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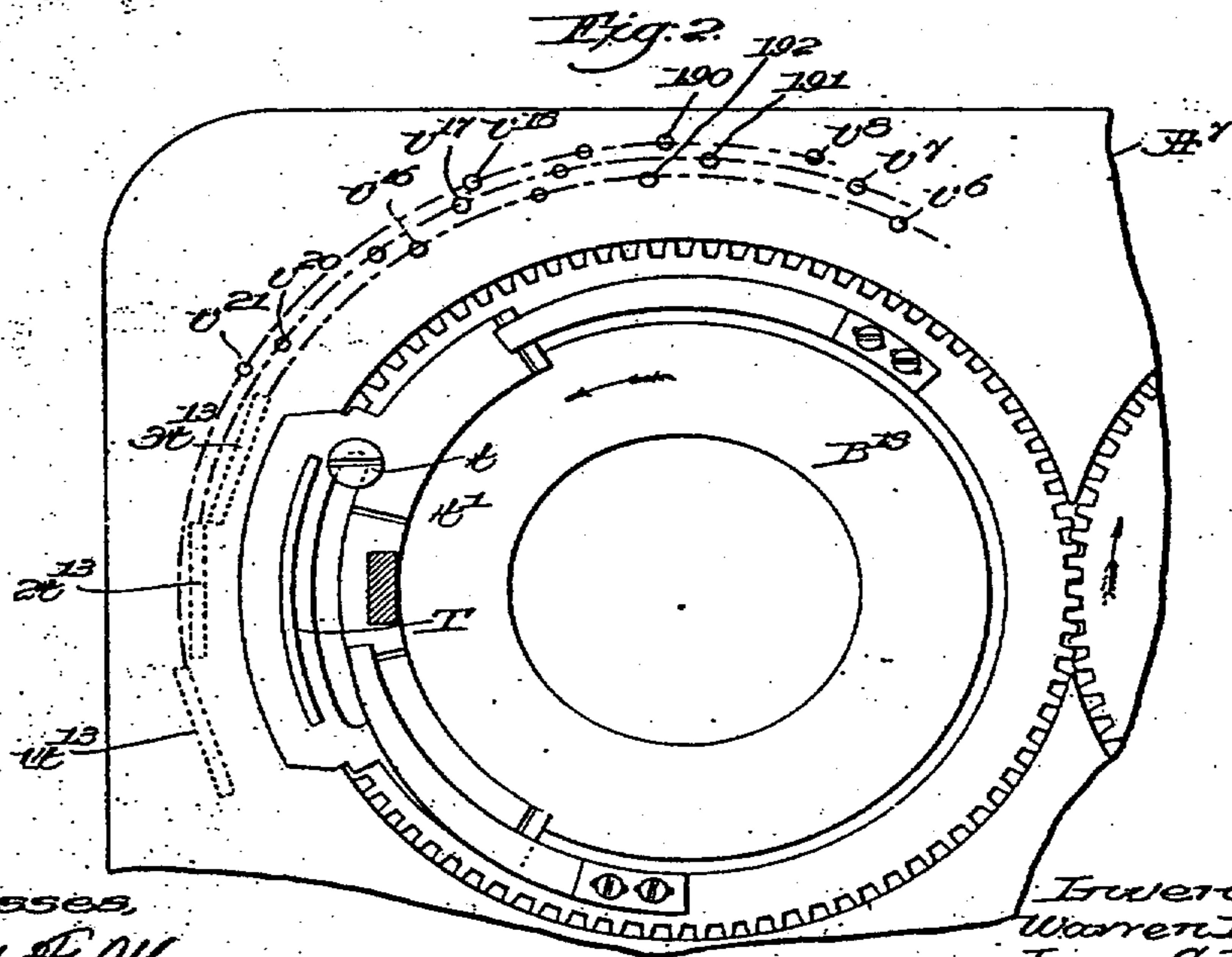
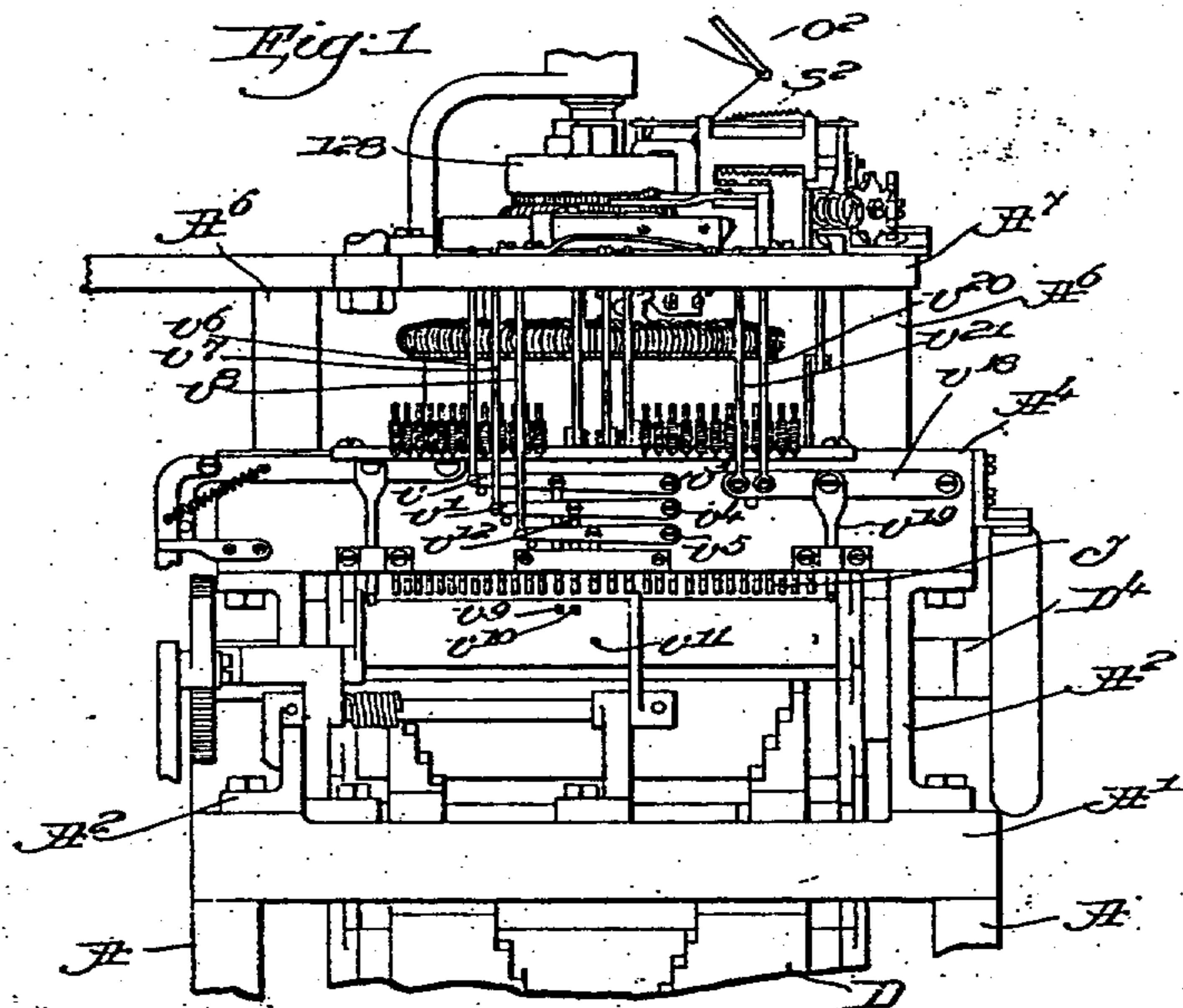
PATENTED FEB. 18, 1908.

