the several reversing guides moves in a path that is inclined with respect to a plane that is normal to the lengths of the needles.

7. Reverse-plating mechanism according to claim 1, combined with fixed yarn guiding means interposed between the yarn-supply means and the reversing guides for the purpose described.

8. Reverse-plating mechanism according to claim 1, combined with means providing a fixed yarn-guide, interposed between the yarn-supply means and the reversing guides, which fixed guide presents a guiding surface or surfaces over which the yarns are drawn without threading them through orifices.

9. In a knitting machine, the combination of a bank of needles, yarn guide means to feed a plurality of yarns to said needles simultaneously, means to move said needle bank and yarn guide means relatively, one with respect to the other, to, in effect, carry said yarn guide means along the needle bank in a direction to supply yarn to the needles successively, a yarn-engaging means to engage at least one of said yarns between a needle drawing a new loop of said yarns and a needle, situated between the first mentioned needle and said yarn guide means, whereas reversal of the yarns is to occur, and means to move said yarn guide means to change the positions of the yarns, one which respect to another, to reverse the plating at the second mentioned or said two needles while said yarn-engaging means is in engagement with at least said one of said yarns being taken up by the needle on the other side of said yarn-engaging means opposite the side of said yarn-engaging means which faces said yarn guide means.

10. A system of knitting by reverse-plating, which system comprises the interchanging of the relative feeding positions of the yarns by means of reversing guides or feeders, and the employment of a sinker, the withdrawal of which in the region in advance of the needle by which the yarn is being taken is delayed more than is usual in order to afford one or more guiding edges against which at least one of the yarns is pressed as it is being drawn by the hook of a needle in rear of said sinkers to form a loop or stitch.

11. The combination with the subject-matter of claim 1, of a movable yarn-presser or deflector (for example 51) and means to move it to a position in which it will hold a newly-introduced yarn or yarns on the reversing guides while a replaced yarn or yarns is or are withdrawn.

12. In or for a knitting machine, the combination with yarn-reversing guides against which the yarns are pressed as they pass to the needles of a movable yarn-presser or deflector, and means to move it to hold one or more newly-introduced yarns in position against which a replaced yarn or yarns is or are withdrawn.

13. The subject-matter of claim 15 characterized in that the presser is in the form of an open frame having one side, for engaging a newly-introduced yarn or yarns.

14. In or for a knitting machine, a yarn-feeder in the form of an open frame having a yarn-delivery guide-eye or eyes at the bottom end and another guide-eye or eyes at the top end, and so formed that the said open frame can be pivotally mounted by one of its side members.

15. In a knitting machine, the combination of a bank of needles and the reversing yarn-guides over which the yarns pass intermediate said means and the knitting point, said bank of needles on the one hand and said means and said reversing yarn-guides on the other hand being movable one along the other so that said means and the reversing yarn-guides may feed yarn to the needles successively, and said reversing yarn-guides being movable one with respect to the other to change the positions of the yarns with respect to each other.

16. In a knitting machine having needles, the combination of means for delivering a plurality of yarns substantially in position to be taken by said bank of needles, and a plurality of reversing yarn-guides over which the yarns pass intermediate said means and the knitting point, said bank of needles on the one hand and said means and said reversing yarn-guides on the other hand being movable one along the other so that said means and the reversing yarn-guides may feed yarn to the needles successively, and said reversing yarn-guides being movable one with respect to the other to change the positions of the yarns with respect to each other.
the needles, a plurality of reversing yarn-guides over which the yarns pass from said means to the knitting point, said reversing yarn-guides as a group being fixed with respect to said means but being movable with respect to each other to change the positions of the yarns with reference to each other and a needle-deflector which presses serially on the backs of the needles so that the hook of that one that is about to take the yarn is moved outwardly beyond the circle on which the needle-hooks are normally situated.

20. In or for a knitting machine, the combination with the subject matter of claim 1, of an adjustable member controlled by pattern-control means for interchanging the relative yarn-feeding positions of the said feeders, and means co-operating with the bob-pin or like member and automatically actuated by pattern-control means for holding the said pin or member operative for any predetermined length of knitting to produce plain knitting while it is so held.

21. Reverse-plating mechanism according to guides are each pivoted about a fixed axis so that as they are swung, the general paths of their movements are in directions that are inclined to a plane that is normal to the lengths of the needles.

22. Reverse-plating mechanism according to claim 1, wherein the reversing yarn-guides are operable by means of plungers whereof one of the plungers serves to actuate two yarn-guides simultaneously to move them in opposite directions, and each other such plunger serves to actuate a single yarn-guide.

23. The subject matter of claim 1 characterized by the fact that each of said reversing yarn-guides presents a guiding surface over which the yarn from a yarn feeder is drawn without threading it through an orifice as it passes to the needles.

HENRY HAROLD HOLMES.
ROBERT HAROLD ROBINSON.
CERTIFICATE OF CORRECTION.


HENRY HAROLD HOLMES, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 87, for "yarn-fingers" read yarn-finger; page 5, line 128, claim 1, for "feeds" read feeders; page 6, line 78, claim 10, for "which" read with; and for the blank line 76, insert the words claim 1, characterized in that the reversing yarn; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of May, A. D. 1934.

Bryan M. Battey

(Seal) Acting Commissioner of Patents,