June 22, 1948. W. A. COOPER ET AL 2,443,813

STRAIGHT-BAR KNITTING MACHINE

Filed Jan. 28, 1947 3 Sheets-Sheet 1

Fig. 1.

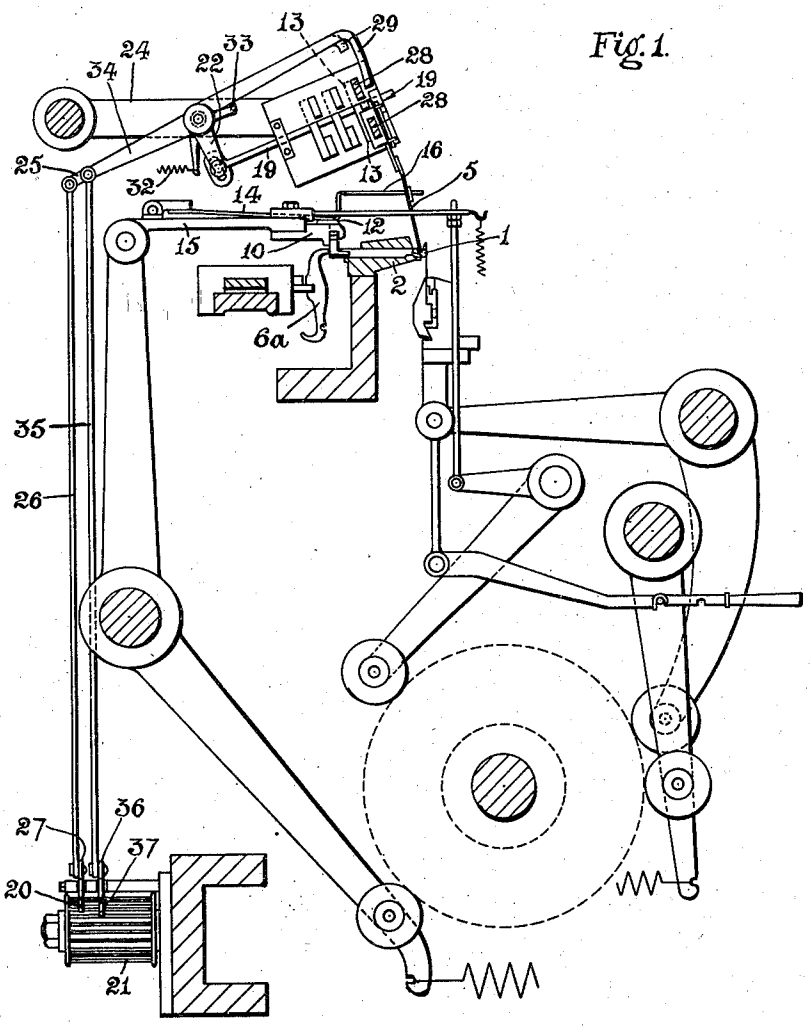
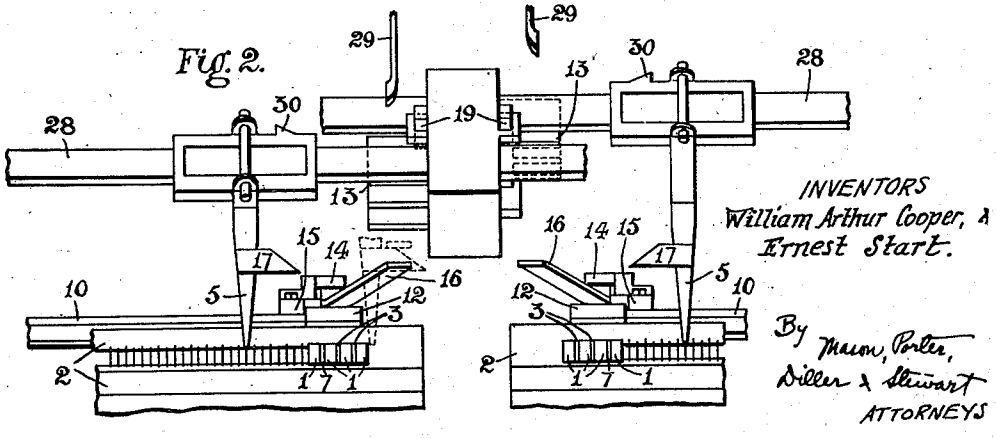


Fig. 2.