W. D. & L. C. HUSE.

THREAD FEEDING MECHANISM FOR KNITTING MACHINES.

APPLICATION FILED JAN. 17, 1906.

3 SHEETS—SHEET 1.



Witnesses,
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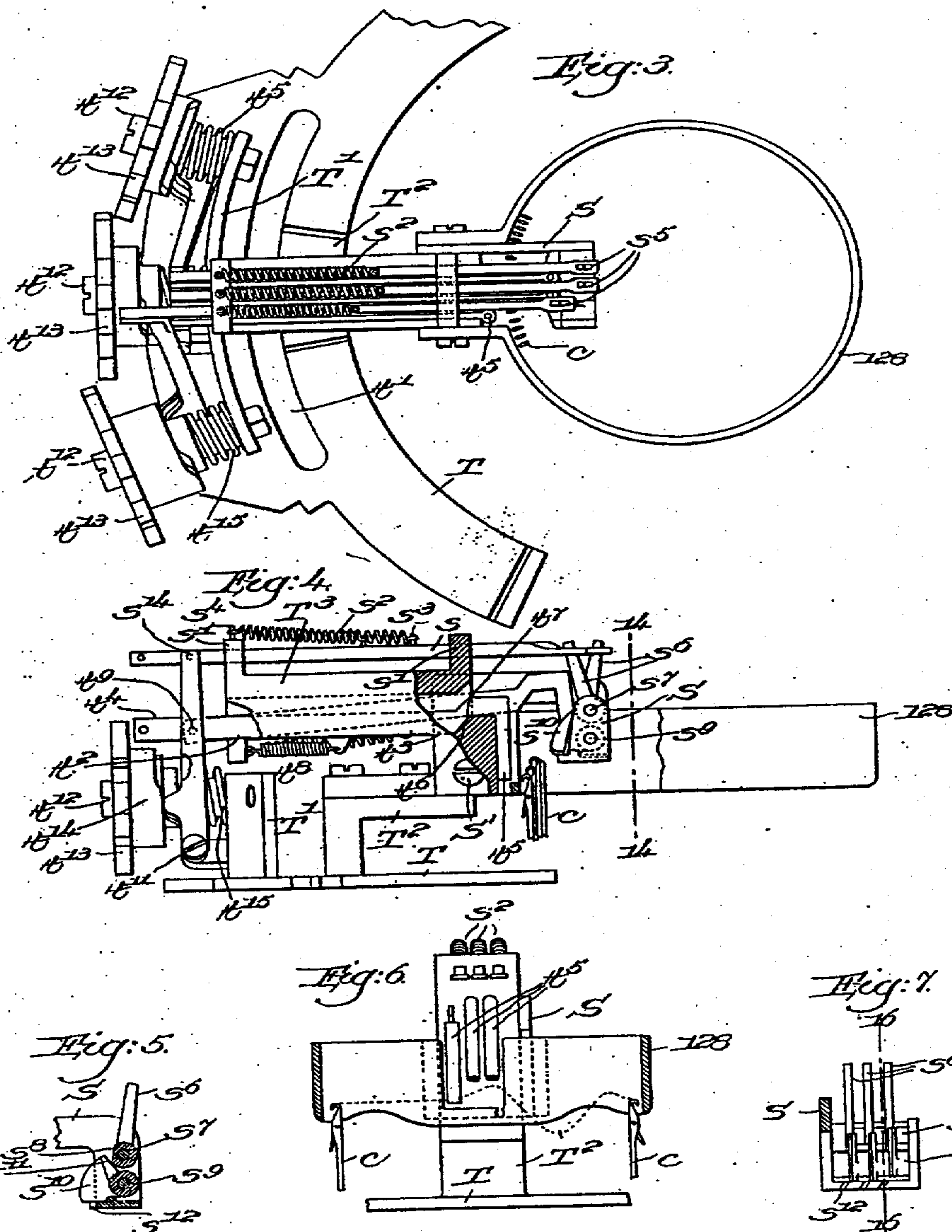
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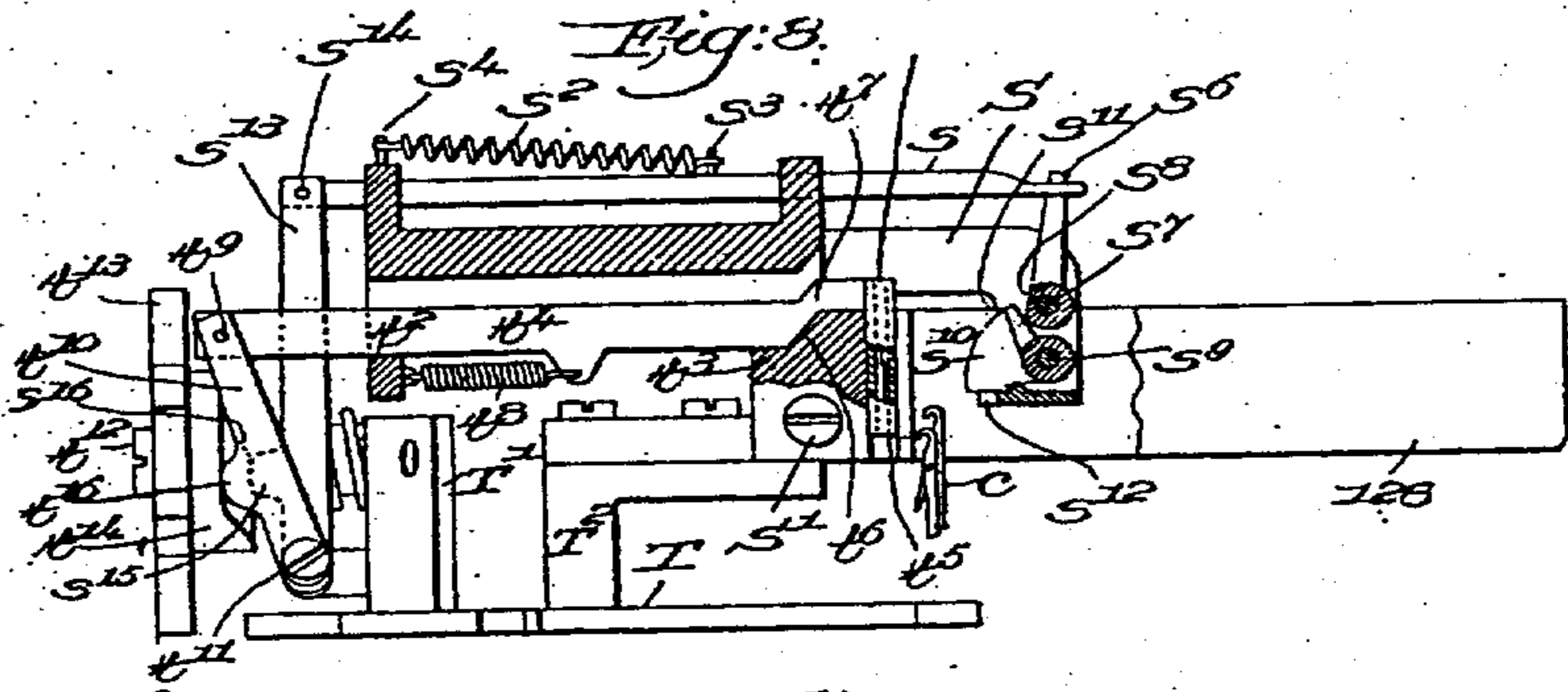
