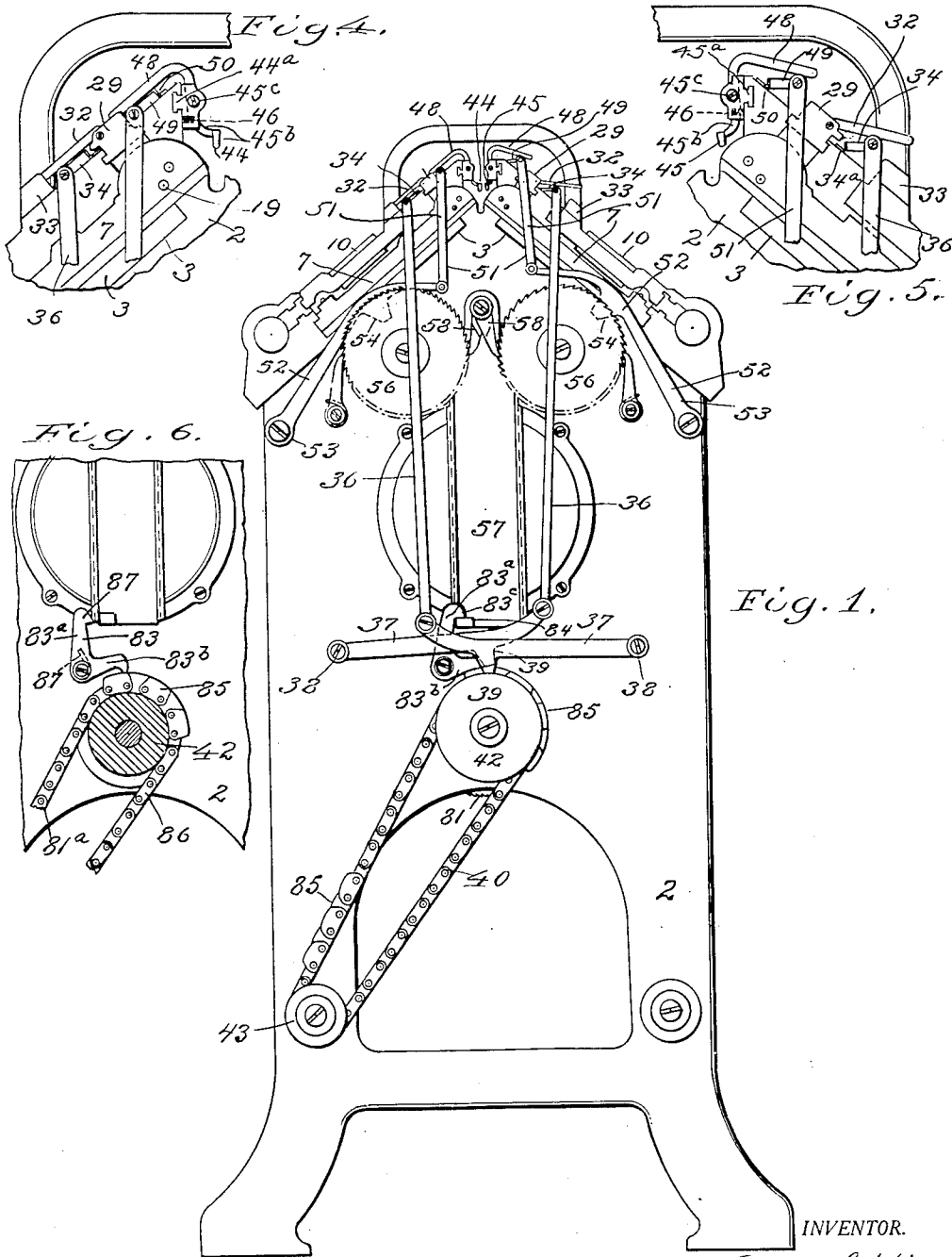


E. LIPPITT.
YARN GUIDE MECHANISM FOR KNITTING MACHINES.
APPLICATION FILED JUNE 18, 1919.

1,398,103.

Patented Nov. 22, 1921.

4 SHEETS—SHEET 1.



INVENTOR.

