July 1, 1941. S. R. SHELMIRE 2,247,967

PATTERN REVERSING MECHANISM FOR ELECTROMECHANICAL KNITTING MACHINES

Filed March 16, 1940 4 Sheets-Sheet 1

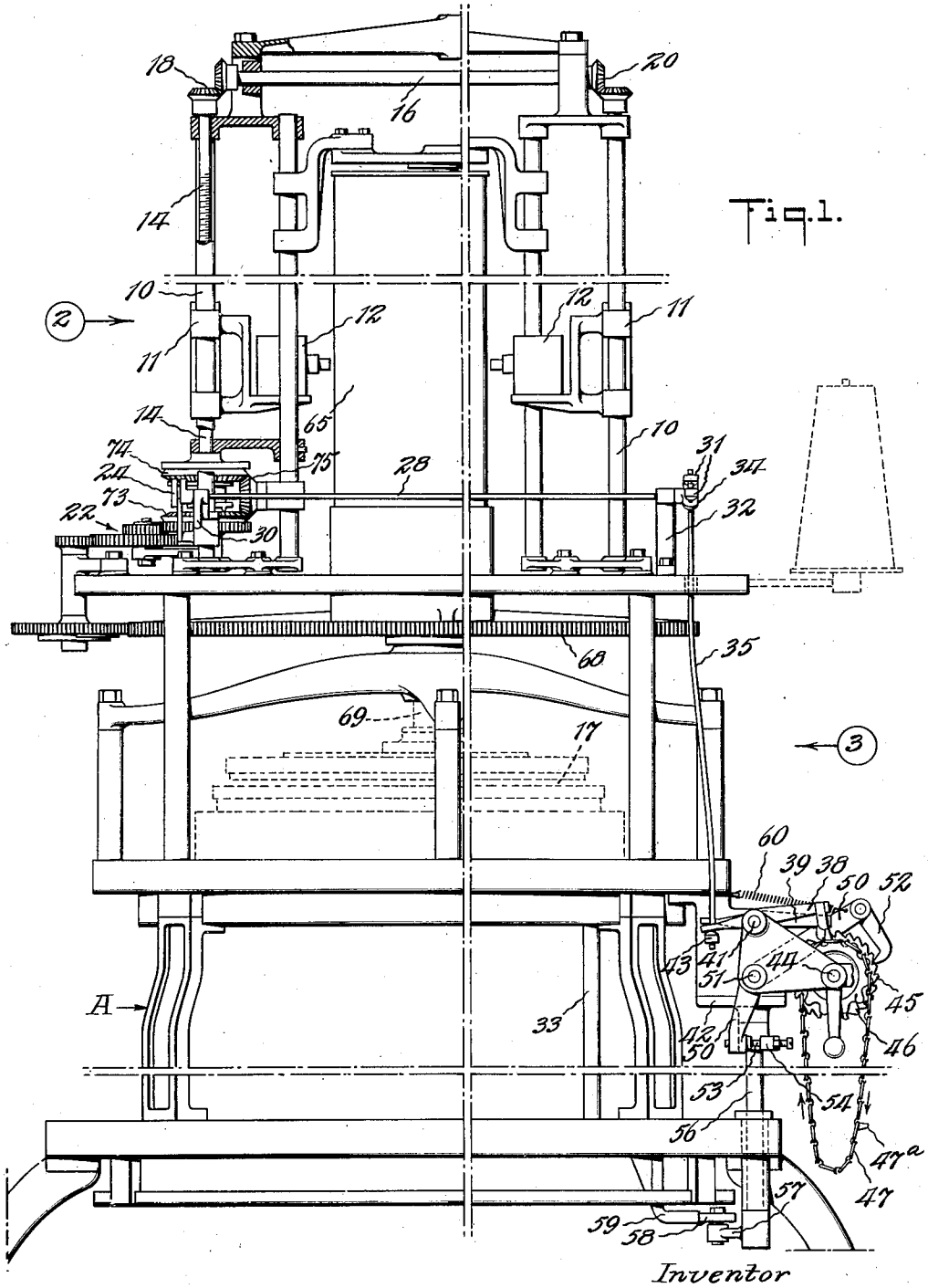


Fig. 1.