INVENTORS
William Arthur Cooper, &
Ernest Start.

By Mason, Porter, Diller & Stewart
ATTORNEYS

June 22, 1948. W. A. COOPER ET AL 2,443,813

STRAIGHT-BAR KNITTING MACHINE

Filed Jan. 28, 1947 3 Sheets-Sheet 2

Fig. 3.

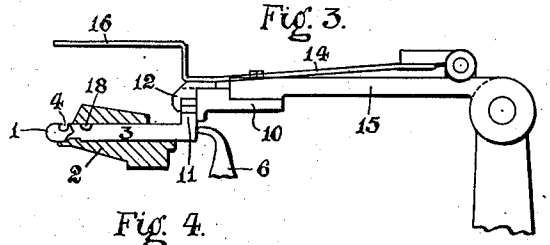


Fig. 5.



Fig. 6.

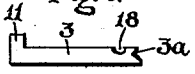


Fig. 4.

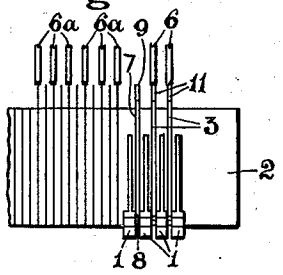


Fig. 7.

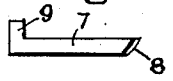


Fig. 8.

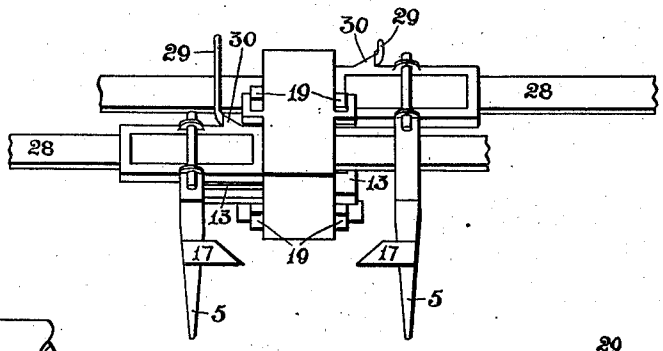


Fig. 9.

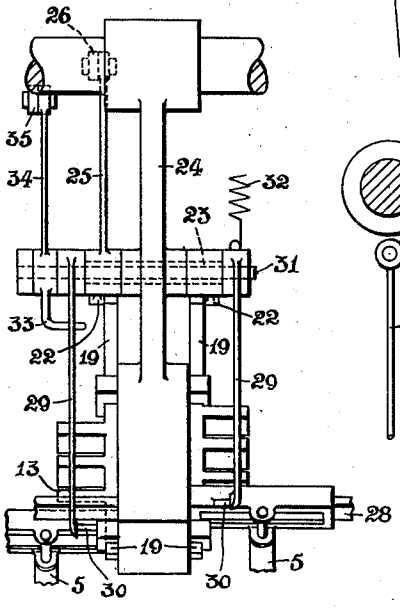
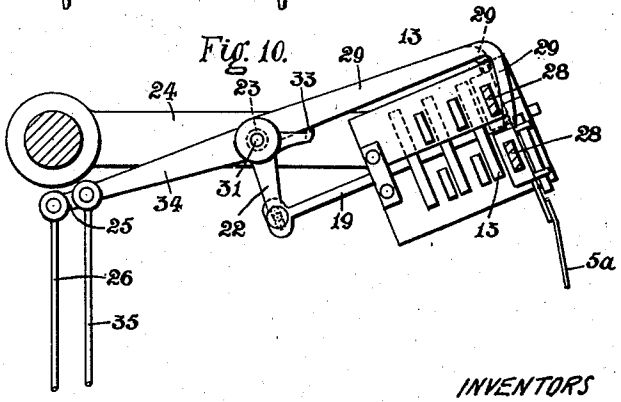


Fig. 10.



