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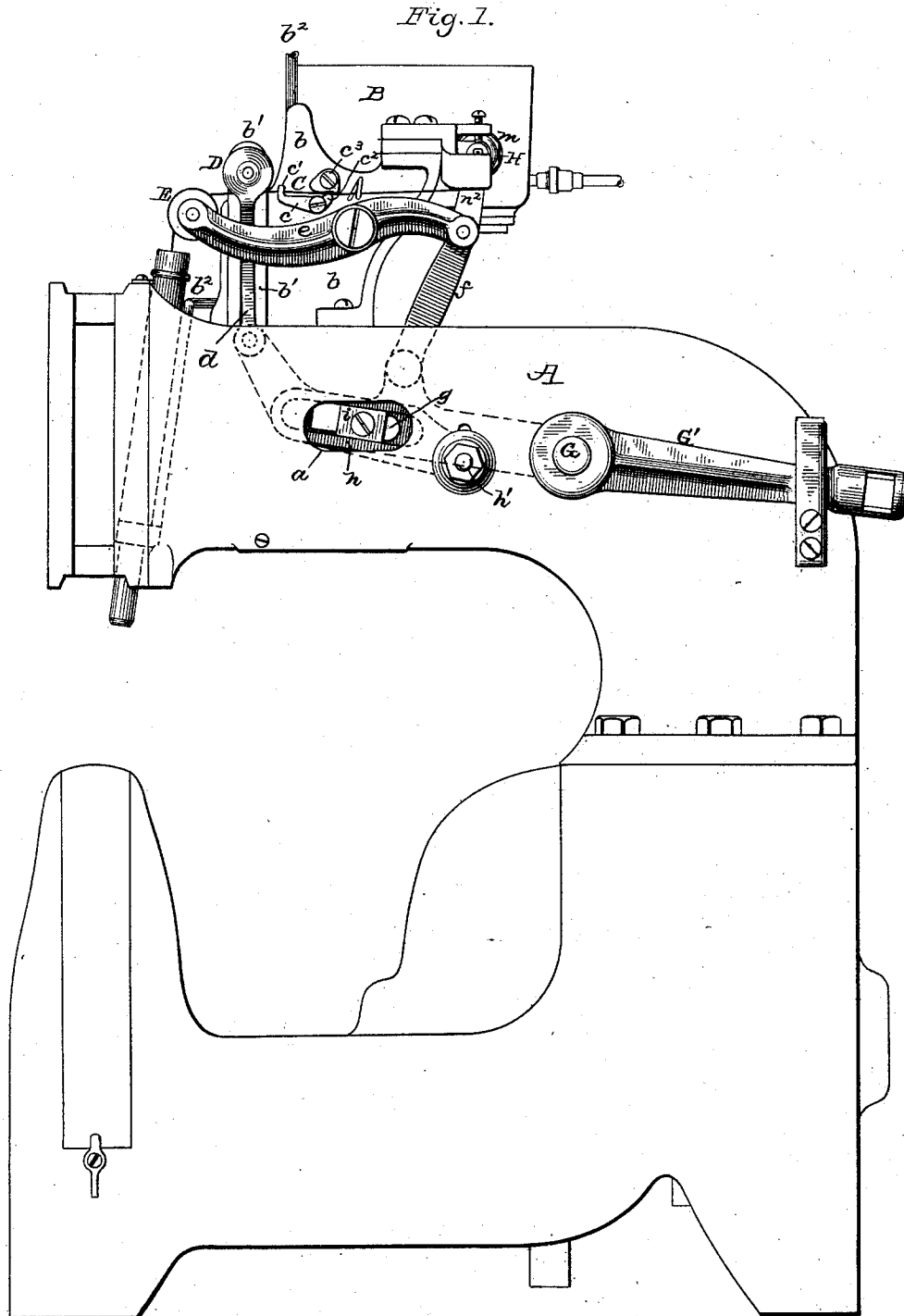
5 Sheets—Sheet 1.

D. H. CAMPBELL.

TAKE-UP DEVICE FOR WAX THREAD SEWING MACHINES.

No. 374,936.

Patented Dec. 20, 1887.



Attest
 Philip F. Larner.
 Sewell & Gaithe

Inventor:
 Duncan H. Campbell.
 By *Wm. Wood*
 Attorney.

(No Model.)