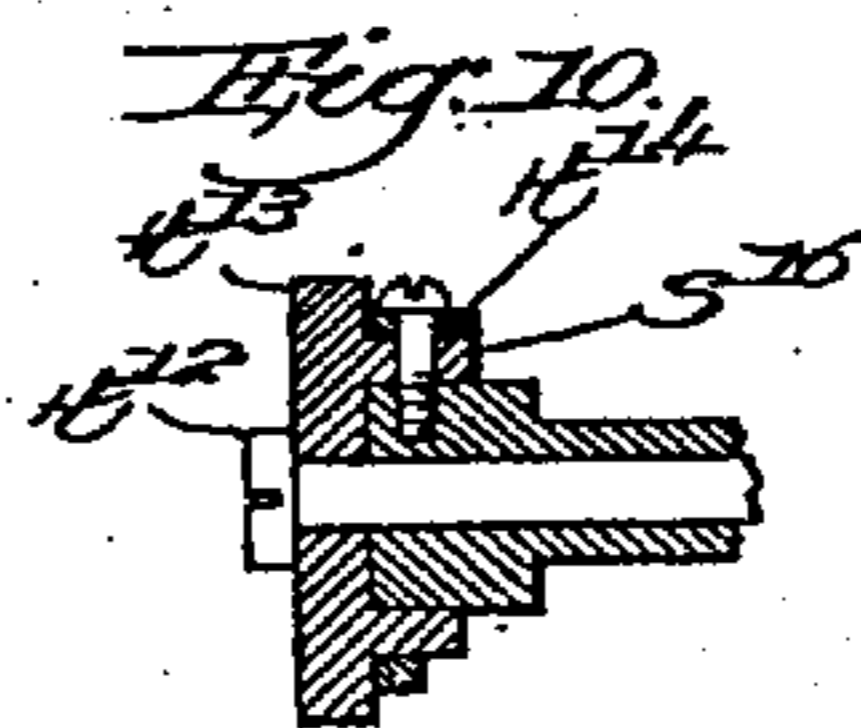
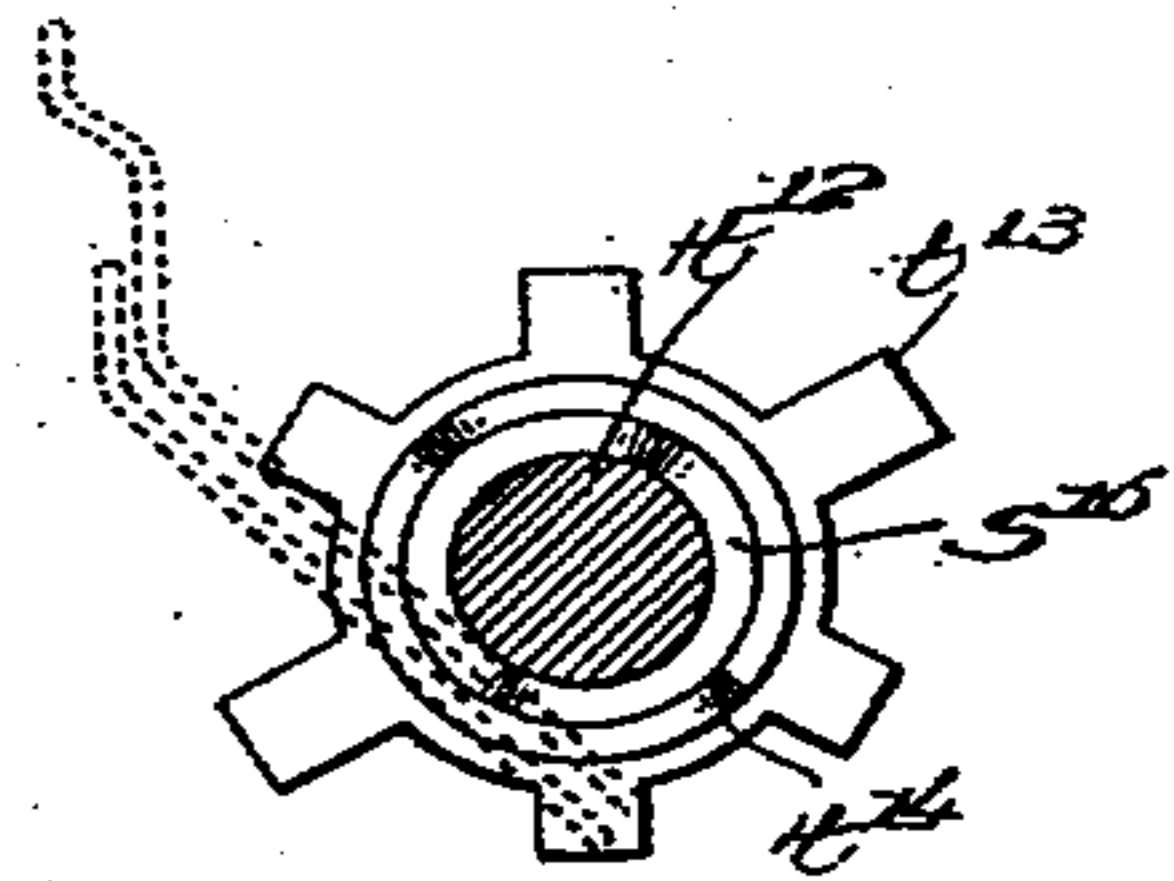
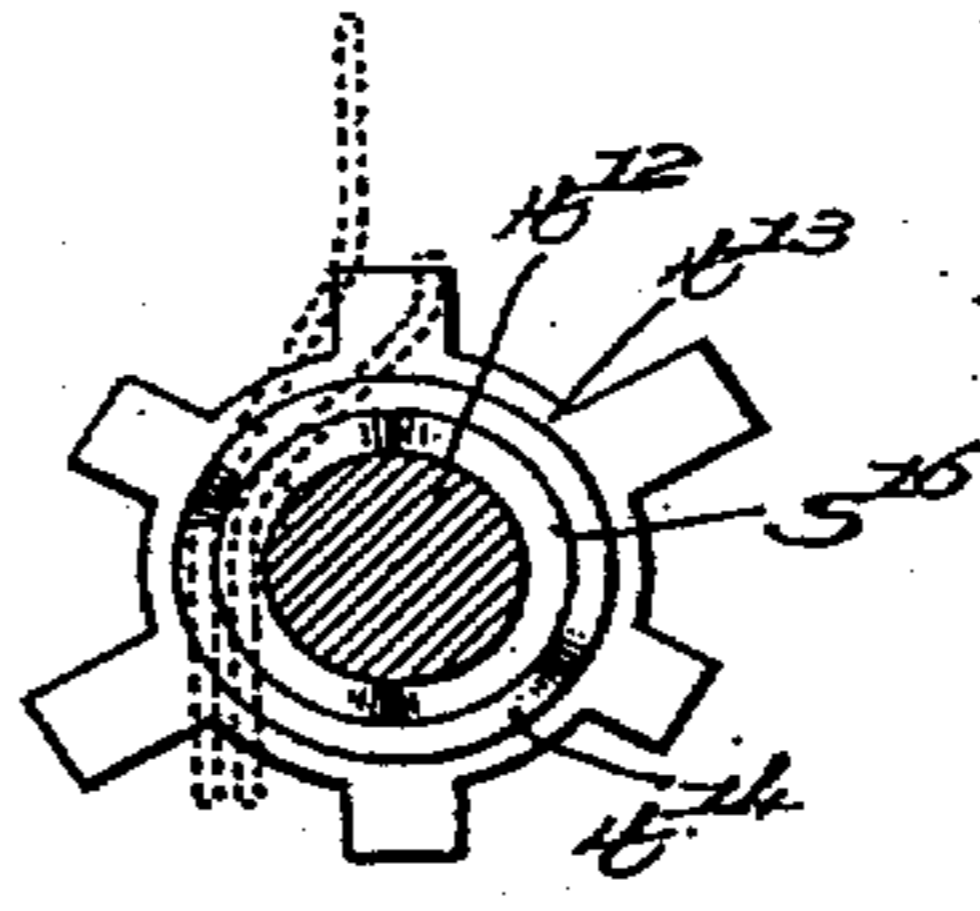
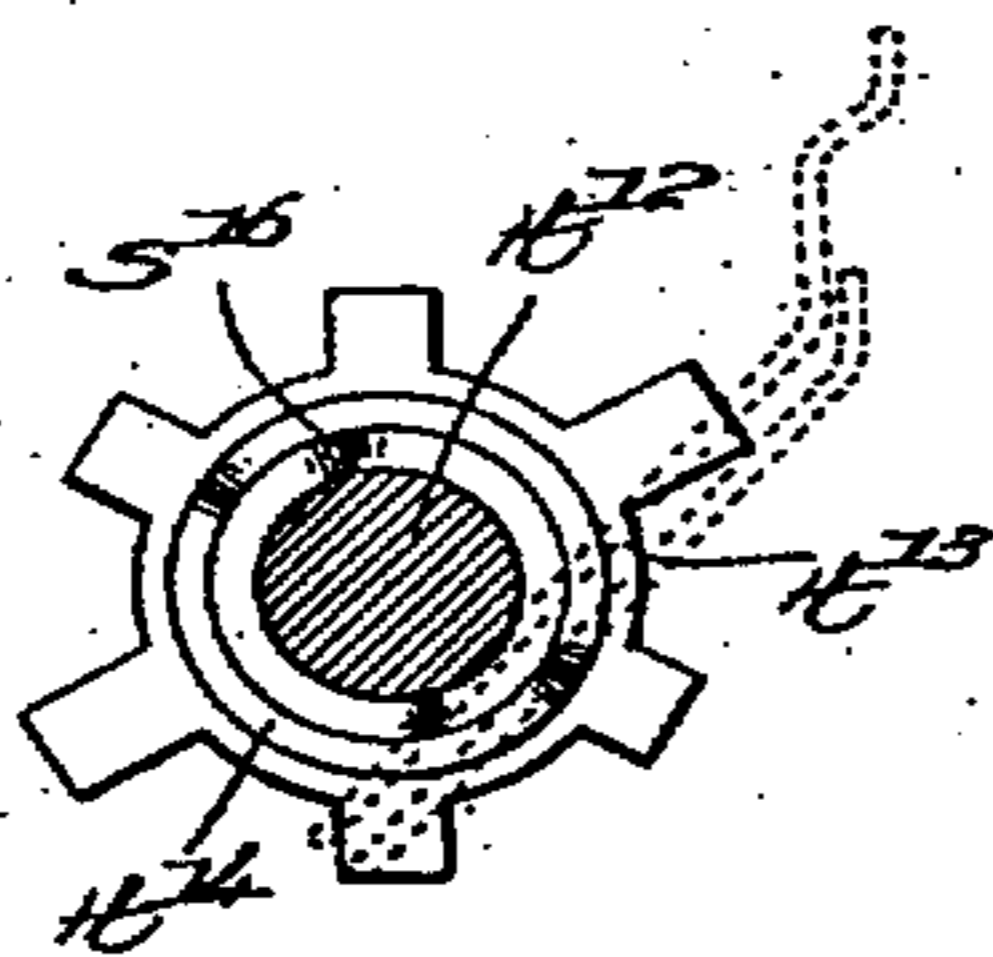