INVENTORS
William Arthur Cooper, &
Ernest Start.

By
Mason, Porter, Diller & Stewart
ATTORNEYS

June 22, 1948. W. A. COOPER ET AL 2,443,813

STRAIGHT-BAR KNITTING MACHINE

Filed Jan. 28, 1947 3 Sheets-Sheet 3

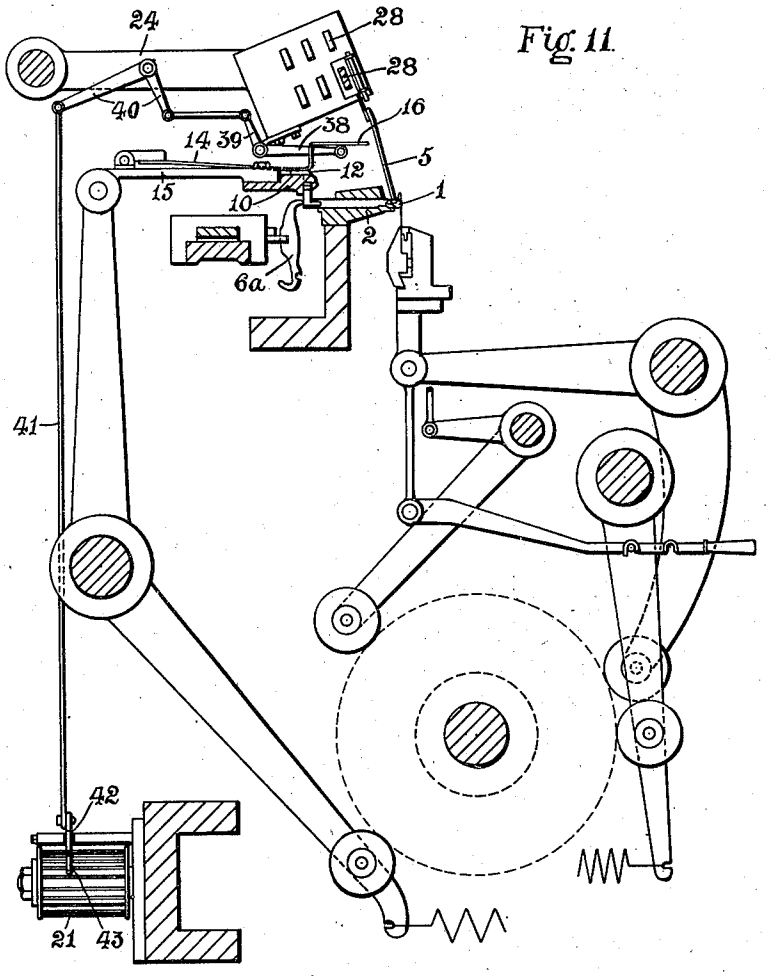


Fig. 11.

Fig. 12.

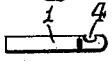


Fig. 13.

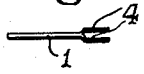


Fig. 14.

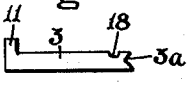
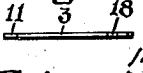


Fig. 15.



INVENTORS
William Arthur Cooper, &
Ernest Start.