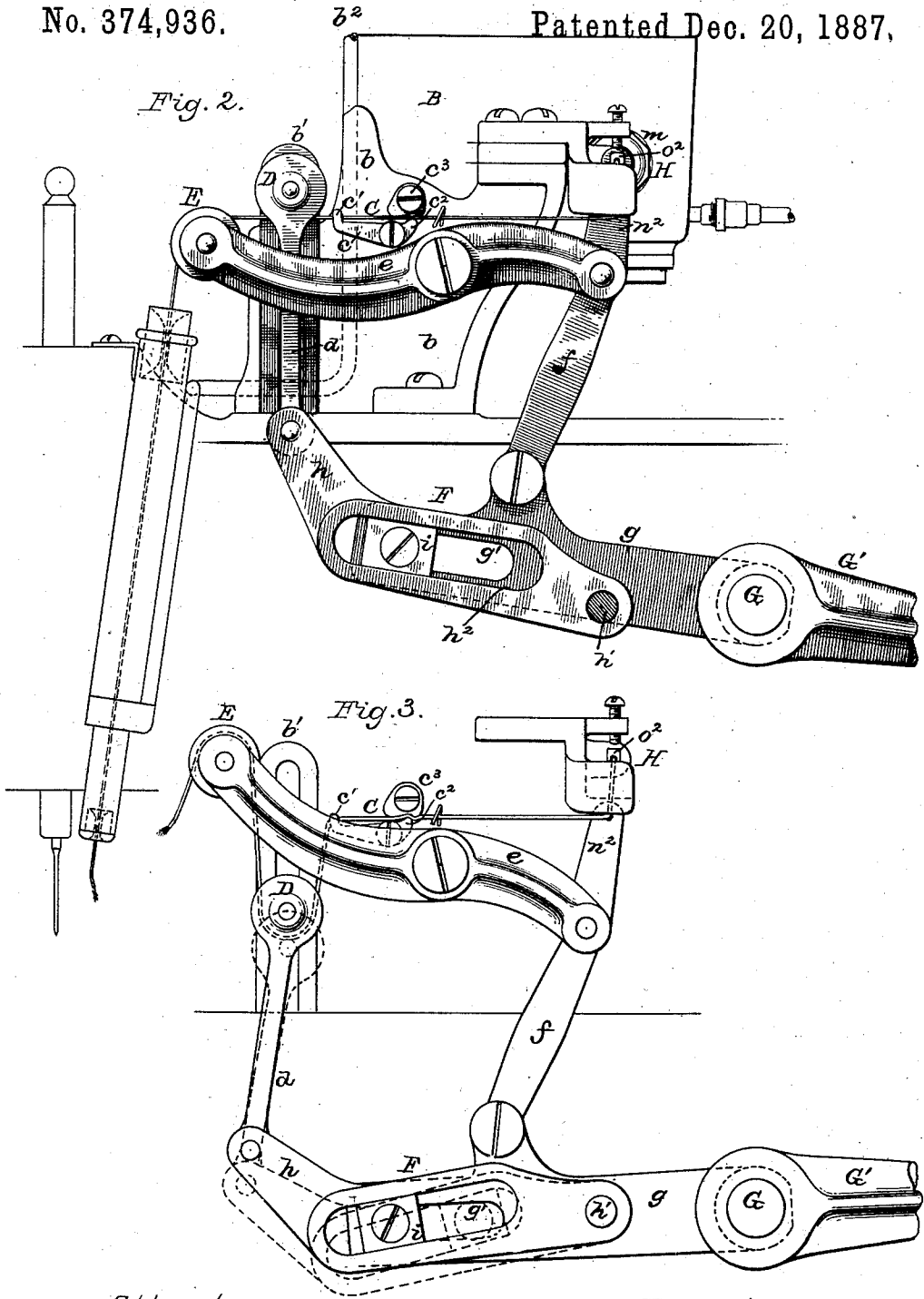
5 Sheets—Sheet 2.

D. H. CAMPBELL.

TAKE-UP DEVICE FOR WAX THREAD SEWING MACHINES.

No. 374,936.

Patented Dec. 20, 1887.



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TAKE-UP DEVICE FOR WAX THREAD SEWING MACHINES.

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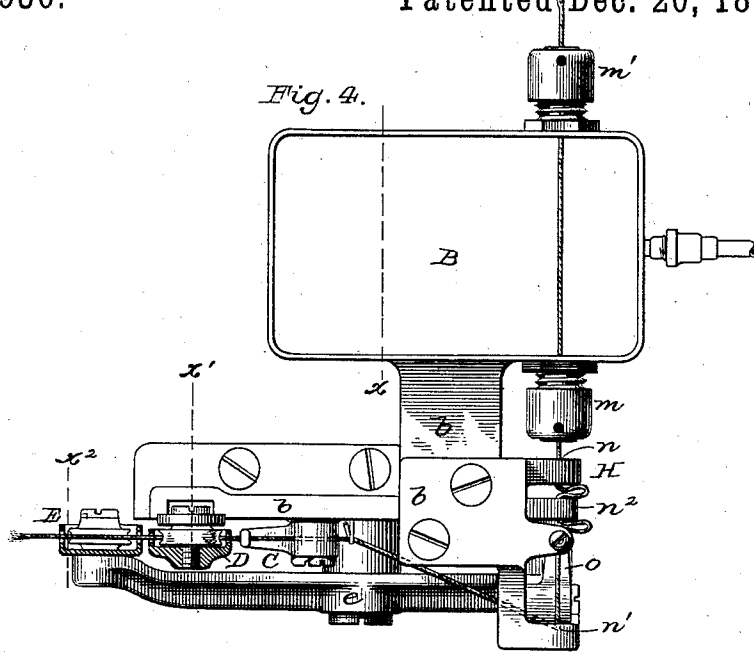


Fig. 5.

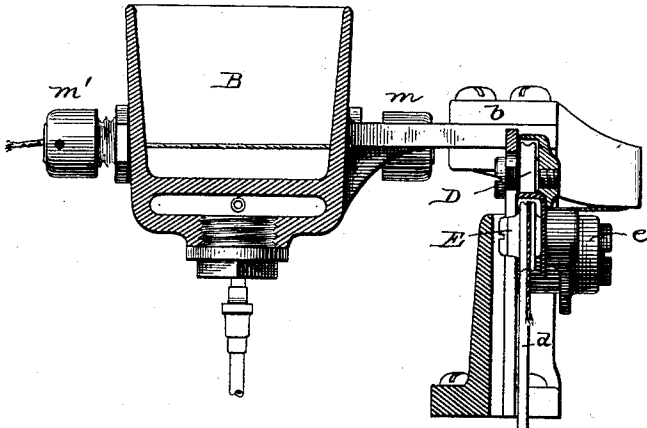


Fig. 6.

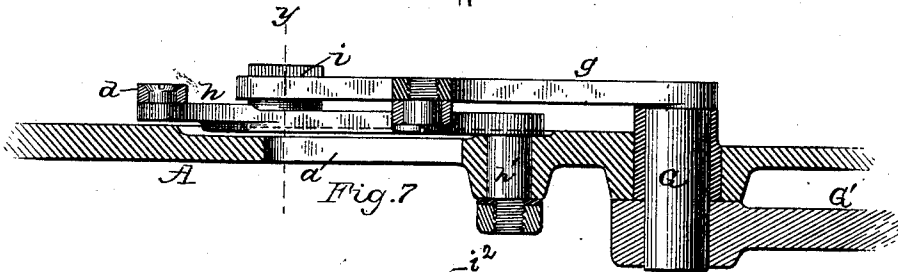
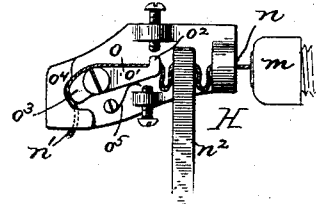


Fig. 7.