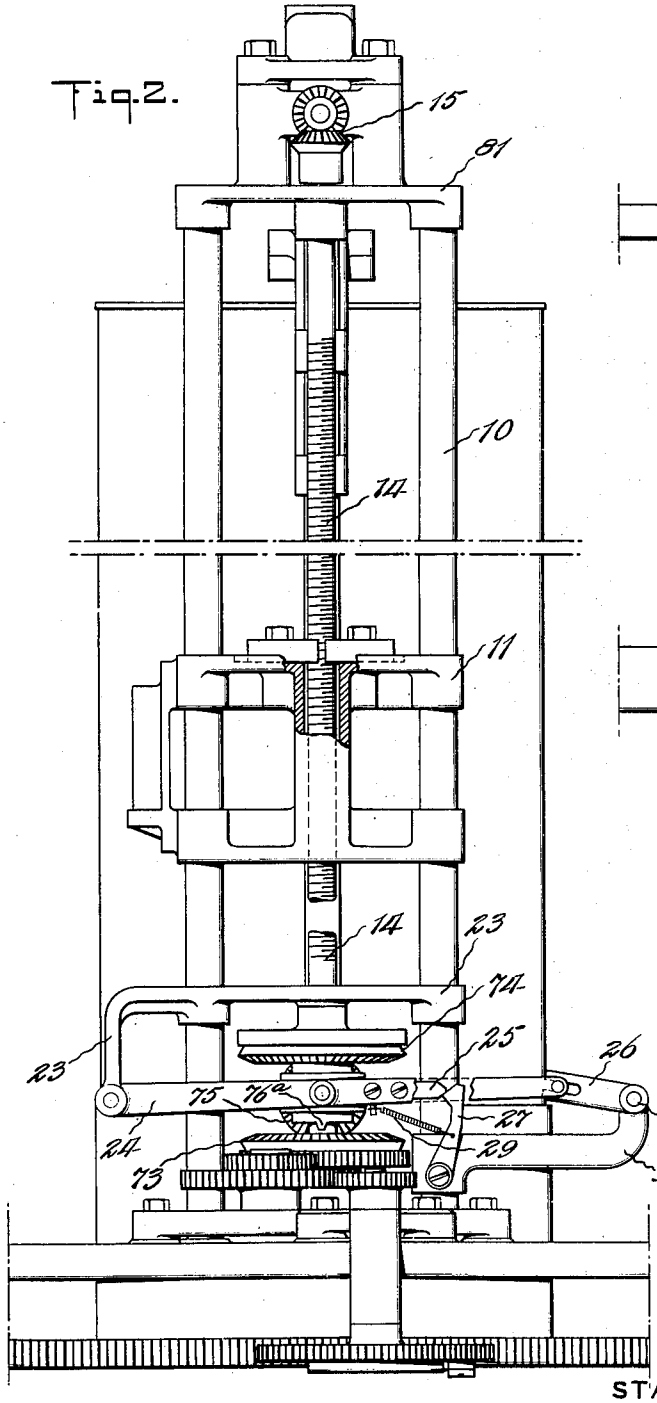
Inventor
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Filed March 16, 1940 4 Sheets-Sheet 2

Fig. 2.