BY *Elihu Lippitt*
Rogers, Kennedy & Campbell
ATTORNEYS.

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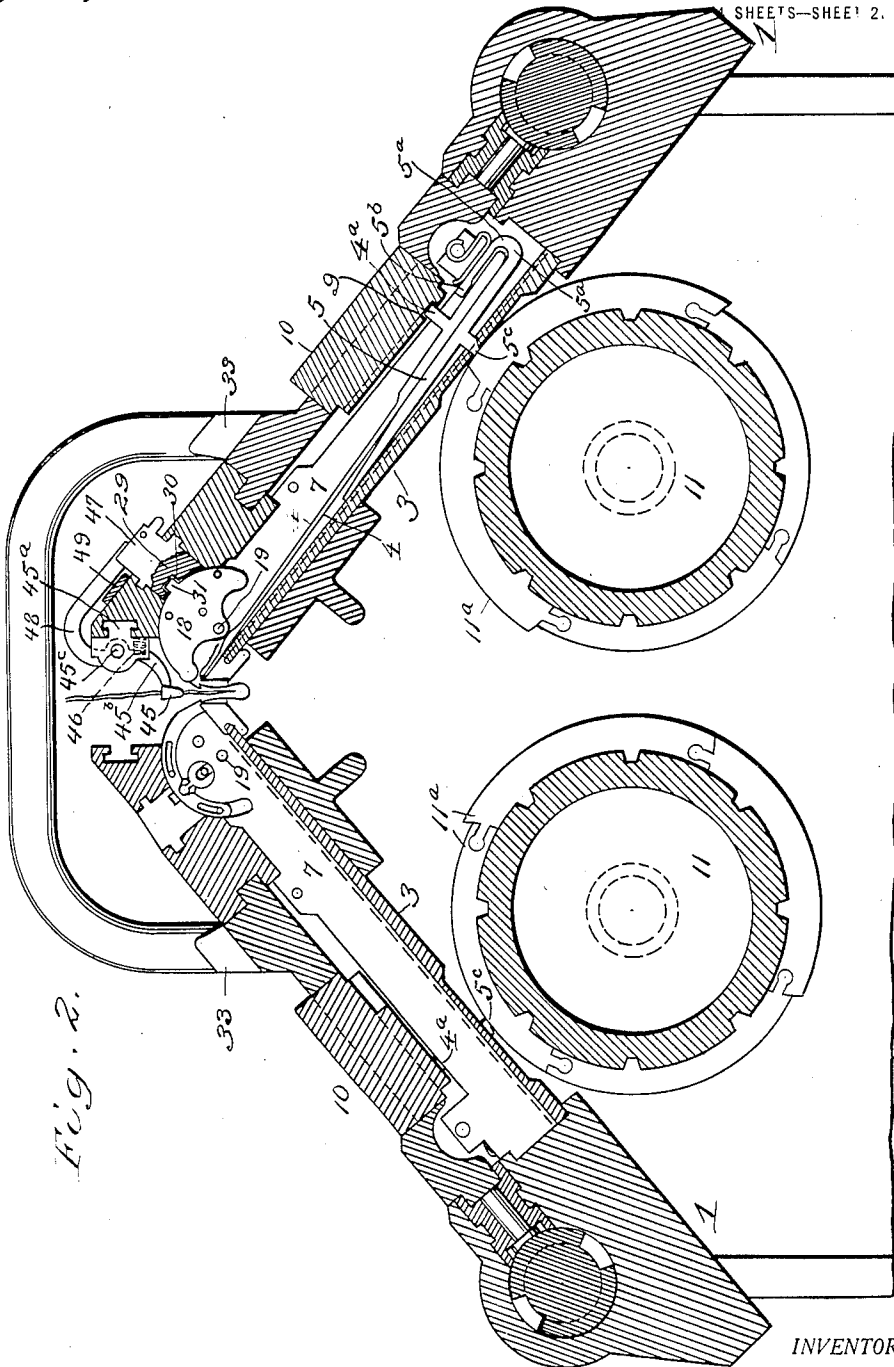


Fig. 2.

INVENTOR.