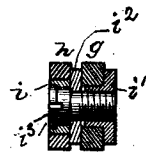


Fig. 8.

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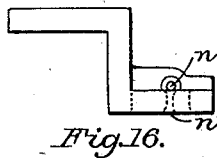
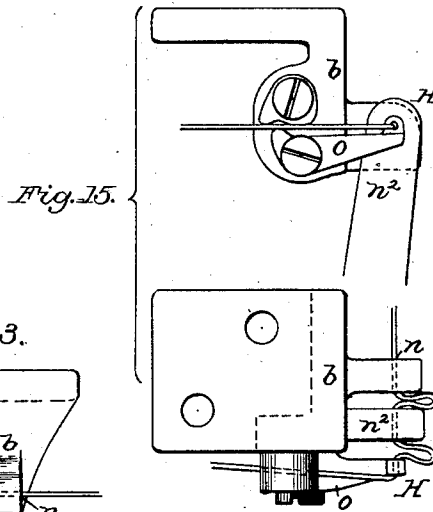
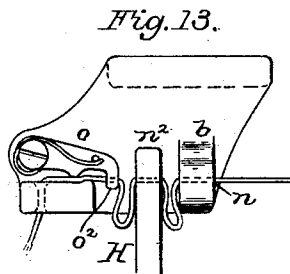
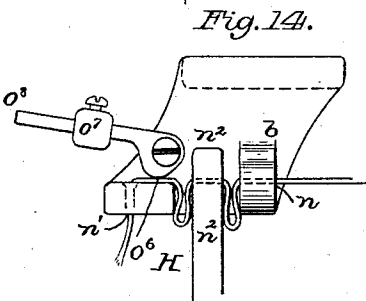
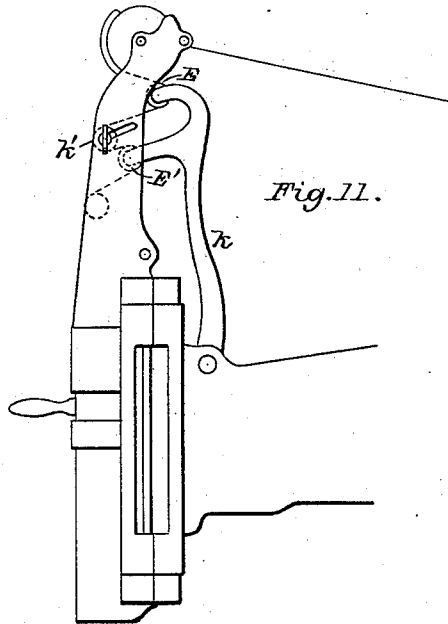
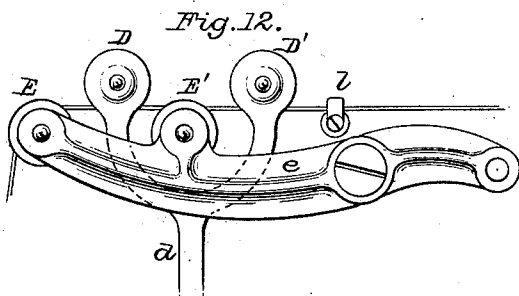
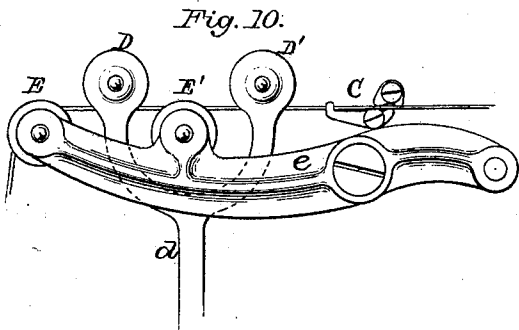
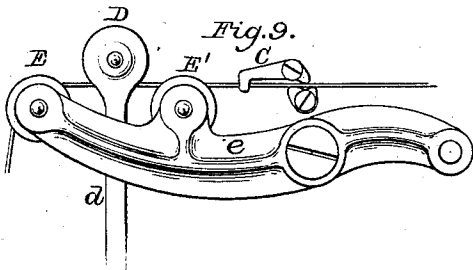
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TAKE-UP DEVICE FOR WAX THREAD SEWING MACHINES.

No. 374,936.

Patented Dec. 20, 1887.



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TAKE-UP DEVICE FOR WAX THREAD SEWING MACHINES.

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Fig 17.

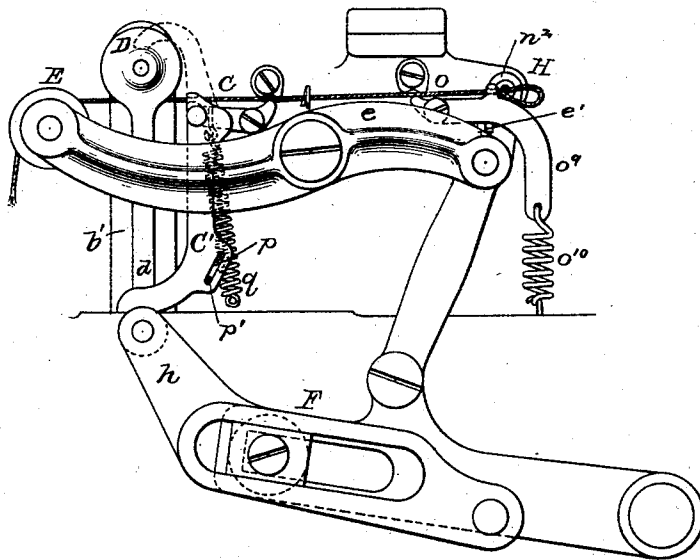
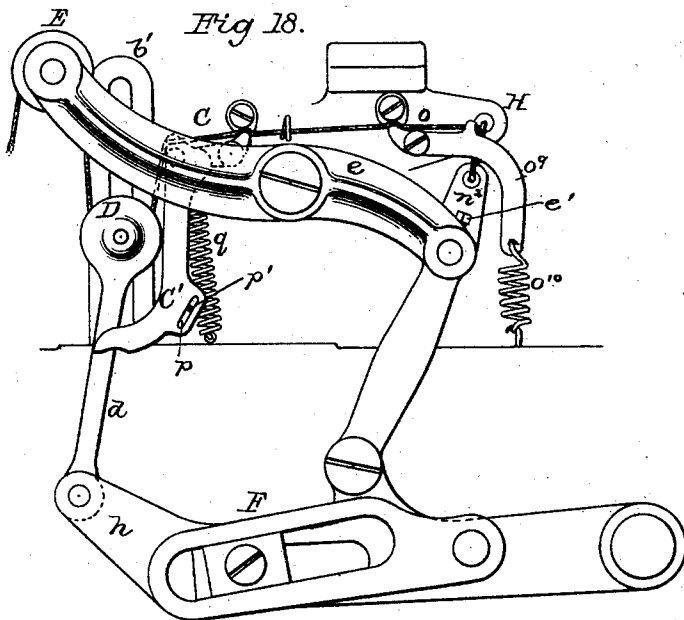