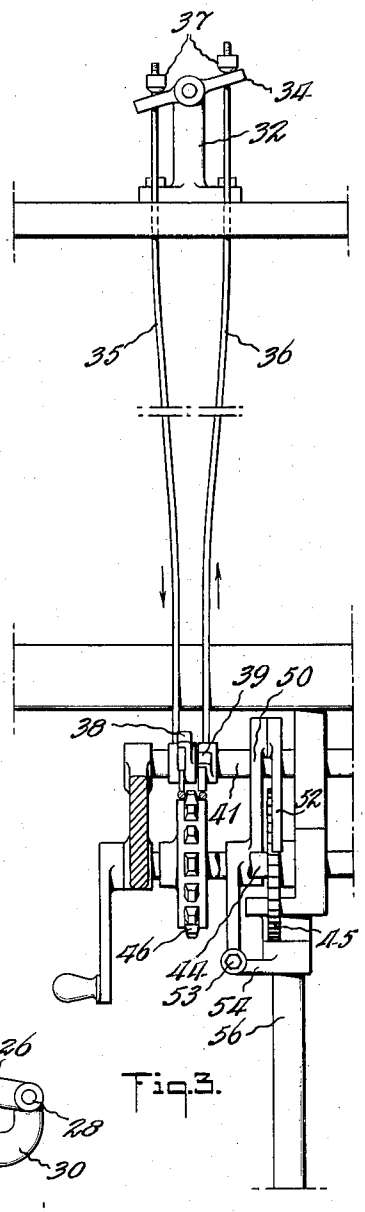


Fig. 3.

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Filed March 16, 1940 4 Sheets-Sheet 3

Fig. 4.

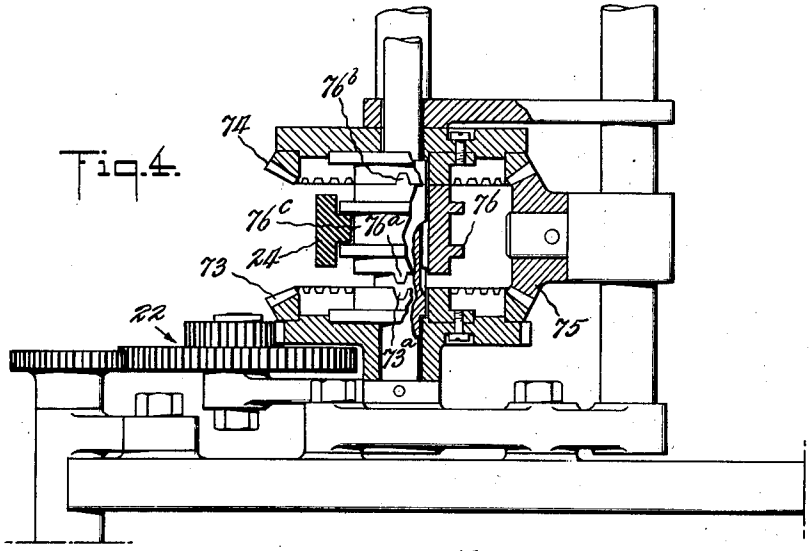


Fig. 5.

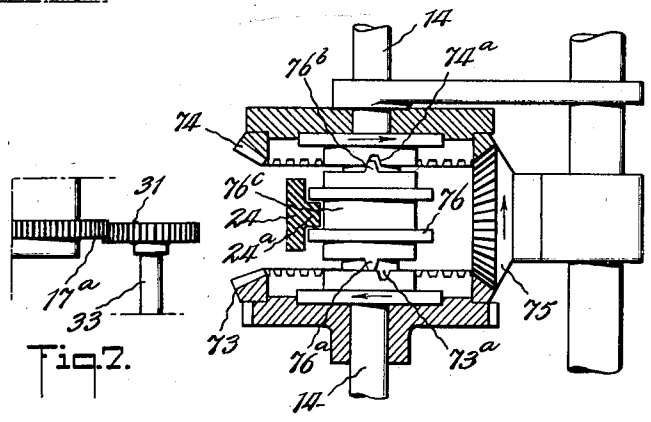


Fig. 7.

Fig. 6.

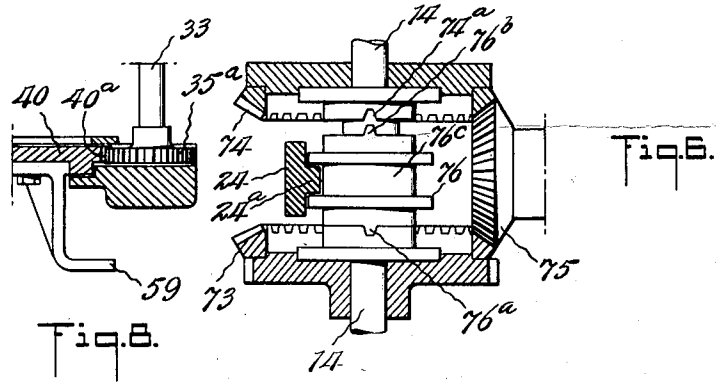


Fig. 8.