Elihu Lippitt

BY

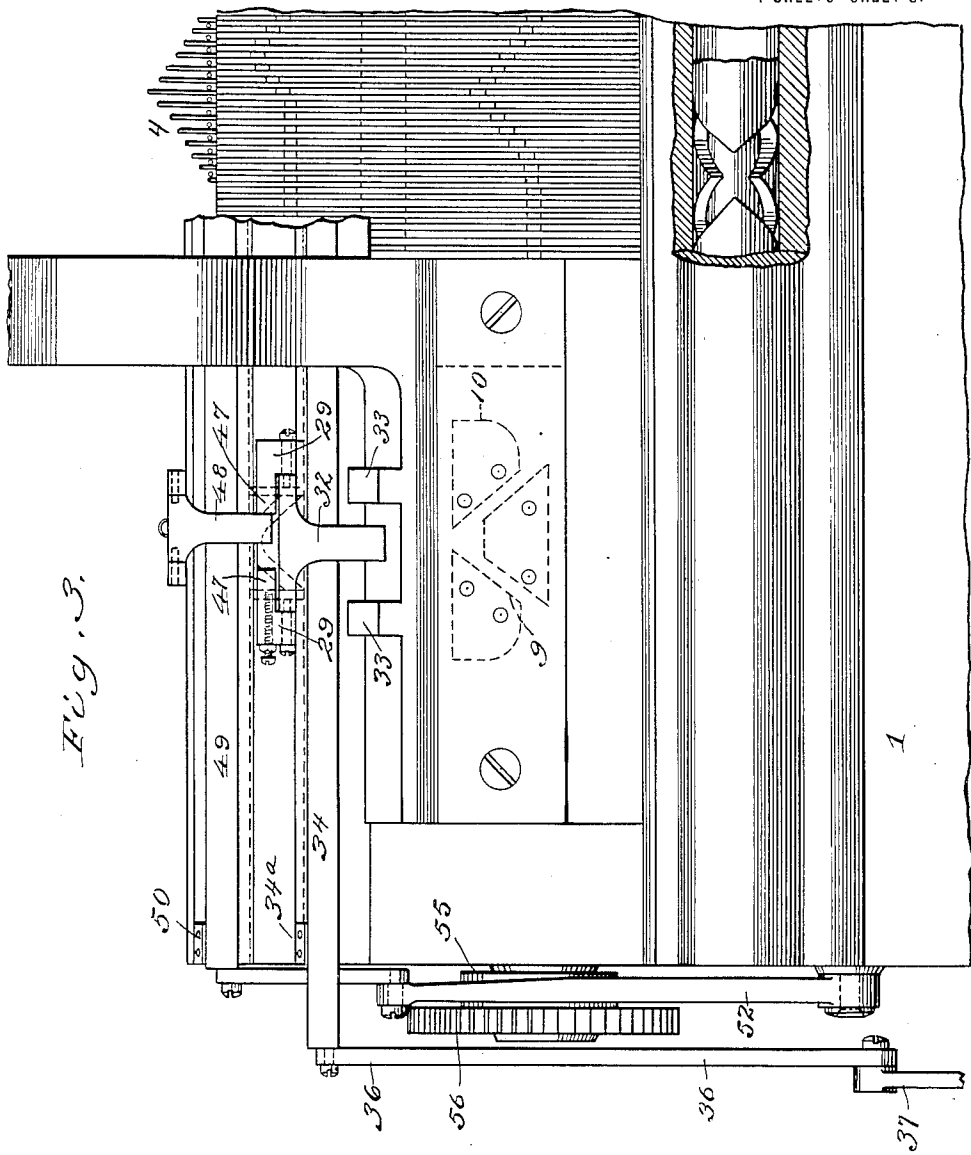
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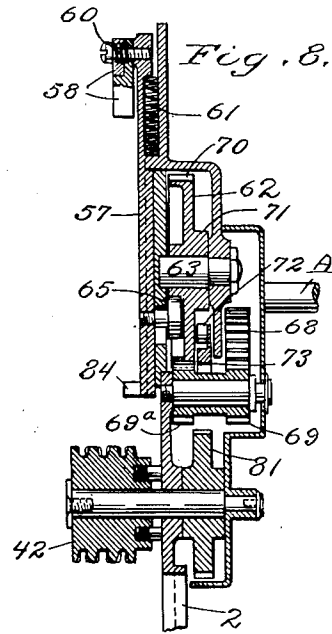
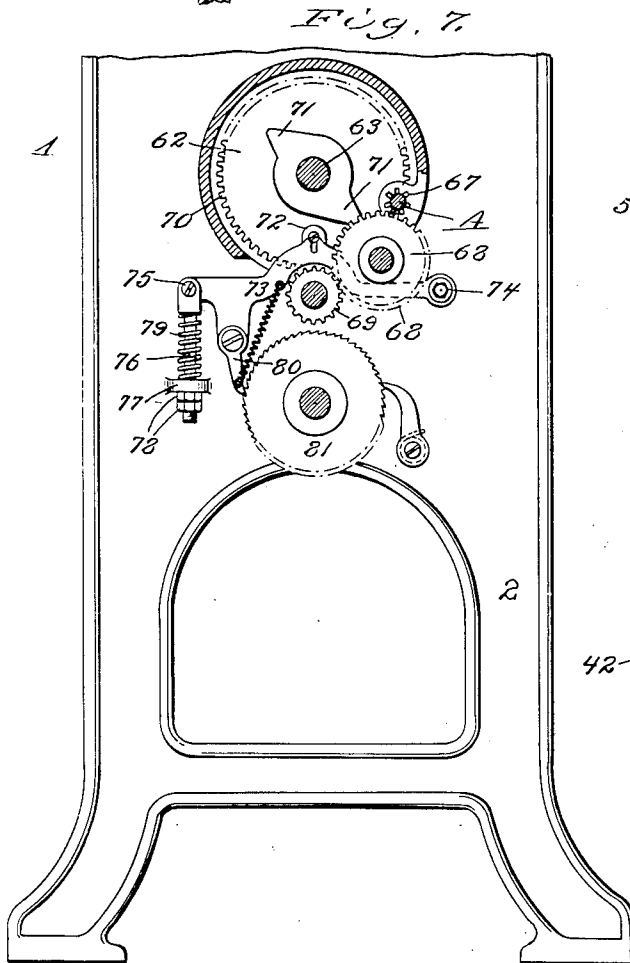
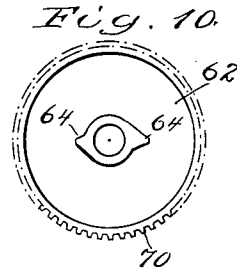
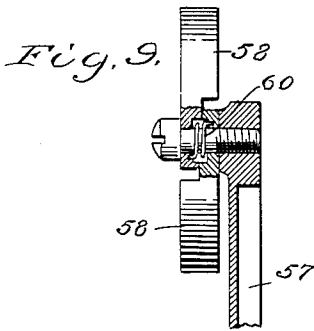
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4 SHEETS—SHEET 4.