Fig 18.



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Inventor:

Duncan H. Campbell,
By *[Signature]*

Attorney

UNITED STATES PATENT OFFICE.

DUNCAN H. CAMPBELL, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO THE
CAMPBELL MACHINE COMPANY, OF SAME PLACE.

TAKE-UP DEVICE FOR WAX-THREAD SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 374,936, dated December 20, 1887.

Application filed June 9, 1885. Serial No. 163,143. (No model.)

To all whom it may concern:

Be it known that I, DUNCAN H. CAMPBELL, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain
5 new and useful Improvements in Wax-Thread Sewing-Machines; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part thereof, is a clear, true, and complete
10 description of the several features of my invention.

My present improvements pertain to the control of thread from its entrance to a wax-pot to its delivery to stitch-forming mechanism at or near the work-plate, and they relate
15 not only to taking up the thread, as in tightening a stitch, but also to feeding thread from the wax-pot to supply the needle.

In many sewing-machines as heretofore constructed for ordinary or dry-thread service various devices have been employed under the name of "take-ups," which are relied upon solely for so controlling the loose slack thread that it can pass freely downward with the needle under (in what may be termed) a "straightened-out" condition, as distinguished from a possibly "kinked" condition, and then as the
20 needle rises to further so control the slack thread that it will have a sharp bight at the eye of the needle, so that the latter can tighten the stitch. In wax-thread machines of the type to which my present invention pertains the needle is in no sense a stitch-tightening medium, because after a stitch has been formed
25 certain positively-operated fingers must perform the entire stitch-tightening duty, and inasmuch as they must first "take up" all slack thread said fingers have also been loosely termed "take-ups," although their prime duty
30 is to do something which the ordinary take-up does not and cannot do—viz., tighten the stitches. Said ordinary take-ups in dry-thread machines are accompanied by tension devices which freely render thread to the needle, and hence said tension devices and take-ups are in
35 no manner dependent upon each other for their proper operation; but the stitch-tightening fingers of the so-called "take-up" in my wax-thread machines essentially depend for their
40 operation upon a thread-brake, which can only be truly effective when it so clamps the thread

at a point between said fingers and its source that the thread cannot slacken, for if it does the stitch-tightening operation will be either wholly defeated or seriously impaired. 55

In wax-thread machines the quantity or length of slack thread to be controlled prior to the forming of each stitch varies according to the character of the stitch-forming mechanism; but in all of them the take-up mechanism
60 should be so far effective in its operation as to thoroughly control the slack thread and tighten the stitch under heavy strains, and in many cases, as in double-thread machines, so as to locate the bight of the two threads within the fabric. Whatever the length of the slack thread
65 may be, I find it important to properly control said thread by reciprocating mechanism having a limited range of movement, so that the shocks and noise due to the sudden stopping of a rapidly-reciprocated device can be
70 avoided and the tendency to break the thread reduced to a minimum, even though it be subjected to sufficiently heavy tensile strains to meet all possible requirements. 75

So far as my knowledge extends, wax-thread take-up mechanism has heretofore involved a single thread-finger, however varied in form and construction, reciprocating between two
80 fixed stationary or practically unyielding supports for the thread, whether said supports were in the form of thread-eyes or in the form of thread-wheels on substantially fixed pivots.

In certain machines heretofore constructed by me there has been on one side of the reciprocating thread-finger a thread-wheel mounted
85 on a pivoted arm or lever, which serves as a brake against a thread-wheel mounted on a fixed pivot, as shown and described in my Letters Patent, September 7, 1880, No. 231,954, and in certain other machines constructed by
90 me the thread on one side of the reciprocating thread-finger passes through an eye in a thread-brake lever, by which the thread is clamped in proportion to the tension developed thereon by the take-up, as shown and described in
95 my application for Letters Patent filed February 12, 1885, Serial No. 155,708. In all these prior machines the range of movement of the reciprocating take-up finger has been equal
100 substantially to one-half the length of slack thread controlled thereby, and one object of

my improvements is to lessen said range of movement, and to thereby take up the slack thread and heavily tighten each stitch in a prompt, easy, and practically noiseless manner. To that end I employ two or more co-operative fingers and preferably two or more oppositely-reciprocated take-up fingers, which operate simultaneously against opposite sides of the thread, and instead of moving all of the slack thread in one direction and in one bight it is thereby divided and moved in opposite directions from a straight line in two or more separate bights. To illustrate, I will assume that a take-up must control four inches of slack thread, and that a single thread-finger in taking up said thread, as heretofore, must be moved, say, about two inches. If, instead of one movable take-up finger, two be employed, as by me, each would only need to be moved, say, about one inch, and this will be still further lessened with each additional finger. In order that the upward draft of thread from the work-plate may be smoothly effected, I so construct my take-up in its best form that one of the fingers rises and falls substantially in line with the vertical course of the thread above the work-plate, instead of at right angles to that line, as in all prior machines known to me.