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Filed March 16, 1940 4 Sheets-Sheet 4

Fig. 9.

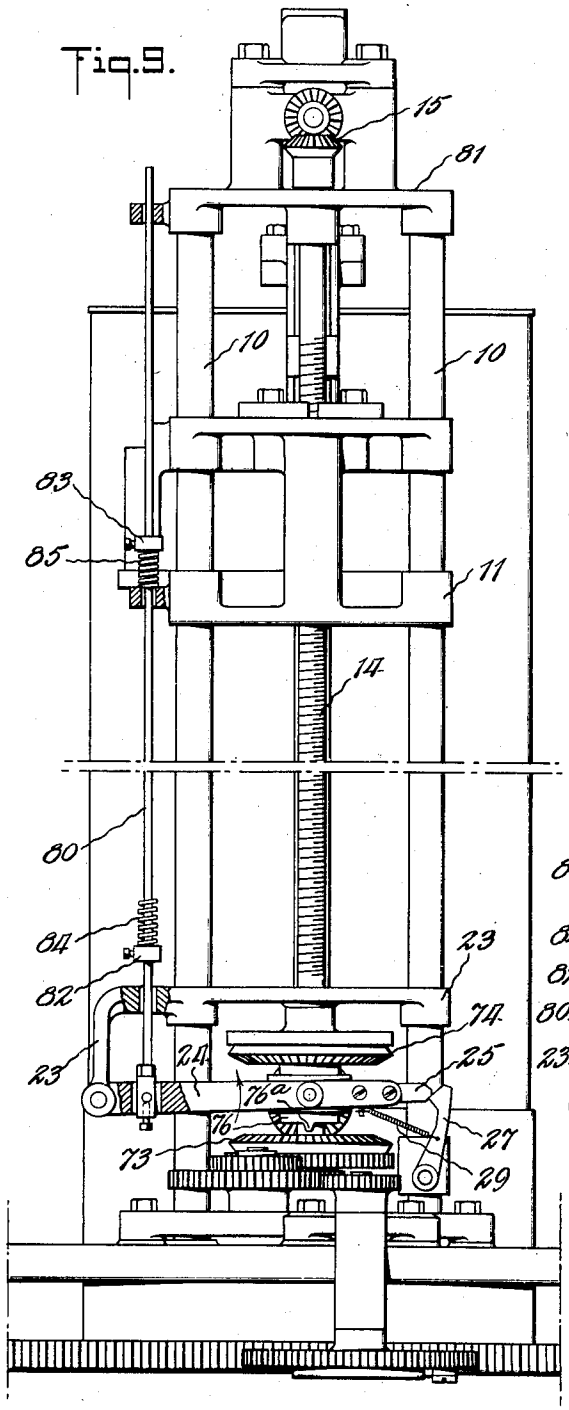
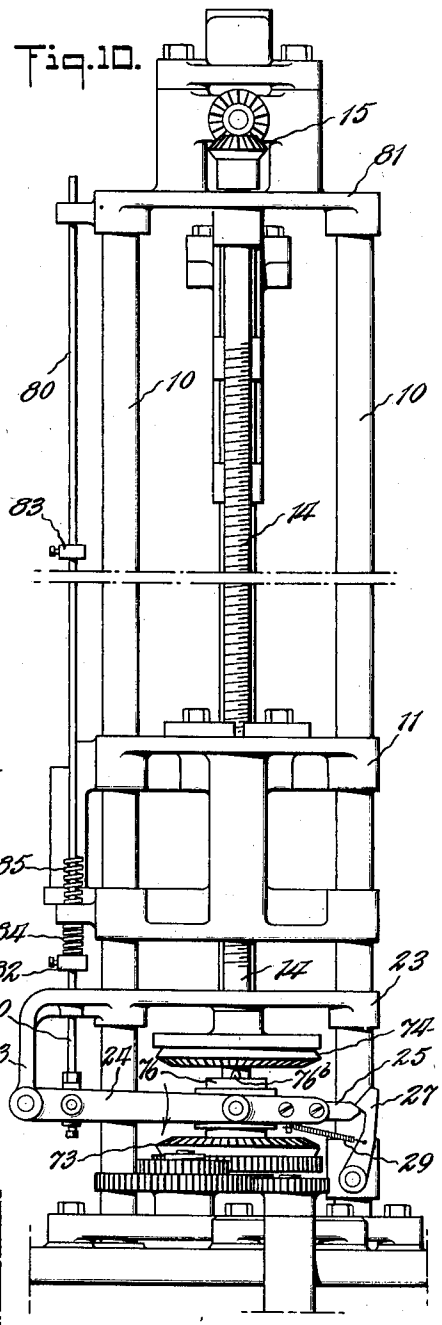