By Mann, Porter, Dillon & Stewart
ATTORNEYS

Patented June 22, 1948 2,443,813

UNITED STATES PATENT OFFICE

2,443,813

STRAIGHT-BAR KNITTING MACHINE

William Arthur Cooper, Loughborough, and Ernest Start, Wilford, England

Application January 28, 1947, Serial No. 724,898
In Great Britain December 19, 1945

Section 1, Public Law 690, August 8, 1946

15 Claims. (Cl. 66—145)

1

This invention relates to improvements in straight-bar knitting machines and is applicable to straight-bar knitting machines of the kind used for knitting fully fashioned stocking blanks and also the machines for producing the heel tabs for such blanks. In machines of this kind the thread is laid by means of a reciprocating thread carrier or carriers and is formed into loops on the needles in well known manner by means of jack and dividing sinkers, and when any of the thread carriers are put out of action and moved to an inoperative position its thread has to be severed from the work and the end extending from the thread carrier held until the thread carrier has been brought into operation again.

The object of the present invention is to provide means which will automatically trap and sever the thread of any of the thread carriers when they are put out of action and hold the thread until the carrier is brought into action again.

According to this invention the thread trapping and severing mechanism comprises a plurality of fixed instruments across which the thread is laid when a thread carrier goes out of action, movable instruments disposed between the fixed instruments adapted to press the thread in between the fixed instruments and a severing device adapted to sever the thread when it has been pressed in between the fixed instruments. The instruments and severing device are disposed at one or both sides of the needles as required and are automatically operated to trap and sever the thread when a thread carrier is moved into an inoperative position. The trapping and severing device may be arranged to co-operate with one or more thread carriers if desired.

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

Fig. 1 is a sectional side elevation of part of a straight-bar knitting machine specially adapted for knitting the heel tabs for a fully fashioned stocking and provided with thread trapping and severing mechanism constructed according to this invention.

Fig. 2 is a front elevation showing part of the mechanism shown in Fig. 1 with thread trapping and severing mechanism disposed at the inner side of each group of sinkers.

Fig. 3 is an end elevation partly in section of one of the sinker sleys and its associated catch bar.

Fig. 4 is a plan of the inner end of one of the sinker sleys with the top removed.

Fig. 5 is a side elevation of one of the fixed trapping instruments.

Fig. 6 is a side elevation of one of the movable trapping instruments.

2

Fig. 7 is a side elevation of the severing instrument.

Fig. 8 is a front elevation,

Fig. 9 a plan and

Fig. 10 a side elevation showing the thread carriers in their inoperative positions and the locking mechanism associated therewith.

Fig. 11 is a sectional side elevation of part of a straight-bar knitting machine showing an alternative method of controlling the sliding trapping instruments when the trapping mechanism is adapted to co-operate with two or more thread carriers.

Fig. 12 is a side elevation and

Fig. 13 a plan of an alternative form of fixed trapping instrument.

Fig. 14 is a side elevation and

Fig. 15 a plan of the movable trapping instrument used with the arrangement shown in Fig. 11.

Figs. 2 to 10 and 12 to 15 are drawn to a larger scale than the remaining figures.

Like numerals indicate like parts throughout the drawings.

The trapping and severing mechanism is disposed so that the thread of a thread carrier engages therewith when the thread carrier goes out of action and is moved to an inoperative position.

In a convenient method of carrying out this invention the fixed instruments 1 of the trapping and severing mechanism are mounted in tricks in the sinker sley 2 at one end of the usual row of jack and dividing sinkers and extend forward therefrom a suitable distance as shown in Figs. 2 and 4. Two or more fixed instruments 1 (shown detached in Fig. 5) may be provided and disposed between them are movable instruments 3 (shown detached in Fig. 6) which may conveniently slide between the fixed instruments 1 and for this purpose are mounted in tricks in the sinker sley. The fixed instruments 1 have an opening 4 in their upper edges in the path traversed by the thread carriers 5 so that when one of the latter goes out of action and is moved to its inoperative position, indicated in broken lines in Fig. 2, it lays its yarn in the openings 4 in the upper edges of the fixed instruments 1. The sliding instruments 3 are withdrawn to their innermost position just prior to a thread carrier going out of action. They are preferably formed with a throat 3a in a similar manner to the ordinary sinkers and are advanced to take the yarn in their throats and press it forward in between the fixed instruments 1 after the yarn has been laid in the opening 4 in the upper edges thereof. To advance the sliding instruments 3 they are provided with jacks 6 which are operated by the slur cock of the machine in well known manner and are similar in shape to the jacks 6a associated with the jack sinkers of the machine.