I have also organized with my co-operating thread-fingers the thread-brake as devised by me, so that as the take-up operates the tensile strain on the thread operates the brake and limits the operation of the take-up to the thread between said brake and the work-plate, and also so that the take-up will release the brake.

As in many other prior machines, some of them organized for wax-thread sewing, I relieve the needle (or in lieu thereof relieve the thread-arms of my prior machine by which thread is measured off and delivered to a hook-needle) from the labor of drawing the thread through a wax-pot by employing a thread-feeder adjacent to the wax-pot, which, between the strokes of the needle, draws a sufficient quantity of thread from the wax-pot to form a stitch; but as one novel feature in this connection I employ between said feeder and the take-up mechanism a thread-clamping brake which is operated by the action of the thread itself, and caused to firmly grip the thread, whether said action be the result of the operation of the stitch-tightening take-up or due wholly to the operation of the thread-feeder preparatory to drawing thread from the wax-cup.

I have organized my improvements with special reference to their use in connection with such machines as are shown and described in my before-mentioned Letters Patent, and also in Patent No. 253,156, dated January 31, 1882; but it will be obvious that they are in whole or in part applicable to wax-thread sewing-machines otherwise constructed.

After fully describing the illustrations of my improvements in their several forms, the

features deemed novel will be specified in the several clauses of claims hereunto annexed.

Referring to the drawings, Figure 1 is a side elevation of so much of one of my improved machines as is deemed necessary for illustrating the embodiment of all my present improvements therein in what I deem their best form. Fig. 2 is an enlarged side view of the portion of said machine which contains my improvement. Fig. 3 is a view similar to Fig. 2, but with the take-up and feeder mechanism in different positions. Fig. 4 is a plan view of the parts shown in Fig. 2. Fig. 5 is a vertical section of the same on line x, x' , and x'' , Fig. 4. Fig. 6 is a rear end view of a portion of Fig. 5. Fig. 7 is a partial sectional and plan view of a portion of the side of the arm of the machine, the levers by which the take-up is operated, and the means by which said levers are adjustably coupled. Fig. 8 is an enlarged sectional view of Fig. 7 on line y , showing said levers and their adjustable coupling. Figs. 9, 10, 11, and 12 illustrate modifications of my take-up. Figs. 13 and 14 illustrate two modifications of thread-brake, both of which are operated by the initial movement of the thread by the thread-feeder. Fig. 15, in two views, illustrates a variation in the arrangement of the feeder-arm and its brake. Fig. 16 illustrates the thread-feeder as arranged when it co-operates only with a thread-brake operated by the take-up mechanism. Figs. 17 and 18 illustrate the take-up as when arranged to release the thread-brake.

Referring to Fig. 1, it is to be understood that my present improvements are mounted upon or embodied in the arm A of the machine, and said arm is substantially as heretofore, except that it has at one side an opening, a , for affording access to the adjusting mechanism by which the throw of the take-up fingers is varied. On top of the arm there are also other openings for the accommodation of vertical portions of the mechanism now employed by me.

A standard, b , is mounted on top of the arm, and on this the wax-cup B is supported. Said standard has also a vertical slotted guide, b' , in which the axis or stud of a vertically-reciprocating thread-finger wheel slides, and these, separately considered, are substantially as heretofore. At one side of the standard b and secured thereto is a steam-pipe, b'' , by which said standard and the mechanism adjacent thereto are maintained in a well-heated condition.

The thread-clamping brake C is mounted on the side of said standard b , and is composed of a lever, c , having a thread-eye, c' , at its outer end, and at its opposite end a curved face, c'' , which co-operates with an adjustable concave-faced thread-block, c''' , substantially as shown and described in my aforesaid application, and as in my prior organization, this thread-brake is operated by the tensile strain upon the thread incident to the operation of the stitch-tightening take-up.

In all of my own machines as heretofore constructed, as well as in other wax-thread machines having a reciprocating thread-finger operating as a take-up, the thread passes from said finger over a wheel on a fixed pivot or through a fixed eye, and thence to the work-plate; but I have now combined with the vertically-reciprocating thread-finger D a second reciprocating thread-finger, E, and this latter substantially occupies the direct line or path of the thread on its way downward from the take-up to the work-plate. It will be obvious, if the thread-finger E be rendered non-reciprocating, that the reciprocating finger D would constitute a complete take-up, and that such other fingers as may co-operate therewith constitute additional portions of the take-up. The thread-finger D is coupled by a link, *d*, to the complex take-up lever F, and the thread-finger E is mounted at the end of the horizontal or walking-beam lever *e*, and this at its opposite end is coupled to the complex lever F by the link *f*, so that at each downward movement of the thus coupled end of said lever F the finger D is depressed and the finger E elevated, and as the thread passes beneath the finger D and over the finger E they, by their opposite movements, respectively depress and elevate the thread below and above the straight line occupied by it when running free, and hence they control and take up the slack thread with, say, about half the movement of each finger, for taking up a given length of thread that would be required of the finger D if that alone were reciprocated. The particular system of leverage here shown obviously imparts to the finger D a somewhat wider range of movement than the finger E, as indicated in Fig. 3, and this difference can be and is varied by adjustment for variably locating the bight of two threads in a fabric.

In my prior machines the thread-finger D operated by forming one bight or bend in the thread; and it now forms a similar but shorter bight, because the finger E, by moving above the true path of the thread, practically forms a second bight or bend, and in doing this it draws thread upward from the work-plate in a practically straight line.

Although it is desirable that the finger D be limited to a vertical movement, and therefore coupled to the complex lever by a link, it will be obvious that said finger, like the finger E, can be mounted upon its lever and still do good service, and that this would only involve such an arrangement of the two fingers and their levers as would enable both fingers to vibrate without contact with each other. Each thread-finger has the usual grooved wheel thereon to obviate undue friction with the thread, and each wheel has the usual inclosing-shield by which the thread is maintained in proper relation to the fingers.