Fig. 10.



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UNITED STATES PATENT OFFICE

2,247,967

PATTERN REVERSING MECHANISM FOR ELECTROMECHANICAL KNITTING MACHINES

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Application March 16, 1940, Serial No. 324,406

21 Claims. (Cl. 66—50)

This invention relates to independent needle knitting machines adapted to make patterned fabric by stitch variation and more particularly to a machine of the type described in which the needle selection for the pattern effects is secured by the scanning of a pattern by electrical devices and it is an object of this invention to provide an improved control of the movements of the scanning device. It is a further object of this invention to provide means for automatically effecting a reversal of the movement of the scanning device in such manner that a break in the pattern effects will not occur. It is also an object of this invention to provide an operating means for the scanning device of a knitting machine of the type described which comprises a clutch arranged to effect the operation of the scanning means in opposite directions and a means for operating the clutch to effect a reversal of the direction of operating of the scanning means.

In the drawings which illustrate preferred embodiments of this invention—

Figure 1 is a partial broken view, partly in elevation and partly in section, of a knitting machine in accordance with this invention, only such parts of the knitting machine being shown as are necessary to illustrate the invention;

Figure 2 is a partial view in side elevation of the structure of Figure 1, the structure being viewed as indicated by the arrow 2 in Figure 1 and parts being broken away to show other parts more clearly.

Figure 3 is a fragmentary view in side elevation of the structure of Figure 1, the structure being viewed as indicated by the arrow 3 in Figure 1, parts being broken away and omitted to show other parts more clearly.

Figures 4, 5 and 6 are sectional views of the clutch for reversing the operation of the scanning device and the gearing with which the clutch is associated, Figure 4 showing the clutch engaged for driving the device in one direction; Figure 5 showing the clutch in the position in which it is held after the operation thereof is started and before the final portion of the clutch movement can be made, and Figure 6 showing the position of the clutch upon the completion of its movement and engaged for driving the device in the opposite direction;

Figure 7 is a fragmentary sectional view showing the upper portion of a driving means for the support for the fabric take-up mechanism;

Figure 8 is a similar view of the bottom portion of the drive of Figure 7; and

Figures 9 and 10 are views similar to Figure 2 of a modified construction.