INVENTOR.

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BY
Rogers, Kennedy & Campbell
ATTORNEYS.

UNITED STATES PATENT OFFICE.

ELIHU LIPPITT, OF LAKEWOOD, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO HENRY J. HUNTINGTON AND ONE-THIRD TO STEPHEN W. LIPPITT.

YARN-GUIDE MECHANISM FOR KNITTING-MACHINES.

1,398,103.

Specification of Letters Patent.

Patented Nov. 22, 1921.

Original application filed July 12, 1917, Serial No. 180,042. Divided and this application filed June 18, 1919. Serial No. 305,003.

To all whom it may concern:

Be it known that I, ELIHU LIPPITT, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Yarn-Guide Mechanism for Knitting-Machines, of which the following is a specification, reference being had therein to the accompanying drawing, being a division of original application filed July 12, 1917, Serial No. 180,042, patented May 11, 1920, No. 1,339,708.

This invention relates to knitting machines, and the invention consists of an improved yarn guide mechanism designed to feed the yarn so that different kinds distinguished as to weight, or material, or color, may be incorporated in the fabric in its course of formation. The detailed form and construction of the improved mechanism will be fully set forth in the specification to follow, and the novel features of the same will be defined in the appended claims.

In the accompanying drawings:

Figure 1 is an end elevation of my improved machine.

Fig. 2 is a transverse sectional elevation through the same on an enlarged scale, certain parts being omitted.

Fig. 3 is a side elevation of a portion of the machine with certain parts broken away.

Fig. 4 is a fragmentary view in elevation showing the operative position of the yarn guide and the means for operating the same.

Fig. 5 is a similar view showing the yarn guide in inoperative position and the operating mechanism therefor out of action.

Fig. 6 is a fragmentary sectional elevation showing the means for controlling the action of a detail of the machine.

Fig. 7 is a transverse sectional elevation showing the driving gearing for the cam drums and pattern chain drive wheel.

Fig. 8 is a longitudinal section through the same.

Fig. 9 is a sectional elevation of the driving dogs for the cam drums.

Fig. 10 is an elevation of one of the gears of the train shown in Figs. 7 and 8.

Referring to the drawings:

The operative parts of the machine are

mounted in and sustained by a frame 1 supported by legs or standards 2 and giving support to two needle beds 3 extending at an inclination upwardly and inwardly toward each other as usual in machines of this type.

Each of the needle beds is equipped with a set of needles 4 adapted to be reciprocated individually endwise so that the needles of the two sets will cooperate with each other and form a flat ribbed fabric; or by the operation of the individual sets of needles, a ribless fabric of flat or tubular form may be produced.

These needles may be of the latch type or spring beard type, as will be more fully explained hereinafter, and in accordance with one part of my invention, which is applicable to needles of either type, the needles are mounted each at its rear in a needle jack 5 of the form shown more particularly in Fig. 2. Here it will be seen that the jack comprises a main lower body portion 5^a, the rear end of which extends upwardly and then forwardly in the form of a hook 5^b, the rear end of the needle being seated beneath the hook and resting on the body portion of the jack. The jacks with the needles thus sustained are mounted side by side in upright guide grooves formed between upright needle guide plates 7 firmly fixed side by side in parallel grooves in the needle bed. The needles are each formed at a point forward of the hook 5^b with an upwardly extending lug or heel 4^a which heels of the two sets of needles are adapted to be engaged by cams 9 on cam carriages 10 mounted on the frame of the machine above the needle beds and reciprocated relatively to the jacks to form the stitches. The body portion of the jack is formed with a depending lug or heel 5^c which heels extend through openings or holes in the needle beds so that they may be acted on by two cam drums 11 mounted for rotation beneath the beds side by side and extending longitudinally thereof. These cam drums are equipped with cam links 11^a of different heights, and by cooperating with the heels on the needle jacks, the latter are raised or lowered at their rear ends according to the arrangement of the cam links, and by correspondingly rais-

ing or lowering the needles, the heels of the latter will be moved into or out of engagement with the operating cams, and the operations of the needles thus controlled according to the character of the fabric being formed.

The cam carriages 10 are connected together as usual by a yoke so that they will be reciprocated over the needle beds in unison, reciprocating movements being given to the cam carriages by suitable driving devices operated from a driving shaft A mounted in suitable bearings in the machine frame.

The machine in the accompanying drawings is shown equipped with spring beard needles, and in connection with these needles there is employed a presser device 18 for pressing down the beards and closing the same, and an associated sinker hook device 19 for sinking and holding the yarn, a set of these devices being employed for each needle, and being operated in timed relations to the needles by means of cam slides 29, one on each side of the machine. The slides 29 are mounted for reciprocation in longitudinal guideways in the machine frame over the respective presser plates, and they are formed in their inner sides with cam grooves 30 engaging lugs 31 projecting upwardly from the presser plates, these cams being of such form that as the slides move past the pressure plates, the latter will be rocked first in one direction and will throw their presser heads down and engage the needles, and then in the opposite direction and move the presser heads away from the needles, these movements of the presser plates actuating the sinker hook devices, all as fully set forth and described in my original application hereinbefore referred to.