The adjusting of the take-up finger D, for variably locating stitch-bights in a seam, is performed by adjusting the two parts or sec-

tions of the complex lever F. This lever consists of a rock-shaft, G, an outside arm, G', engaged by a lateral lever and an interior arm, *g*, coupled to an auxiliary arm, *h*, which is pivoted at *h'* to the side of the arm of the machine. In this connection novelty is involved in the combination with the take-up finger D of the complex lever, composed in part of the arm *h*, having a longitudinal slot, *h*², and the arm *g*, having a slot, *g*¹, and a pivot-block, *i*, which is adjustable in said slot *g*¹ and can be clamped at any point therein. The vibration of the arm *g* is uniform; but the vibration of the auxiliary arm *h* is lengthened or shortened according to the varied position of the pivot-block in its slot.

The pivot-block, considered as a whole, consists of a rectangular block, *i*, fitted to slide freely in the slot *h*², a flanged nut, *i*¹, flat on two sides and fitted to the slot *g*¹, a washer, *i*², interposed between the two levers *g* and *h*, and also between the rectangular block and the flanged nut, and a central pivot bolt or screw, *i*³, which firmly locks the washer *i*² and the flanged nut *i*¹ to the lever *g*, thus rendering them immovable in the slot *g*¹, but permitting the rectangular block *i* to have a free rocking movement on the round shank of said screw or bolt as its axis during the vibrations of the lever and the consequent sliding movement of said block in its slot *h*² in the lever *h*. In my prior machines the take-up finger D is thrown downward by the operation of a quickly-acting cam, leaving the free movement or momentum of loose levers and said finger to complete its downward movement, and the extent of said movement is therein limited and varied by means of an adjustable abutment or stop; but with my present means for the adjustment of said finger it will be seen that I employ connections between it and the cam by which it is operated which allow of no free movement by said finger.

It will be obvious that the adjustable pivot-block, in combination with the two slotted parts *g* and *h* of the complex lever F, is as applicable for the adjustment of the thread-finger D, when it alone is reciprocated, as when it is employed with additional reciprocating fingers co-operating therewith.

The employment of two oppositely-vibrated thread-fingers, as thus far shown and described, is ample for all ordinary purposes, because their comparatively short range of movement enables a prompt, easy, and effective control of a considerable length of thread with but little, if any, shock or noise, and tensile strain for tightening the stitches and locating the stitch-bight can be therewith applied to the thread to any degree under that which would break it. With the oppositely-reciprocated take-up fingers it will be seen that the heavy strains exerted upon the thread are well distributed between the two parts of the complex lever, and it will also be obvious that the walking-beam lever and its finger operates as a counter-balance for the complex lever, thus secur-

ing the smooth, easy, and noiseless operation of the take-up and enabling the machine to be operated with uniform results at a high rate of speed.

5 In prior dry thread-machines oppositely-vibrated arms for controlling slack thread have been employed; but, so far as I know, it is broadly new in wax-thread machines to employ a positively-operated stitch-tightening
10 take-up embodying two or more reciprocating fingers, which will dispose of a given length of slack thread by making two or more bights or bends therein, regardless of the character of the thread-brake employed therewith; and
15 while the best results can be obtained by the use of oppositely-reciprocated fingers, it will be within one portion of my invention if two or more fingers be simultaneously moved in one direction, so as to form two or more bights
20 of the slack thread, and thus enable said fingers with but little movement to nevertheless fully and easily control a considerable length of thread. For instance, in Fig. 11 I illustrate the upper portion of a machine in which,
25 as heretofore, the take-up arm *k* vibrates in a vertical plane toward and from the vertical path of the thread on its way from a gripped thread-wheel to the work-plate. Heretofore in such machines a single take-up finger with
30 a wide range of movement formed one long bight or bend in the thread; but with the two vibrating take-up fingers *E* and *E'*, here shown, co-operating with the intermediate stationary thread wheel or finger *k'*, two short bights of
35 thread are formed, thus greatly shortening the vibratory movement of the take-up arm *k*, as compared with what its movement must be when a single thread-finger is used, as heretofore. The thread-wheel *k'* has its axis adjust-
40 able in a slot, as shown, whereby the stitch-tightening operation of the take-up fingers may be obviously varied, as well as the location of the stitch-bights.

In some cases three thread-fingers oppositely
45 reciprocated may be profitably employed, as illustrated in Fig. 9, wherein the thread-finger wheel *D* is, as before described, located between the two fingers *E* and *E'*, these latter being mounted upon the one lever and co-
50 operating with the finger *D* and the thread-brake *C*, this latter being as before described, except that it is reversed in position, so that an upward draft on the thread by the finger
55 next to it will cause it to clamp and hold the thread firmly. In other cases four oppositely-vibrated thread-fingers, *D D' E E'*, may be employed, as illustrated in Fig. 10, with which the
60 thread-brake *C* may be employed, as shown in Fig. 2; and when the thread is otherwise confined against forward movement, as herein-
65 after described, the same or a lesser number of fingers may be employed with a simple thread eye and wheel *l*, as illustrated with oppositely-reciprocated fingers in Fig. 12. In my present machine, as shown in Fig. 1, I employ a substantially-vertical thread-tube extending within the head of the machine from

near the take-up toward the work-plate, as in my prior machines; but instead of using it as a part of the waxing apparatus, it is now employed as a heating-chamber for the waxed
70 thread on its passage to the needle, and it is maintained in a well-heated condition by steam-pipes *b'*, placed in contact with it or closely adjacent thereto. 75

I will next describe the waxing apparatus and the thread-feeder by which the thread is controlled, so far as relates to drawing it from the wax-pot and delivering it in variable quantities or lengths for each stitch, and corresponding with the quantity or length of thread
80 actually used in making the last preceding stitch.