Fig. 9.



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UNITED STATES PATENT OFFICE.

WARREN D. HUSE AND LEON C. HUSE, OF LACONIA, NEW HAMPSHIRE.

THREAD-FEEDING MECHANISM FOR KNITTING-MACHINES.

No. 879,821.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Original application filed February 4, 1901. Serial No. 46,004. Divided and this application filed January 17, 1906. Serial No. 296,443.

To all whom it may concern:

Be it known that we, WARREN D. HUSE and LEON C. HUSE, citizens of the United States, and residents of Laconia, county of Belknap, and State of New Hampshire, have invented an Improvement in Thread-Feeding Mechanism for Knitting-Machines, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawings representing like parts.

This application is a division of our pending application No. 46,004, filed February 4, 1901, for knitting machine, and the invention herein described and illustrated has been divided out from the aforesaid application by the requirement of the Patent Office.

The present invention relates to mechanism for controlling the feed or supply of the threads to the needles of the machine.

In the aforesaid application a complete knitting machine is illustrated and described, and that machine has for its object the automatic production of seamless stockings, wherein the entire stocking is knit from one end to the other, and wherein both plain and rib knitting are performed, the changes from one to the other in each case being made entirely automatically, and wherein also different kinds of thread are used, the change from one thread to the other being likewise performed automatically.

A stocking such as made by the aforesaid machine is described in United States Patent No. 626,864, granted June 13, 1899. The stocking there described is composed of a plain foot portion including the heel and toe formed of a thread or threads of sufficient size to withstand the excessive wear upon these parts, and a ribbed leg portion which gives the requisite elasticity required at this part of the stocking. In forming the ribbed leg a larger number of needles are brought into action, and it follows that unless provision were made to compensate for the increased number of stitches thus formed the ribbed leg would be too large and unsightly. To overcome this objection the leg portion is formed of a thread sufficiently finer than that in the foot portion to compensate for the increased number of stitches, and as a further means of attaining the required comparative size of the foot and leg portion the size of the stitches in the two portions is also varied. The stocking may also have a portion of the leg, as at the ankle, formed with plain

knitting with the required size of thread if desired. In general, the operation of the entire machine upon the stocking is as follows. The stocking is preferably commenced at the toe pouch, the active set of needles in narrowing and widening being supplied with a coarse thread, after which the plain knit portion is knit in complete circular courses, preferably by a thread of different size, and during the formation of such foot portion the parts are actuated at an increased speed until the heel pouch is reached, when the speed of the machine is decreased, a change to coarser yarn automatically effected, and the heel pouch formed by narrowing and widening. On completion of the heel pouch the plain circular knitting is again automatically resumed at high speed, a change to finer thread being made to constitute an ankle portion if such ankle portion is desired, or if the ribbed leg is to be formed directly on completion of the heel pouch then the dial needles are automatically thrown into action, a change to the finer thread effected, the speed of the machine automatically increased, and the size of the stitch changed so as to produce a ribbed leg of the requisite elasticity and weight, the entire operation being automatic and continuous.

The operation and construction of the entire machine referred to is fully set forth in the aforesaid application No. 46,004, and reference may be had thereto for a more complete understanding of the details of the machine, but as the present invention relates only to a portion of the mechanism therein set forth, and the operation and construction is readily understood by itself, no more extended reference will be made to the construction and operation of the other parts of the machine.

It is obvious that the number of different kinds of thread used by the machine may vary as desired, and it will be seen that the mechanism to be described is applicable without any change in principle to a larger number of threads than herein illustrated, without any change in principle, but chiefly by the duplication and slight rearrangement of the parts. As herein shown provisions are made for the employment of three threads, and there are accordingly three thread-guides, one for a large or coarse thread used in knitting the heel and toe pouches, a second for a medium or finer thread used for the body of the foot, and a third for a still finer

thread used for the ribbed leg portion. The present machine, therefore, contains as herein illustrated, a plurality of thread-guides, each one under the control of proper devices to put it automatically into and out of operative position at the desired times, and coöperating with each thread-guide is shown a thread catcher which holds the end of the thread which is thrown out of action while that thread is not needed in the knitting, and releases said thread when the same has been moved by its thread-guide into engagement with the needles for a plurality of stitches, thus avoiding holes where the change of thread is effected.

The invention will be more particularly described and illustrated in the accompanying description and drawing, and more definitely pointed out in the appended claims, but while certain specific mechanisms are shown as the preferable embodiment of the invention, still the invention is a broad one and such description is not considered to constitute any limitation of the claims other than required by their terms.

The drawings represent only so much of the machine as is necessary to show the mechanism made the subject of the claims herein.

Figure 1 is a rear elevation of the body portion of the machine with the upper thread-supporting parts removed, with the parts at the right-hand side of the machine removed, and with the lower portion of the machine removed; Fig. 2 is a detail in plan view showing the movable stand for carrying the thread-guides and holders or catchers, said figure also showing the pins for operating the cam wheels, the locking means for the stand, and the pin for arresting the stand during reciprocating knitting; Fig. 3 is a detail plan view showing the stand carrying the thread-guides and the cams for changing their position, together with the circular ring, one of the thread-guides being shown in operative position; Fig. 4 is an elevation of the parts represented in Fig. 3, with some of the parts broken away; Fig. 5 is a sectional detail of the machine taken on the line 16—16 in Fig. 7; Fig. 6 is a sectional view of some of the parts shown in Fig. 4, taken on the line 14—14; Fig. 7 is a detail in front elevation showing the thread holders or catchers; Fig. 8 is a view similar to Fig. 4, with the parts in a different position, one of the thread-guides having just been put into position to feed the thread to the needles; Fig. 9 is a diagrammatic view representing the cams and wheels employed in effecting the change of position of the thread-guides and holders or catchers; Fig. 10 is a sectional detail of one of the cam wheels.