The reciprocation of the cam slides is effected by the movements of the cam carriages, through the medium of driving fingers 32, Fig. 3, on the slides, which fingers extend downwardly between upwardly extending driving lugs 33 on the carriages, there being a set of driving lugs for each driving finger, so that when the carriages are moved in one direction one of the lugs of the sets will engage the associated fingers and will move the slides in one direction, and when the carriages are moved in the opposite direction, the other lugs of the sets will engage the fingers and move the slides in the opposite direction. The driving fingers are hinged to the respective slides so that the fingers may be swung up to inoperative positions out of the path of the driving lugs, as shown in Fig. 5, the purpose of this construction being to prevent the operation of the slides, and consequently the presser devices and sinker devices, under certain conditions, such for instance when for certain kinds of work, only one set of

needles is operated, or for instance when latch needles are employed on one or both sides of the machine.

The control of the presser operating cam slides is effected in the present instance by means of two rocker plates 34, Figs. 1, 3 and 5, extending longitudinally at each side of the machine beneath the respective driving fingers and pivoted at their upper edges on horizontal longitudinal axes as at 34^a, the arrangement being such that when the plates are swung upwardly they will lift the fingers out of the path of the driving lugs, and when swung downwardly the fingers will be allowed to descend into the path of the lugs. The plates are operated by means of upright links 36 pivoted at their upper ends to the plates at one end, and extending downwardly at one end of the machine, and pivoted at their lower ends respectively to the inner ends of two horizontal operating levers 37 whose outer ends are pivoted to the frame of the machine on horizontal longitudinal axes as at 38. The said levers are provided between their ends with depending lugs 39 disposed in longitudinal alinement with each other and in position to be engaged respectively by pattern chains 40 passing over a rotary pattern chain drive-wheel 42 journaled on the machine frame, and over a guide pulley 43 mounted on the machine frame. The pattern chains are provided with links of different heights so arranged in relation to each other that the plates controlled by the levers will be operated to render the driving fingers operative or inoperative at proper times, according to the character of the fabric being formed.

The yarn is fed to the needles in accordance with my invention by means of two yarn guides 44 and 45 carried respectively by slides 44^a and 45^a mounted to move longitudinally in guides formed in the machine frame above the upper ends of the needle beds. Each of the guides consists of a finger 45^b pivoted to the slide on a horizontal longitudinal axis as at 45^c and formed at its lower end to guide the yarn, whereby said finger may be swung inwardly to an operative position where the yarn will be taken by the needles, or may be swung outwardly to an inoperative position where it will hold the yarn out of reach of the needles, a spiral spring 46 being disposed between the finger and slide and tending to swing the guide inwardly to an operative position.

The purpose of this movable mounting of the yarn guides on their slides is to enable them to be employed alternately, first one feeding the yarn to the needles, and then the other, so that different kinds of yarn may be incorporated in the fabric automatically in the course of formation, as will be more particularly described later on,

The yarn guide slides are reciprocated in their guides by means of the presser plate cam slides 29, which latter are provided each with two upwardly extending driving lugs 47 between which the ends of arms 48 connected fixedly with the respective fingers carrying the yarn guides extend when said guides are in operative position to guide the yarn to the needles, it being understood that in the operation of the machine but one yarn guide is in action at one time. In other words, the guides are operated alternately. The construction is such that when the arm 48 is swung upwardly free of the path of the driving lugs, the yarn guides will be swung outwardly to an inoperative position, in which position of the parts the yarn guide will remain at rest and will not be reciprocated by the driving lugs; and when the arm 48 is swung down, the yarn guide will be swung inwardly to an operative position and will be reciprocated back and forth by the presser cam slide and thereby caused to guide the yarn to the needles.

The arms 48 are controlled in their movements to correspondingly control the operation of the yarn guides, by means of two plates 49 extending longitudinally of the frame beneath the respective arm 48 and pivoted to the frame at their upper edges on horizontal longitudinal axes as at 50 so that when the plates are swung upwardly on their axes they will engage and raise the arms 48 clear of the driving lugs 47, Fig. 5, and will swing the yarn guides outwardly to inoperative positions, the said plates when swung downwardly permitting the springs 46 to swing the yarn guides inwardly to operative positions, thereby throwing the arms 48 down between the driving lugs.