The wax-cup *B*, as before stated, is mounted at one side of the standard *b*, and it has a steam-jacket below its bottom provided with induction and eduction steam-pipes. In each of its
85 sides, a little above its bottom, it has two tubular heads, *m m'*, which are provided with compressible packing and are coincident with each other, so that dry thread from a spool or
90 ball will pass through the head *m'*, directly through or across the wax-pot into and through the head *m*. This construction of wax-cup and its heads will constitute in part the subject of a separate application for Letters Patent. (See
95 Serial No. 188,704.) The thread is thus passed directly through the highly-heated portion of the wax above the sediment liable to accumulate at the bottom of the cup, and is much better saturated with wax than when, as is usual, it
100 passes down and up twice through the cooled caked and impure portions liable to be encountered at the top of a body of heated wax.

The tension on the thread within the cup
105 can also be reduced to a minimum, and as the thread turns no corners and does not change direction in the cup it is always in a condition highly favorable for thoroughly absorbing the wax. The coincident heads also enable
110 the thread to be drawn through the cup very easily by the thread-feeder *H*. This thread-feeder is novel in its construction and mode of operation. It includes in its best form a slotted
115 horizontal portion of the standard *b*, having at one side of the slot a thread hole or eye or seat, *n*, coincident with the center of the wax-cup head *m*, and at the other side a vertical thread hole or eye, *n'*; and within said
120 slot there is a vertically-reciprocating feeder-arm, *n''*, and a thread-brake, which is actuated by the movement or the tension of the thread itself, and located at some point between said thread-arm *n''* and the take-up—as, for instance, the thread-brake *C*, controlled by the
125 movement and tension of the thread induced by the action of the take-up mechanism—will prevent the backward movement of the thread whenever the reciprocating feeder-arm is engaged in drawing thread from the wax-cup, and this will be generally effective if the feeder-arm have its downward movement in harmony with the tightening movement of the
130 take-up; but in its best form the feeder should

include a thread-brake of its own, operated by the motion or tension of the thread induced by the movement of the feeder-arm itself, and therefore I have mounted upon the standard *b*, between the thread-hole *n'* and the feeder-arm, the thread-brake *o*. This thread-brake consists of a lever, *o'*, having at its outer end an eye, *o''*, and at its opposite end a rounded face, *o'''*, which co-operates with a concave thread-block, *o''''*, the face of the latter being substantially in line with the threaded hole *n'*. A light spring, *o''''''*, below the outer end of the lever, serves to maintain it normally in an elevated position, and the clamping-faces at *o''* and *o''''* are then so far separated that thread under free tension can be drawn downward through the thread hole or eye *n'*; but when the feeder-arm descends and the thread between the brake and wax-pot is drawn taut the brake operates and prevents any movement of the thread except from the wax-pot.

In operation the thread under the control of the feeder-arm can never be drawn taut by the direct operation of the stitching mechanism, there being always a considerable length of slack thread at the feeder-arm, and although its vibrations are uniform its operation is variable, because it only draws from the wax-pot at each stroke just as much thread as was consumed in making the last previous stitch, and this cannot be fixed or definite, but will vary from time to time according to the variable thickness of the leather or fabric along the line of a seam. For limiting the vibration of the brake-lever *o'* to exactly what may be required two adjusting-screws may be oppositely located, one above and the other below said lever, to serve, respectively, as stops against its undue upward and downward movements.

It is immaterial, so far as regards certain portions of my invention, in what manner the feeder-arm is reciprocated; but in its best form it is made a part of or attached to the link *f*, by which the walking-beam lever *e* is coupled to the complex lever *F*, not only because of simplicity in construction, but also because the feeder is thus made to operate in harmony or synchronously with the take-up. The brake *o*, operated by the movements of the feeder, when it operates in harmony with the take-up, may sometimes be relied upon not only to limit the movement of thread from the wax-cup, but also to prevent the thread from moving toward the take-up during the tightening of a stitch, and so, also, can the brake *C* be sometimes relied upon to perform this double service; but for obtaining the best and most reliable results I provide a special brake for the feeder, and although the brake *o* is in a desirable form I do not limit myself thereto, because, in view of the comparatively light tensile strain involved in drawing thread from a wax-pot as devised by me, I am aware that other forms of brake operated by the movement of or tension on the thread, due to the action of the feeder, may be employed without materially affecting my invention—as, for in-

stance, instead of a lever of the first order, one of the second order may be used, as illustrated in Fig. 13, in which case the descent of the feeder-arm *n''* causes the thread to be clamped between the fulcrum and the outer end of the lever, where the thread passes through an eye, *o''*, as before described. Again, in lieu of a lever directly deflected by tension, a cam-lever brake may be employed, as illustrated in Fig. 14, by which the thread is clamped between a flat seat and the face of the cam *o''*, this latter being so formed that it will be firmly set upon the thread by the slightest initial rearward movement thereof, due to the strain on the thread from the feeder-arm *n''*, and yet said cam will allow a forward movement of the thread, varied as to freedom or tension by the adjustment of the sliding weight *o''''* on the arm *o''''''* of the cam-lever.

While I prefer to reciprocate the feeder-arm *n''* in a slot, the brake *o* may be arranged to substantially form one side of a slot, and so that its eye will serve as the thread-seat *n'*, as before described, and as illustrated in Fig. 15.

As hereinbefore indicated, the feeder-arm *n''* may sometimes be relied upon without a brake of its own if the take-up brake *C* be operated in harmony with said arm, and in this case the arm is located within a slot provided only with the thread holes or seats *n* and *n'*, as illustrated in Fig. 16.

In working with some grades of very smooth thread charged with highly heated and slippery wax there is a tendency for the brake during its initial braking action to admit of a slight slip of the thread, and this tendency I obviate by providing the brake with a light spring for initially setting it upon the thread, and causing the brake to be absolutely released by means of a tail-piece which is lifted by a vertically-reciprocating portion of the take-up just prior to the moment when the thread should be free for delivery to the needle.