The framework of the machine, comprising the side plates A of suitable shape to stand upon the floor, the tie-plate A' connecting

the side plates and supporting the working parts of the machine, the stands A² erected on the tie-plate and supporting the cross-bars and cap plates A⁴, which in turn support the posts A⁶ upon which the top plate A⁷ of the machine is mounted, the cam cylinder B¹⁸ with the latch needles c with the jacks c' for operating them, the pattern chain D driven from the shaft D¹, herein illustrated, are all as shown and described more at length in our aforesaid application No. 46,004.

A thread-guide stand T is secured to the top of the cam cylinder B¹⁸ by a stud screw t passing through a slot t' in the stand. The thread-guide stand T has projecting upward therefrom a flange T' which supports the thread-guide operating devices. A second flange T² projects upwardly from the guide stand T and supports the frame T³ and the ring 128. The ring 128 is provided with a lower beveled edge, as shown in Figs. 4 and 8, and is adapted to surround the circular needles of the machine in a usual and a well-known manner. The frame T³, which is mounted upon the flange T², has suitable tracks or guide-ways t², t³, in its lower portion for the thread-guides t⁴, whereby the thread-guides are free to slide lengthwise in a manner to be described.

Each thread-guide preferably coöperates with a thread catcher for catching the thread as it is withdrawn from the needles, and to hold the end thereof as the guide is moved to feed the threads to the needles, the latter operation being for the purpose of insuring the proper engagement of the thread by the needles prior to freeing the end thereof.

Any number of thread-guides and catchers may be used, as already pointed out, but in the present embodiment of the invention we have shown but three, one for the heel and toe thread, one for the thread used to form the plain circular web of the foot and ankle portion, and the third for the ribbed leg portion. While the guides and catchers are somewhat differently disposed, as will appear, they are yet the same in general construction, so that a description of one guide and catcher will suffice for a clear understanding of all.

Each thread-guide t⁴ consists of a slide-bar carrying at its end a guide-tube or eye t⁵, through which the thread controlled by that guide is passed. The guide-way t³ for the thread-guide is preferably provided with an incline t⁶, and the guide is preferably provided with a corresponding incline t⁷ to coöperate therewith, so that as the thread-guide is retracted by its spring t⁸ to place the thread controlled thereby into position to be fed to the needles, the tubular end t⁵ of the guide is dropped to carry the thread below the upper ends of the needles as the latter rise to take it.

The outer end of each thread-guide is connected at t^9 to a lever t^{10} , pivoted at t^{11} to a projection from the flange T' of the thread-guide stand T , below a stud t^{12} , also projecting from said flange T' . The stud t^{12} carries a toothed wheel t^{13} to the inner side of which is secured a face cam t^{14} , a spring t^{15} being interposed between a flange T' and the hub of the cam to prevent too easy movement of the cam and toothed wheel on the stud and to act as a friction brake. The levers t^{10} are each provided with a toe t^{16} , which under the stress of the springs t^8 are normally pressed against the face cams t^{14} . It will thus be apparent that if the high part of the face cam t^{14} is brought into position to engage the toe t^{16} the upper end of the lever t^{10} will be forced inward toward the needles, and the thread-guide t^4 will be moved endwise up the incline t^6 to carry the tubular end t^5 of said guide upward and within the circular row of needles. If the low part of the face cam t^{14} is brought into position opposite the toe t^{16} the thread-guide t^4 under the action of its spring t^8 will be moved endwise outwardly over the top of the circular row of needles, and as the incline t^7 of the guide passes the incline t^6 the tubular end t^5 of the guide carrying the thread will drop below the tops of the lifted needles and in position to supply thread thereto, as shown in Fig. 8.

Coacting with each thread-guide t^4 is a thread catcher comprising a slide arm s movable lengthwise in suitable guideways s' , s' , in the supporting frame T^3 , and normally pressed outward by the spring s^2 , connected at one end to a pin s^3 on the slide arm, and at the other end to a pin s^4 on the supporting frame T^3 . At its inner end each slide arm s is provided with a slot s^5 which engages the upper end of an arm s^6 , suitably sleeved on a shaft s^7 , secured to a suitable supporting frame S , rigidly mounted in any approved manner on the flange T^2 , and as shown by a screw bolt S' . The lower end of the arm s^6 is formed as a sleeve with a portion on one side cut away at s^8 , thereby converting said sleeve into a sleeve cam. On a shaft s^9 below the said sleeve cam is mounted to turn loosely a clamping sleeve formed with a flange or thread catcher s^{10} , the upper end of which has a portion s^{11} adapted to bear upon the sleeved cam s^8 . The lower wall of the support S is continued beneath the series of catchers, and its edge is preferably notched to present guides s^{12} which, as the tubular end of the thread-guide moves inward and upward serves to direct the end of the thread beneath the catcher s^{10} .

The outer end of each slide arm s is connected to an actuator or lever s^{13} , at s^{14} , the said lever being connected to the flange T' by the same pivot t^{11} that supports the lever t^{10} , and it is provided as at s^{15} with a toe adapted to engage a second face cam s^{16}

mounted on the stud of the toothed wheel t^{13} . This cam s^{16} is not directly in line with the cam t^{14} , so that in the rotation of the toothed wheel t^{13} and cams connected thereto the thread-guide is permitted by the relations of said cams to move outwardly under stress of its spring t^8 to carry the thread to the needles before the thread catcher is moved outwardly to free the end of the same thread, thus insuring the engagement of the thread with the needles and the formation of several stitches prior to releasing the end of the thread.

It will be evident that on the rotation of the toothed wheels t^{13} the thread-guides t^4 will be actuated to supply thread to the needles and thereafter the catcher co-operating with its thread-guide will be operated to release the end of the thread. It will also be evident that when the thread-guide is actuated to withdraw the thread from the needles it will thereupon be caught by the proper catcher, the end being retained beneath the thread catcher. The parts remain in their thread supplying or non-supplying position until such time as the change is desired to be made.