These plates are operated to act in this manner by means of two links 51, the upper ends of which are pivoted respectively to the plates 34, while their lower ends are pivoted respectively to the inner ends of two operating levers 52 whose outer ends are pivoted as at 53 to the machine frame. Between their ends the levers are provided with depending lugs 54 in position to be engaged respectively by cams 55 on two rotary operating wheels 56 fixed to the ends of the cam drums 11 before alluded to, the said cams being of such form and so located relatively to each other that they will act through the levers, the links and pivoted plates, to cause the yarn guides to be operated respectively by the sets of driving lugs alternately.

The wheels 56 and consequently the cam drums 11 are rotated step by step by means of a vertically reciprocating actuating slide 57, Figs. 1 and 8, mounted in vertical guides on the machine frame, the said slide having pivoted to its upper end two driving dogs 58 in position to engage ratchet teeth on the wheels. The dogs are acted on by a torsional

spring 60 surrounding their pivotal axis and bearing against the dogs and tending to spread them apart and thereby maintain their engagement with the ratchet teeth, the construction and arrangement of the parts being such that when the slide is moved downwardly, the dogs will engage the teeth and advance the wheels, and when the slide is moved upwardly the dogs will slip over the teeth for another hold. The slide is acted on by an expansion spring 61 bearing respectively against the machine frame and the slide and acting to return the slide to its upper position after being moved downwardly by its operating mechanism. This operating mechanism for the slide 57 consists in the present instance of a cam wheel 62 which is mounted to rotate on a stud 63 sustained by the machine frame and constituting a longitudinal horizontal axis for the wheel, said wheel being arranged closely alongside of the lower portion of the slide. At its inner side the wheel has fixed to it two cams 64 in position to engage a roller 65 projecting from the side of the slide so that the latter is given two impulses in every revolution of the wheel, the spring 61 returning the slide to its upper position between each of its downward movements. In this manner the rotation of the wheel in connection with the expansion spring 61, imparts to the slide a vertical reciprocating movement, which movements of the slide will through the medium of the driving dogs, impart step by step rotative movements to the ratchet wheels 56.

The cam wheel 62 is operated from the main driving shaft A before alluded to, a pinion 67 being fixed to the end of the shaft and engaging a gear wheel 68 journaled on the machine frame, which gear wheel meshes with a pinion 69 also journaled on the machine frame and having on its hub a second pinion 69^a engaging gear teeth 70 on the cam wheel.

The cam wheel also operates the pattern chain drive wheel 42 before alluded to, to impart thereto a step by step rotation. This is effected by means of two cams 71 on the side of the cam wheel opposite the cams 64, which cams 71 are in position to engage a roller 72 journaled on a horizontal lever 73 between the ends of the latter. At one end the lever is pivoted as at 74 to the machine frame on a horizontal longitudinal axis, and at its other end it is pivoted as at 75 to the upper end of a sliding bolt 76, the lower end of which slides through a guiding opening in a lug 77 on the machine frame, nuts 78 being screwed on the end of the bolt and bearing against the under side of the lug. The bolt is encircled by an expansion spring 79 bearing at its upper end against a shoulder on the bolt and at its lower end against the lug, the tendency of the spring being to

urge the lever upwardly. Adjacent the sliding bolt the lever has pivoted to it a driving dog 80 which engages ratchet teeth 81 on the pattern chain drive wheel 42. As a result of this construction, when the cam wheel is rotated, the cams 63 will engage the rollers 72 in succession and will impart to the lever successive downward movements, the spring 79 moving the lever upwardly between each downward movement so that the lever will be reciprocated, and the driving dogs acting on the ratchet teeth will impart to the chain wheel a step by step rotating movement.