In the drawings the invention is shown in connection with an independent needle knitting machine of the type in which the needle selection for pattern effects is secured by the scanning of a pattern by electrical devices as shown in the patent to A. E. Page, No. 2,129,148, issued Sept. 6, 1938. As shown such a machine comprises a frame A in which the needle cylinder 17, the pattern cylinder 65 and the support 40 for the fabric take-up mechanism are rotatably mounted and so connected as to rotate in synchronism, the pattern cylinder 65 being mounted on a gear 68 which is fixed on the shaft 69 which supports the dial. The support 40 for the fabric take-up mechanism is driven from gear teeth 17a on the needle cylinder 17 through a gear 31 meshing with the gear teeth 17a and fixed on a shaft 33 and a gear 35a fixed on the shaft 33 and meshing with the gear teeth 40a on the support 40. Slidably mounted on the rods 10 carried by the frame A are the cross heads 11 carrying the scanning mechanisms 12 which are reciprocated on the rods 10 to cover the desired portion or portions of the pattern cylinder 65 by means of threaded shafts 14 which are connected for simultaneous operation by the shaft 16 and the bevel gears 18 and 20. The threaded shafts 14 are driven from the gear 68 by means of a gear train 22 which includes spaced bevel gears 73 and 74 freely rotatable on the threaded shaft 14 and caused to rotate in opposite directions by means of an intermediate gear 75. Slidably keyed to the threaded shaft 14 between the gears 73 and 74 is a clutch member 76 having oppositely directed tapered lugs or teeth 76a and 76b adapted to be engaged in correspondingly shaped notches 73a and 74a in the gears 73 and 74 respectively. The lugs 76a and 76b are alined and the over-all length at the lugs is slightly greater than the distance between the gears 73 and 74 so that one lug can not be disengaged from its notch until the other lug is engaged in its notch. The changing of the connection of the clutch member 76 from one to the other of the gears 73 and 74 is shown in Figs. 4, 5 and 6, Figure 4 showing the clutch member 76 engaged with the gear 74 to rotate the threaded shaft 14 in one direction; Figure 5 showing the lug 76b partly withdrawn from the notch 74a but held in engagement therewith until the notch 73a is again alined with the lug 76a, and Figure 6 showing the clutch member 76 disengaged from the gear 74 and engaged with the gear 73.

The clutch member 76 is shifted to and from engagement with one or the other of the gears 73 and 74 by means of a lever 24 pivotally mounted at one end in a bracket 23 carried by the rods 10 and having a projecting lug or yoke 24a engaging in a groove 76c in the clutch member 76. At its other end the lever 24 has a pin and slot connection with an end of a lever 26 which is fixed on an end of a rod or shaft 28 journalled in a bracket 30 mounted on a rod 10 and in a bracket 32 carried by the machine frame. Attached to the lever 24 intermediate its ends is a beveled finger 25 adapted to be engaged by a pivoted detent member 27 operated by a spring 29 to oppose movement of the lever 24 and clutch member 76 to disengage the clutch member from either of the gears 73 and 74.

At its other end the rod 28 has fixed thereon a lever 34 having openings at the opposite ends thereof through which extend rods 35, 36. At their upper ends the rods 35, 36 have collars 37 fixed thereon so that either rod when drawn down, will operate the lever 34. At their lower ends the rods 35, 36 extend through ends of levers 38, 39, respectively, and are provided with collars 43, adjustably fixed thereon so that when the end of a lever is lowered the corresponding rod is drawn down.

The levers 38, 39 are mounted to pivot freely on a rod 41 supported in a bracket or housing 42 attached to the frame, which bracket or housing also serves to support the shaft 44 on which is fixed the usual main pattern drum (not shown), the ratchet wheel 45 for operating the shaft 44 and the sprocket 46 for the pattern chain 47. The levers 38 and 39 and the sprocket 46 are so mounted that a lever extends on each side of the sprocket 46 in position to be operated by a lug 47a on the corresponding side of the pattern chain 47. Each lever, when raised by a lug on the pattern chain, draws down its associated rod and operates the lever 34, rod 28, lever 26 and lever 24 to shift the clutch member 76 from one gear to the other. The sprocket wheel 46 is operated to place the lugs on the pattern chain 47 under one or the other of the levers 38 and 39 by the rotation of the shaft 44 by the ratchet wheel 45. The operation of the levers 38 and 39 by the lugs on the pattern chain 47 is timed to take place when the notches 73a and 74a of the gears 73 and 74, respectively, are not alined so the clutch member 76 does not make its complete movement at once and the various rods and levers are held under a strain, particularly the rod 28 which is twisted slightly, until the notches 73a and 74a aline and the movement of the clutch member 76 is completed because of the elasticity of the various rods and levers.