In order to actuate the toothed wheels t^{13} at the desired times to supply or withdraw the thread, a suitable pattern mechanism is provided, and is herein shown as a pattern chain D , having a series of risers or projections which act through intermediate devices upon pins passing through holes in the top-plate A^7 of the machine to lift them so that they will project into the path of the teeth on said toothed wheels, and turn the same as they are carried around by the cam cylinder.

More specifically considered the above results are effected by connecting to the frame of the machine a number of levers v , v' , v^2 , pivoted respectively at v^3 , v^4 , v^5 and provided at their free ends with pins v^6 , v^7 , v^8 respectively, that pass through suitable holes in the bed-plate A^7 and are adapted to be raised into the path of the teeth of the wheels t^{13} indicated by dot and dash lines in Fig. 2, by means of risers or projections as v^9 , v^{10} , v^{11} , on the pattern chain D , acting on the ends of suitable fingers v^{12} projecting downwardly from the levers v , v' , v^2 .

The arrangement and disposition of the risers on the pattern chain and the pins for engaging with the toothed wheels will depend, of course, upon the particular changes to be made in the thread during the knitting operation. In the present instance the risers and pins are so disposed that in knitting the toe one thread is employed. Upon passing to circular work for the foot portion the pattern chain is moved to bring other risers into position, to lift the pins into the path of movement of the toothed wheels, and effect the removal of the thread

4.

from engagement with the needles and the substitution of a lighter thread of medium weight. This thread is continued to be knit until the heel pouch is reached when the pattern chain is again moved, effecting in a like manner a change from this medium weight thread to the previous heavier thread used in the toe portion. On completion of the toe pouch and just prior to commencement of circular knitting for the ankle portion the pattern chain is again moved, bringing other risers into position to again effect the change of thread. Prior to commencement of the ribbed leg portion the pattern chain is again moved to bring other risers into position, and the lightest thread of the series is introduced.

It is desirable in making the change of thread at the various stages required to introduce the previously inactive thread prior to the withdrawal of the knitting thread, and to this end it is necessary so to operate the thread-guides in their changing movement as to throw in the idle thread for several stitches prior to withdrawing the knitting thread, and to do this it is necessary to provide each toothed wheel with a separate series of actuating pins.

In the present construction there are three thread-guides provided, and the toothed wheels d^{13} for actuating the said guides to effect a change of thread are arranged at different distances from the center of the cam cylinder, and the pins for actuating said toothed wheels are likewise arranged in three concentric circles corresponding to the varying radial distance of the toothed wheels.

By a proper arrangement of risers on the pattern chain D it will be evident that the actuating pins for the toothed wheels may be thrown into position as desired, but inasmuch as the change of thread is to be effected after several stitches of the previously inactive thread have been made, it follows that a single set of pins, such as v^6, v^7, v^8 , for the toothed wheels will not be sufficient. Other pattern-controlled pins, such as v^{15}, v^{16}, v^{17} are therefore disposed in the circular series of pins so that the timing of the change of thread may be accurately controlled.

The toothed wheels are each provided with two cams, one of which controls the operation of the thread guides and the other the operation of the thread catchers. Each cam has two parts. In the case of the cam for the thread guides, one part controls the movement of the thread guide into the needle-feeding position and the other the movement of the thread guide into the position where the thread is not knitted. In the case of the cam for the thread catchers, one part controls the movement of the thread catcher into and the other the movement out of the thread catching or clamping position. As will be pointed out, each toothed

wheel carrying the two cams is provided with two long teeth one for each movement of the thread guides and catchers into and out of position. These teeth are operated by striking against adjustable stationary pins. Each toothed wheel is also provided with shorter teeth by which the toothed wheel is positioned so that the long teeth may strike at the proper time the stationary pins, and since in the machine illustrated the cam cylinder makes two rotations to one movement of the pattern surface, two of the shorter teeth are provided for each long tooth. The shorter teeth are of such length as to clear the stationary pins, and are operated by striking against movable pattern-controlled pins which are projected at the required times into the path of the toothed wheels.

Each of the toothed wheels is provided with a number of teeth, best illustrated in Fig. 9, two of which teeth at opposite sides are prolonged to engage when in their lowest position with suitable stationary pins as 190, 191, 192 on the top-plate of the machine.

In order to further provide for turning the toothed wheel at desired times we pivot upon the machine frame an additional lever v^{18} similar to the levers v, v', v^2 already described, and having a detent finger v^{19} adapted to engage a suitable riser on the pattern chain D, and projecting from the end of said lever v^{18} we provide two pins v^{20}, v^{21} .

The disposition of the pins and risers, herein specifically referred to, constitute simply a disposition of such parts for the use of three thread guides, as contemplated in the present illustration of the invention, and such general disposition of pins is necessary by reason of the relative location of the toothed wheels t^{13} which renders it at times necessary to operate at first the forward or lower wheel, and then one of the following wheels to effect the desired change, and at other times to operate first one of the wheels t^{13} to the rear and above the lower t^{13} and thereafter to operate the forward one of said wheels.

The general disposition of the risers to effect the desired change in thread and the location and disposition of the pins defining properly the operation of the toothed wheels with respect to each other, is a matter within the ability of anyone familiar with knitting machines, and need not be further described herein.

It will readily be seen that the position of the movable pins, which are controlled by the risers on the pattern surface, and the position of the stationary pins, depends upon the timing of the machine and upon the particular point at which the desired thread is to be introduced into the web, or taken out therefrom. The positioning and timing of these pins will, therefore, be largely at the

option of the operator of the machine according to the particular kind of work which it is desired to perform thereon. In practice a number of holes may be made in the circular paths of the toothed wheels, and these pins may be changed and arranged as desired. While the pins 190, 191 and 192 have been termed the stationary pins they are stationary only in the sense that they are not vertically movable, as in the case of the pins operated by the risers. They may, however, be removed and replaced in any desired position to perform their desired functions. The set of pins v^{16} , v^{17} and v^{18} are chiefly necessary to secure the proper operation of the toothed wheels with respect to each other when it is desired, as usual, to insert the new thread before the old thread has ceased knitting. The three wheels are necessarily arranged one ahead of the other and a considerable distance apart, and by the use of these pins necessary relative operation of the wheels can more readily be secured.