The operation of the slide 57 in actuating the cam drums 11 and the parts operated thereby is controlled so that these parts may be rendered inoperative at certain times according to the character of the work being produced. This is effected by means of a pattern chain 81^a, Fig. 6, passing around and operated by the pattern chain wheel 42, and having links thereon which engage a locking detent 83 pivoted to the frame of the machine adjacent the lower end of the slide. This detent comprises a vertical arm 83^a and a horizontal arm 83^b. The arm 83^a is formed with a hook 83^c, which when the vertical arm is moved inwardly and the horizontal arm moved downwardly, will engage over a lug 84 on the lower end of the slide when the latter is in its lowered position, and will thereby lock the slide down out of action, the slide being released and permitted to be actuated, when the detent is rocked to move the vertical arm laterally and thereby disengage the nose from the lug. These movements of the arm are controlled by furnishing the chain with links of different height, the high links 85 acting on the horizontal arm of the detent and raising the same so as to move the vertical arm free of the lug on the slide, and the low links 86 on the chain permitting the horizontal arm of the detent to move downwardly and thereby cause the vertical arm to move inwardly and engage its nose over the lug on the slide. The detent is acted on by a spring 87 which tends to hold the horizontal arm down on the links of the chain beneath.

In the foregoing description and accompanying drawings, I have set forth my invention in the particular detailed form which I prefer to adopt, and which in practice has been found to answer to a satisfactory degree the ends to be attained. It will be manifest, however, that the details may be variously changed and modified without departing from the limits of my invention, and further it will be understood that the invention is not limited to any particular form or construction of the parts, except in so far as such limitations are specified in the claims.

Having thus described my invention, what I claim is:

1. In a knitting machine, the combination

of a needle bed, needles therein, a reciprocating cam carriage provided with cams for operating the needles, a yarn guide movable longitudinally in a path to guide the yarn to the needles, means whereby said yarn guide is operated by the cam carriage, said yarn guide being displaceable out of said path to a position where it will not be operated by the cam carriage, means independent of the cam carriage for displacing the yarn guide, and a pattern chain controlling the operation of said means.

2. In a knitting machine, the combination of two needle beds inclined upwardly toward each other, a set of needles in each bed, two cam carriages provided with cams for operating the two sets of needles, longitudinally movable slides on the respective needle beds, a yarn guide carried by each slide and movable therewith in an operative path to guide the yarn to the needles, said guides being displaceable laterally relatively to the slides to inoperative positions out of said path, reciprocating slides on the respective needle beds operated by the cam carriages, said slides adapted when the yarn guides are in an operative position to engage and operate the same, and said slides being movable free of the yarn guides when the latter are displaced to an inoperative position, and means for displacing said yarn guides respectively to enable them to be operated in alternation.

3. In a knitting machine, the combination of two needle beds inclined upwardly toward each other, a set of needles in each bed, cam carriages on the respective beds for operating the needles, a yarn guide movable longitudinally in guides on the upper end of each bed in a common path to guide the yarn to the needles, said yarn guides being displaceable independently of each other out of said path, means controlled by the cam carriages for operating the respective yarn guides when in an operative position, and automatic means independent of the cam carriages for displacing said guides independently of each other to permit them to be operated alternately by the cam carriages.

4. In a knitting machine, the combination of a needle bed and needles therein, a reciprocating slide at the end of the bed, a yarn guide pivoted to said slide to move relatively thereto from an operative to an inoperative position and vice versa, a driving arm fixed to the yarn guide and adapted to be lowered when the yarn guide is in an operative position and to be raised when the yarn guide is in an inoperative position, and a reciprocating slide in position to engage and drive the arm when in lowered position, and adapted to move free of the arm when the latter is in raised position.

5. In a knitting machine, the combination of a needle bed, needles therein, a slide mov-

able longitudinally at the upper end of the bed, a yarn guide pivoted to said slide to move laterally to an inoperative position, an arm on the yarn guide for moving it to an inoperative position, an operating slide adapted to engage and drive the arm when the latter is in one position, said slide being movable free of the arm when the latter is moved laterally to another position, a pivoted plate extending beneath the arm and adapted to be rocked to move the arm free of the operating slide, and means for controlling the movements of the pivoted plate.

6. In a knitting machine, the combination of a needle bed, needles therein, a slide mov-

able longitudinally of the bed, a yarn guide pivoted to said slide, an arm on the yarn guide, an operating slide adapted to engage and drive the arm when the latter is in one position and movable free of the arm when the arm is in another position, a pivoted plate in position to engage the arm to move the same free of the operating slide, an operating lever pivoted to the frame of the machine and operatively connected with the pivoted plate, and a rotary cam for operating said lever.

In testimony whereof, I have affixed my signature hereto.

ELIHU LIPPITT.