To operate the ratchet wheel 45 there is provided a lever 50 pivotally mounted at 51 in the bracket or housing 42 and having, at one end thereof, a pivotally mounted pawl 52 which engages the teeth of the ratchet wheel 45. The other end of the lever 50 is positioned to be engaged by the adjustable contact 53 in the outer end of an arm 54 fixed on the upper end of a rod 56 which is rotatably supported in the frame A and housing 42. To the lower end of the rod 56 there is secured an arm 57 carrying a roller 58 positioned to be engaged by a cam 59 carried by the take-up mechanism support 40. The cam 59 is rotated with the support 40 in synchronism with the needle cylinder and engages the roller 58 once in each revolution causing the rod 56 to be oscillated and the lever 50 and pawl 52 operated to advance the ratchet wheel once for each revolution of the needle cylinder. A spring 60 attached to the lever 50 and the machine frame retracts the lever and pawl after each operation and returns the arm 57 and roller 58 to position for engagement by the cam 59.

Control of the scanning means by the pattern chain permits of varying the extent of the movement of the scanning means so that different parts or all of the pattern on the pattern cylinder may be repeated as desired.

In the modification shown in Figures 9 and 10 the cross-head 11 carrying the scanning mechanism is operated by the threaded shaft 14 and the gears 73 and 74 are engaged by the clutch member 76 to rotate the shaft 14 as in the construction just described. The lever 24 which operates the clutch member 76, however, is ended at the finger 25 which engages the detent 27 and at a short distance from its pivot the lever 24 has pivotally connected thereto a rod 80 which extends through alined openings in the bracket 23 and lugs extending from the cross-head 11 and the cap member 81. Adjustably secured on the rod 80 on opposite sides of the lug of the cross-head 11 are the collars 82 and 83 and surrounding the rod 80 between the collars and the lug on the cross-head 11 are the springs 84, 85. The cross-head 11 in its movement on the rods 10 engages the lug with one or the other of the springs 84, 85 causing the rod 80 to be moved longitudinally and operating the lever 24 to shift the clutch member 76 and reverse the operation of the threaded shaft 14 and the movement of the scanning mechanism.

In this construction the springs 84 and 85 will be engaged while the notches 73a and 74a are not alined and will be compressed during the movement of the gears 73 and 74 to aline the notches so that the final movements of the lever 24 and the clutch member 76 are brought about quickly by the elasticity of the springs 84 and 85.

What is claimed is:

1. In a knitting machine, a reciprocating element, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members and operating means for said clutch element comprising resilient means stressed by operation of said operating means while said clutch element is held engaged with one of said oppositely moving members by the other of said oppositely moving members.

2. In a knitting machine, a reciprocating element, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members, operating means for said clutch element comprising resilient means stressed by operation of said operating means while said clutch member is held engaged with one of said oppositely moving members by the other of said oppositely moving members, said resilient means completing movement of said clutch element from engagement with the one of said oppositely moving members to engagement with the other of said oppositely moving members upon release of said clutch element by said other of said oppositely moving members and pattern means controlling said operating means.

3. In a knitting machine, a reciprocating element, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members and means for operating said clutch element by the operation of said reciprocating element, said means

comprising resilient means stressed by operation of said operating means while said clutch element is held engaged with one of said oppositely moving members by the other of said oppositely moving members.

4. In a knitting machine, a reciprocating element, a threaded shaft for reciprocating said element, oppositely rotating driving means, a clutch element for selectively operating said shaft from said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means, and operating means for said clutch element comprising resilient means stressed by operation of said operating means while said clutch element is held engaged with one of said driving means by the other of said driving means.

5. In a knitting machine, a pattern scanning device, a threaded shaft for reciprocating said scanning device, oppositely rotating driving means, a clutch element for selectively operating said shaft from said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means, operating means for said clutch element comprising resilient means stressed by operation of said operating means while said clutch element is held engaged with one of said driving means by the other of said driving means and pattern means controlling the operation of said operating means.

6. In a knitting machine, a pattern scanning device, a threaded shaft for reciprocating said scanning device, oppositely rotating driving means, a clutch element for selectively operating said shaft from said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means and means for operating said clutch element by the operation of said scanning device comprising resilient means stressed by operation of said operating means while said clutch element is held engaged with one of said driving means by the other of said driving means, said resilient means completing movement of said clutch element from one operative position to the other.