When the sliding instruments 3 have been advanced as described the yarn is kinked around the end thereof and pressed in between the fixed instruments 1, the sliding instruments 3 being then left in their forward position until it is necessary to bring the trapping mechanism into operation again. When the yarn has been disposed in the trapping mechanism as described it is severed between the trapping mechanism and the work. For this purpose a cutter is provided. The cutter comprises a sliding member 7, shown detached in Fig. 7, mounted in tricks in the sinker sley 2 and having a cutting edge 8 on its front end and a butt 9 on its rear end of the same height as that on the dividing sinkers. To advance the cutter 7 at the appropriate time the butt 9 (see Fig. 6) thereon is engaged by the catch bar 10 of the machine and advanced to sever the yarn at the same time as the dividing sinkers are advanced by the catch bar 10 to divide the loops sunk on the needles during the laying of the course in which a thread carrier is put out of action and moved to an inoperative position. The cutter 7 may be actuated by the catch bar 10 each motion thereof or it may be actuated when required by providing it with a shorter butt that the dividing sinkers and lowering the catch bar to engage therewith when it is desired to actuate the cutter. The cutter 7 is disposed alongside a fixed instrument 1 and in order to hold it up to its work so as to sever the yarn it may slide between two fixed instruments as shown in Figs. 2 and 4.

In order to withdraw the sliding instruments 3 into an inoperative position they are provided with butts 11 (see Fig. 6) on their inner ends. Separate mechanism may be provided for engaging therewith to retract them when necessary or they may be engaged by and withdrawn by the catch bar 10. In the latter case the butts 11 are made the same height as those on the jack sinkers and provision is made for leaving them in their forward position after trapping the yarn as previously described. For this purpose the front lip of the catch bar 10 is provided with a movable section 12 and this movable section 12 is raised into an inoperative position when it is desired to leave the sliding instruments 3 in their advanced or trapping position. The movable section 12 may be arranged so that it is moved into its inoperative position by the thread carrier when the latter moves into its inoperative position and be retained in its inoperative position until such time as the thread carrier is again brought into operation.

In a straight-bar knitting machine for knitting the heel tabs of a fully fashioned stocking as illustrated in Figs. 1 to 10 of the drawings the latter arrangement forms a simple and convenient method of raising the movable section 12 to an inoperative position. In machines of the kind referred to, two groups of needles and associated knitting elements are provided, and associated with each group of needles is a slur cock and at least one thread carrier. The thread carriers and slur cock associated with each group of needles traverse in opposite directions and at the completion of the heel tabs the thread carriers finish at the inner ends of the rows of needles. In the drawings only one thread carrier 5 is shown in connection with each group of needles. Referring to Fig. 2, the thread carriers 5 normally engage at the inner ends of their traverse with stops 13 during the knitting of the heel tabs. When the thread carriers commence their last traverse to lay the last course of the heel tabs the stops 13

are withdrawn and the thread carriers move beyond their normal position and come to rest in the position shown in Fig. 8. The movable part 12 of the catch bar 10 associated with each group of needles is carried by an arm 14 pivoted to the arm 15 normally provided to carry one end of the catch bar 10. In order to lift the movable part 12 when the thread carriers 5 go out of action, each arm 14 is provided with a forward extension 16 and the thread carriers 5 have an abutment 17 secured thereto which engages under the extension 16 and lifts the latter, and consequently the movable part 12 of the catch bar 10, when the thread carriers 5 move into the position shown in Fig. 8 and indicated by the broken lines in Fig. 2.