In Figs. 17 and 18 I show the take-up fingers *D* and *E* and the brake *C* as illustrated in Figs. 1, 2, and 3; but the latter is now shown to be provided with a pendent tail-piece, *C'*, which is pivoted to the outer end of the brake-arm and is curved at its foot toward the link *d*, and at its tip it is forked, so as to loosely embrace said link. For guiding said tail-piece it has a slot, *p*, occupied by a rigid stud, *p'*, projecting laterally from the head-frame. For maintaining the jaws of the brake in a normally-closed position, a light retractile spiral spring, *q*, is coupled at one end to the outer end of the brake-arm and at its other end to a stud on the frame, as clearly indicated. When thus organized, it will be seen from Fig. 17 that when the thread should be free the end *h* of the take-up lever *F* will strike the tail-piece and release the brake, not only as against the previous downward strain of the thread, but also as against the action of the light spring *q*. When the brake should operate for clamping the thread, it is free to have the outer end of its arm depressed, because, as shown in Fig.

18, the take-up lever $F \frac{1}{2}$ is at its lowest position and the finger D is then pulling heavily downward on the thread.

The guide-slot and stud may be dispensed with if the tail-piece be rigidly coupled to the brake-arm; and in lieu of the tail-piece being below the brake, it may be above it, as indicated in dotted lines in Fig. 17, so that it will be lifted by the top of the link d at one side of the thread-finger D. A similar contrivance is also applicable under the same conditions to the brake which co-operates with the thread-feeder H, as illustrated in Figs. 17 and 18. I here show a brake, o , like that illustrated in Fig. 15; but it is here provided with a pendent tail-piece, o^9 , and a light retractile spring, o^{10} , and said tail-piece so overlies the rear end of the rocking-lever e as to occupy its path, and therefore when said lever is holding the take-up finger B free from the thread its rear end is lifting the arm of the brake and releasing its jaws from clamping contact with the thread. The tightening action on the brake, by the feeder-arm n^2 straining on the thread, is as before described, although it is augmented (more or less) by the spring. The lever e is provided with an adjustable abutting screw, e' , by which its lifting contact with the tail-piece o^9 can be readily varied and adjusted.

I have hereinbefore indicated that it is not new to employ in wax-thread machines a thread-feeding device between the wax-cup and the needle, nor between the wax-cup and a thread-wheel, around which the thread passes, and which is provided with a ratchet-wheel and pawl for preventing the wheel from being turned backward during the operation of the thread-feeder. In this latter instance the thread-feeder drew the thread from the wax-pot through a thread-stripper; but my contrivance differs from any other known to me, in that my thread-feeder, as a whole, includes, essentially, a clamping thread-brake which, by the tension on the thread, is caused to reliably clamp it, and thus not only assure a proper draft of thread from the wax-pot, but enables the stitch-tightening take-up to operate under the heaviest possible tensile strains, without any liability of its being incapacitated by taking up any of the slack thread which is always immediately adjacent to the feeder.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a wax-thread sewing-machine, the combination, with a thread-clamping brake, of a take-up embodying two or more positively-reciprocated stitch-tightening thread-fingers, substantially as described, whereby slack thread is taken up in two or more bights, and thereby easily and promptly placed under a stitch-tightening tension.

2. The combination of a thread-clamping brake and a take-up embodying two or more positively-operated oppositely-vibrating stitch-tightening thread-fingers, substantially as described.

3. The combination, with a thread-clamping brake operated by tension on the thread, of oppositely-reciprocated stitch-tightening thread-fingers operating as a take-up, substantially as described, whereby the brake is operated by said take-up and the slack thread controlled and strained in two or more bights, as set forth.

4. The combination, in a wax-thread sewing-machine, of a thread-clamping brake and oppositely-reciprocated stitch-tightening take-up fingers, one of which is reciprocated substantially in line with the thread extending from it to the work-plate of the machine, substantially as described, whereby the slack thread is taken up in two or more bights and stitches tightened by a direct lift between one of said fingers and the work-plate.

5. The combination, substantially as hereinbefore described, of oppositely-reciprocated stitch-tightening take-up fingers, and an operating-lever by which both of said fingers are reciprocated and to which one of said fingers is adjustably connected, whereby stitch-bights may be variably located and a variable quantity of slack thread taken up in two or more bights.

6. The combination, in a wax-thread sewing-machine, with a stitch-tightening take-up finger and a complex lever coupled thereto, composed in part of a main section, g , slotted at its outer end, and a slotted auxiliary section, h , pivoted at one end to the frame of the machine and coupled at its opposite end to the take-up finger, of a pivot-block occupying the slots in both sections of said complex lever and adjustable therein, substantially as described, whereby the said two parts or sections of the complex lever are coupled and the reciprocation of the take-up finger variably adjusted.

7. The combination of a thread-clamping brake and two or more oppositely-reciprocated stitch-tightening take-up fingers coupled to and operated by a single lever, substantially as described.

8. The combination of oppositely-reciprocated stitch-tightening take-up fingers and a main lever to which said fingers are coupled by auxiliary arms or levers and links, substantially as described, whereby said fingers and their coupling mechanism are counterbalanced during their operation.

9. The combination, with the take-up, of a thread-clamping brake having a spring for initially setting it in contact with thread in its jaws and provided with a tail-piece, which is engaged by a reciprocating portion of the take-up mechanism for releasing the thread from the action of the brake, substantially as described.

10. The combination of the thread-feeder brake provided with a spring for initially setting said brake upon the thread and a tail-piece on the arm of said brake projecting into the path of a reciprocating portion of the take-up mechanism, substantially as described, for relieving said brake at intervals from the ac-

tion of its spring, and also releasing thread from the brake.

5 11. In a wax-thread sewing-machine, the combination of a thread-clamping brake operated by tension on the thread, a wax-pot, and a reciprocating arm operating exclusively as a thread-feeder between said brake and wax-pot, substantially as described.

10 12. In a wax-thread sewing-machine, the combination, with a wax-pot, of a reciprocating thread-clamping feeder-arm and a thread-brake operated by tension on the thread induced by said feeder-arm, substantially as described.

13. In a wax-thread sewing-machine, the 15 combination, with a wax-pot, of a reciprocating stitch-tightening take-up finger, a reciprocating thread-feeder arm operating synchronously with said take-up finger, and a thread-clamping brake operated by tension on the 20 thread during the operation of the take-up, and also during the operation of the thread-feeder arm, substantially as described.

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Witnesses:

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