7. In a knitting machine, a pattern scanning device, a threaded shaft for reciprocating said scanning device, oppositely rotating driving means, a clutch element for selectively connecting said shaft to said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means and operating means for said clutch element comprising yieldable means for shifting said clutch element from one operative position to another, said clutch element being held in engagement with one driving means by the other driving means while said yieldable means are stressed for the operation of said clutch element.

8. In a knitting machine, a pattern scanning device, a threaded shaft for reciprocating said scanning device, oppositely rotating driving means, a clutch element for selectively connecting said shaft to said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means, operating means for said clutch element comprising yieldable means placed under stress for the operation of said clutch element while said clutch element is held engaged with one driving means by the other driving means and pattern means for stressing said yieldable means.

9. In a knitting machine, a pattern scanning device, a threaded shaft for reciprocating said scanning device, oppositely rotating driving means, a clutch element for selectively connecting said shaft to said driving means, said clutch element being disengageable from one driving means only upon engagement with the other driving means and means for operating said clutch element by the operation of said scanning device, said means comprising yielding means placed under stress for the operation of said clutch by the operation of said scanning device while said clutch element is held engaged with one driving means by the other driving means.

10. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members and means for operating said clutch element for changing the connection of said scanning device from one moving member to the other with said clutch element held temporarily at an intermediate operating position in its operating movement.

11. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, means for operating said clutch element for changing the connection of said scanning device from one moving member to the other with said clutch element held temporarily at an intermediate operating position in its operating movement and pattern means controlling the operation of said clutch element.

12. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members and means for operating said clutch element from said scanning device for changing the connection of said scanning device from one moving member to the other with said clutch element held temporarily at an intermediate operating position in its operating movement.

13. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, said clutch element being disengageable from one moving member and engageable with the other with said moving members in a single relation and operating means for said clutch element initiating the operation thereof with said moving members in other relations.

14. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, said clutch element being disengageable from one moving member and engageable with the other with said moving members in a single relation, operating means for said clutch element initiating the operation thereof with said moving members in other relations and pattern means controlling said operating means.

15. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, said clutch element being disengageable from one moving member and engageable with the other with said moving members in a single relation and means operating said clutch element from said scanning means and initiating the operation thereof with said moving members in other relations.

16. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, operating means for said clutch element and pattern means controlling the operation of said operating means, said operating means comprising resilient means stressed by said pattern means for the operation of said clutch element.

17. In a knitting machine, a pattern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members and means for operating said clutch element by the operation of said scanning device comprising resilient means stressed by the operation of said scanning means while said clutch element is held in an operative position for operation of said clutch element when said moving members attain a definite relation.

18. In a knitting machine, a reciprocating element moving at a constant relative speed to that of a primary driving means, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members and yieldable operating means for said clutch element causing the reversal of direction of said reciprocating element while said reciprocating element is maintained at a constant relative speed to that of said primary driving means.

19. In a knitting machine, a reciprocating element, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members, operating means for said clutch element comprising resilient means and means for stressing said resilient means so as to cause the reversal of the direction of the motion of said reciprocating element to be substantially instantaneous.

20. In a knitting machine, a reciprocating element, oppositely moving members, a clutch element for selectively operating said reciprocating element from said moving members, means operating said clutch element, said means comprising a torsion-member for reversing the movement of said reciprocating element and pattern means controlling the operation of said clutch operating means by stressing said torsion-member.

21. In a knitting machine, a patern scanning device, oppositely moving members, a clutch element for selectively operating said scanning device from said moving members, operating means for said clutch element and pattern means constructed and arranged to control said operating means to provide a continuous variable operation of said scanning device.

STANLEY R. SHELMIRE.

CERTIFICATE OF CORRECTION.

Patent No. 2,247,967. July 1, 1941.

STANLEY R. SHELMIRE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, lines 14 and 15, claim 20, strike out the comma and words ", said means comprising a torsion-member" and insert the same after "element" in line 16, same claim; line 20, claim 21, for "patern" read --pattern--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of August, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)