As the thread carriers move into their inoperative positions the threads carried thereby are laid in the openings 4 in the upper edges of the fixed instruments 1 across which the thread carriers pass. The slur cock associated with each group of needles traverses a short distance behind the thread carriers and operates the jacks 6a to advance the jack sinkers in well known manner. Before the slur cock reaches the end of its traverse it operates the jacks 6 (see Fig. 4) and advances the sliding members 3 to trap the threads as previously described. On the forward movement of the catch bar to advance the dividing sinkers the cutter 7 is advanced and the thread severed from the work. As the movable part 12 of the catch bar 10 is raised out of action by the thread carriers the sliding instruments 3 remain in their forward position when the catch bar 10 is withdrawn during the subsequent knitting of the last course drawn on the needles and remain in this position until the thread carriers are moved into operation again to commence knitting another pair of heel tabs.

In order that the thread carriers 5 can be moved into their operative position again whilst the sliding instruments 3 are in their forward position openings 18 are provided at the appropriate points in the upper edges thereof so that the thread carriers can pass across them without fouling them.

In order to withdraw the stops 13 at the appropriate time to permit of the thread carriers moving into their inoperative positions the stops 13 are mounted on sliding members 19. Each sliding member 19 is longitudinally adjusted to withdraw the stops 13 by a stud 20 on the pattern chain 21 of the machine. For this purpose the slides 19 are connected to arms 22 secured to a sleeve 23 (see Fig. 9) carried in a bearing in the fixed bracket 24. Associated with one of the arms 22 is second arm 25 which is connected by a link 26 to a lever 27 which is actuated by the stud 20 on the pattern chain 21.

The thread carriers 5 are mounted on bars 28 which are reciprocated in well known manner by the draw mechanism of the machine. The thread carriers engage frictionally with the respective bars 28 and in order to hold the thread carriers in their inoperative positions, whilst the machine completes the necessary motions to press off the complete heel tabs and to turn the machine into the correct position to receive another stocking blank for the knitting thereto of the heel tabs, locking mechanism is provided. The locking mechanism comprises a locking lever 29 associated with each thread carrier. The locking levers are normally held in an inoperative position as shown in Fig. 1 and are lowered when the thread carriers move into their inoperative positions to engage with abutments 30

provided for the purpose thereon and as shown in Fig. 8. The levers 29 are secured on a shaft 31 (see Fig. 9) carried by the sleeve 23 and a spring 32 is provided to move them into their operative positions at the appropriate time. The levers 29 are normally held in an inoperative position by one arm 33 of a bell crank lever which engages under one of the levers 29. The other arm 34 of the bell crank lever is connected by a link 35 (see Fig. 1) to a lever 36 associated with the pattern chains 21. The lever 36 is normally held down by a spring and the lever 36 is raised to release the locking levers 29 by a stud 37 on the pattern chain 21.

In order that the yarn will be trapped between the sliding instruments and the fixed instruments the latter may have their outer ends thickened as shown in Figs. 2 and 4 to provide the necessary gripping action. Alternatively the outer ends of the fixed instruments may comprise two spring blades which are set so that the instruments are formed with fork shaped ends as shown in Fig. 13 and the blades of one instrument press on the blades on the adjacent instruments. With this arrangement the yarn can be pressed in between the blades by the sliding instruments and will be retained between the blades when the sliding instruments are withdrawn and consequently the trapping mechanism can be used to hold one or more yarns and so serve one or more thread carriers.

When the trapping mechanism is used to hold the threads of more than one thread carrier, as for example in the case of a straight bar knitting machine for knitting the leg, instep and sole portion of a stocking, provision must be made for withdrawing the sliding instruments just prior to a thread carrier going out of action and to advance them to trap the thread as previously described after the thread carrier has laid its thread across the fixed instruments and to leave the sliding instruments in their advanced or trapping position until the trapping mechanism is brought into action again. The movable section of the catch bar which engages with the butts on the sliding members and the cutter may conveniently be controlled from the pattern chain of the machine as shown in Fig. 11, so that the movable section of the catch bar can be raised out of action or lowered into action when desired. The movable section 12 of the catch bar 10 is carried by a pivoted arm 14 as described in connection with the previous arrangement. The arm 14 is provided with a forward extension 16 which is raised to move the section 12 into an inoperative position by a bell crank lever, the arm 38 of which engages under the extension 16. In order to angularly adjust the bell crank lever the other arm 39 thereof is connected by a link to one arm of a bell crank lever 40, the other arm of which is connected by a link 41 to a lever 42 actuated by a stud 43 on the pattern chain 21 of the machine so that whilst a stud remains under the lever 42 the movable section 12 of the catch bar 10 remains in an inoperative position. If preferred the mechanism can be so arranged that the movable section 12 is normally held in an inoperative position and is lowered into its operative position when a stud on the pattern chain engages with and raises the lever 42.

The arrangement described forms a simple method of automatically trapping and holding the thread of a thread carrier when the latter moves to an inoperative position and of severing the thread from the work. It can be arranged to trap and hold the threads of one or more carriers which go out of action together as in the case of heeling machines or it may be arranged to trap and sever the threads of several thread carriers which are put out of action at different times.

What we claim as our invention is:

1. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments across which a thread carrier lays its thread when moved to an inoperative position, movable instruments adapted to press the thread so laid in between the fixed instruments and a severing device adapted to sever the thread from the work.

2. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments across which a thread carrier lays its thread when moved to an inoperative position, movable instruments between the fixed instruments and sliding longitudinally thereof to press the thread so laid in between the fixed instruments, means to operate the sliding instruments and a severing device to sever the thread from the work.

3. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments across which a thread carrier lays its thread when moved to an inoperative position, movable instruments to press the thread so laid in between the fixed instruments, means to operate the movable instruments, a member having a cutting edge thereon and means to move it longitudinally of the fixed instruments to sever the thread from the work.

4. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers in a sinker sley, means to operate the sinkers and needles, a plurality of fixed instruments mounted in the sinker sley, movable instruments slidably mounted in the sinker sley between the fixed instruments, means to operate the movable instruments to press in between the fixed instruments a thread laid across the latter when a thread carrier goes out of action, a member having a cutting edge thereon slidably mounted in the sinker sley and means to operate the latter to sever the thread from the work.

5. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, a slur cock, jacks to advance the jack sinkers, a catch bar to advance the dividing sinkers and withdraw all the sinkers, means to operate the catch bar, a plurality of fixed instruments mounted in the sinker sley, sliding instruments disposed between them to press the thread laid across the fixed instruments when a thread carrier is moved to an inoperative position in between the fixed instruments, jacks to advance the sliding instruments, butts on the latter for the catch bar to engage with to withdraw them and a sliding member having a cutting edge thereon and actuated by the catch bar to sever the thread from the work.

6. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, a slur cock, jacks to advance the jack sinkers, a catch bar, means to

operate the catch bar, a plurality of fixed instruments mounted on the sinker sley, sliding instruments disposed between them, jacks to advance the latter to press the thread laid across the fixed instruments in between the latter when a thread carrier moves to an inoperative position, butts on the sliding instruments a movable section on the catch bar to engage with the butts, to withdraw the sliding members, means to move the section to an inoperative position when desired and means to sever the thread from the work.

7. A straight-bar knitting machine comprising in combination, needles, a thread carrier, sinkers, means including a catch bar to operate the sinkers, a plurality of fixed instruments mounted on the sinker sley, sliding instruments disposed between them, butts on the sliding instruments, a movable section of the catch bar to engage therewith, means to advance the sliding instruments to press the thread laid across the fixed instruments, when a thread carrier goes out of action, in between the fixed instruments, an abutment on the thread carrier to engage with the movable section and move it into an inoperative position when the thread carrier moves to an inoperative position and means to sever the thread from the work.

8. A straight-bar knitting machine comprising in combination, needles, a thread carrier, sinkers, means including a catch bar to operate the sinkers, a plurality of fixed instruments mounted in the sinker sley, sliding instruments disposed between them, butts on the sliding instruments, a movable section of the catch bar to engage therewith carried by a pivoted arm, means to advance the sliding instruments to press the thread, laid across the fixed instruments when a thread carrier goes out of action, in between the fixed instruments, an abutment on the thread carrier to engage with the arm and raise the movable catch bar section to an inoperative position when the thread carrier moves to an inoperative position and means to sever the thread from the work.

9. A straight-bar knitting machine comprising in combination, needles, a thread carrier, sinkers, means including a catch bar to operate the sinkers, a plurality of fixed instruments mounted in the sinker sley, sliding instruments disposed between them, butts on the sliding instruments, a movable section of the catch bar to engage therewith carried by a pivoted arm, means to advance the sliding instruments to press the thread, laid across the fixed instruments when a thread carrier goes out of action, in between the fixed instruments, a lever operated by a stud on the pattern chain of the machine to raise the movable catch bar section to an inoperative position when the thread carrier moves to an inoperative position and means to sever the thread from the work.

10. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments, openings in the upper edges thereof in which the thread is laid when the thread carrier moves to an inoperative position, movable instruments between the fixed instruments, means to operate the movable instruments to press the thread in between the fixed instruments and a severing device adapted to sever the thread from the work.

11. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments, openings in the upper edges thereof in which the thread is laid when the thread carrier moves to an inoperative position, movable instruments between the fixed instruments, throats therein to engage with the thread, means to operate the movable instruments to press the thread in between the fixed instruments and a severing device adapted to sever the thread from the work.

12. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments, forked shaped outer ends thereon across which the thread is laid when the thread carrier moves to an inoperative position, movable instruments between the fixed instruments, means to operate the latter to press the thread in between the fixed instruments and a severing device to sever the thread from the work.

13. A straight-bar knitting machine comprising in combination, needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments across which the thread is laid when the thread carrier moves to an inoperative position, movable instruments between the fixed instruments, means to operate the movable instruments to press the thread in between the fixed instruments, means to sever the thread from the work and means to hold the thread carrier in an inoperative position whilst the work is pressed off the needles.

14. A straight-bar knitting machine comprising in combination needles, a thread carrier, jack and dividing sinkers, means to operate the sinkers and needles, a plurality of fixed instruments across which the thread is laid when the thread carrier moves to an inoperative position, movable instruments between the fixed instruments, means to operate the movable instruments to press the thread in between the fixed instruments, means to sever the thread from the work, an abutment on the thread carrier, a lever to engage with the abutment and hold the thread carrier in an inoperative position and means to move the lever to an inoperative position at the appropriate time to release the thread carrier.

15. A straight-bar knitting machine comprising in combination, a needle bar, needles carried thereby, two groups of jack and dividing sinkers, a thread carrier to each group, means to operate the sinkers, a plurality of fixed instruments disposed at the inner end of each group of sinkers, movable instruments between the fixed instruments, means to operate the movable instruments to press in between the fixed instruments the thread laid across each group of the latter when the thread carriers are moved to an inoperative position between the groups of sinkers and means associated with each group of fixed instruments to sever the thread from the work.

WILLIAM ARTHUR COOPER.
ERNEST START.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,100,345	Miller	Nov. 30, 1937
2,101,048	Ischinger	Dec. 7, 1937
2,363,008	Lambach	Nov. 21, 1944