The movable pins v^{21} and v^{20} are especially designed for use where a change of thread is made during reciprocating knitting, as at the toe or heel portion. They will be arranged to operate the particular wheels whose threads are desired to be changed, and if it were not for them the thread could not be changed during reciprocating knitting where the toothed wheels are not carried clear around over the various pins, but are obviously oscillated back and forth in their circular path and it is obvious that two movements of the toothed wheels by the short teeth striking against the movable pins are necessary to position the wheel so that the long teeth will be struck by the stationary pins in the case of reciprocating as well as in the case of rotary knitting.

In the machine as herein designed the pattern chain D is moved once to every two revolutions of the cam cylinder B^{18} , which carries the toothed wheels, and therefore the toothed wheels will pass twice over the pins as they are positioned by the risers on the pattern surface for any given position. The arrangement of the long and short teeth on the toothed wheel, as shown in Fig. 9 of the drawings, is rendered necessary for this reason.

In Fig. 2 the direction of rotation of the cam cylinder is indicated by the arrow thereon. The three toothed wheels are indicated in dotted lines, and marked $1t^{13}$, $2t^{13}$, $3t^{13}$. Assume as a simple condition that the knitting is being done by the thread controlled by the toothed wheel $3t^{13}$ and that it is desired to drop this thread out and substitute the thread controlled by the toothed wheel $1t^{13}$, but that this latter thread shall be inserted before the former is thrown out. The risers on the pattern chain would be arranged so as to elevate the pins v^8 and v^6 ,

and the stationary pins 190 and 192 would be inserted in a suitable place, about as indicated in Fig. 2. As the cam cylinder v^{18} carried the toothed wheels around they would be in the position shown in Fig. 19, that is, with a short tooth projecting downwardly and the long tooth being in position to take the place of the short tooth when the short tooth was struck by the pin. The wheels on reaching the pins v^8 and v^6 would be given one-sixth of a turn, the wheel $1t^{13}$ being turned first because it is angularly so far ahead of the wheel $3t^{13}$. The pins v^8 , v^6 would thus swing the long teeth into the lowermost position, and upon the continued rotation of the cam cylinder the pins 190 and 192 would strike against the long teeth and turn the wheels another sixth of a revolution, thus putting the threads controlled by the respective wheels either into or out of operation, according to which of the two long teeth were struck. In the case under consideration the thread controlled by the wheel $1t^{13}$ would be out of operation and would accordingly be put into operation by the pin 190, and the thread controlled by the wheel $3t^{13}$ being in operation would be put out of operation by the pin 192. Again, it will be noted of the wheel $1t^{13}$ being far in advance angularly of the wheel $3t^{13}$ would be put into operation some time before the dropping out of the thread controlled by the wheel $3t^{13}$. On the second rotation of the cam cylinder past the pins v^8 , v^6 , the short teeth succeeding the long teeth would be struck and the toothed wheels given another sixth revolution to place them in position for a repetition of the movements described, and then the pins v^8 and v^6 would be lowered by the turning of the pattern-chain so as not to be struck by the toothed wheels upon subsequent revolutions of the cam cylinder until another change was desired.

In reciprocating knitting, the toothed wheels will obviously not pass twice in the same direction over the various pins, hence the additional set as v^{20} , v^{21} is necessary to give the three movements to the wheels.

Having described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a plurality of thread catchers one for each thread, pattern-controlled mechanism for moving any desired thread guide into or out of needle-feeding position, and for operating the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

2. In a knitting machine, a thread-changing device mounted upon and carried by the part of the machine movable with respect to

the needles, comprising a plurality of thread guides one for each thread, pattern-controlled mechanism for moving any desired thread guide into or out of needle-feeding position, and for operating the corresponding thread catcher accordingly, to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

3. In a knitting machine, a thread-changing device mounted upon and carried by the movable cam cylinder of the machine, comprising a plurality of thread guides one for each thread, a plurality of thread catchers one for each thread, pattern-controlled mechanism for moving any desired thread guide into or out of needle-feeding position and for operating the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

4. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a plurality of thread catchers one for each thread acting upon the thread between the delivery end of its thread guide and the needles, pattern controlled mechanism for moving any desired thread guide into or out of needle-feeding position, and for operating the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

5. In a knitting machine, a thread-changing device comprising a plurality of thread guides, one for each thread, a plurality of thread catchers one for each thread acting upon the thread between the delivery end of its thread guide and the needles, a double cam for each set of thread guide and catcher, one cam part of which controls the movement of its thread guide and the other the movement of its thread catcher, the former cam part acting in advance of the latter, pattern-controlled mechanism for operating said cams to cause thereby the movement of any desired thread guide into or out of needle-feeding position and the operation of the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

6. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a plurality of thread catchers one for each thread acting upon the thread between the delivery end of its thread guide and the needles, a toothed wheel for each set of thread guide and catcher provided with a long actuating tooth and a short positioning tooth all mounted upon a support rotatable with respect to the needles, an adjustable stationary pin in the path of each toothed wheel, of a height to engage

said long tooth and clear said short tooth, a pattern-controlled movable pin adapted to be projected into the path of said short tooth to position the said long tooth, intermediate mechanism between each toothed wheel and its corresponding thread guide and catcher, whereby upon the movement of the wheel by its long tooth its thread guide is moved into needle-feeding position and its thread catcher is released after the thread has been caught by the needles.

7. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a plurality of thread catchers one for each thread acting upon the thread between the delivery end of its thread guide and the needles, a toothed wheel provided with two long actuating teeth, and a plurality of short positioning teeth all mounted upon a support rotatable with respect to the needles, adjustable stationary pins in the path of each toothed wheel of a height to engage said long teeth and clear said short teeth, pattern-controlled movable pins adapted to be projected into the path of said short teeth to position said long teeth, intermediate mechanism between each toothed wheel and its corresponding thread guide and catcher, whereby upon the movement of the wheel by one of its long teeth its thread guide is moved into needle-feeding position and its thread catcher operated to release the thread end after it has been caught by the needles, and upon the movement of the wheel by its other long tooth its thread guide is moved out of needle-feeding position and its thread catcher is operated to clamp and hold the thread taken from the needle.

8. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a thread support, a plurality of thread catchers cooperating with said support to form clamps, one for each thread, guides formed in said support to direct the threads beneath their respective thread catchers, pattern-controlled mechanism for moving any desired thread guide into or out of needle-feeding position, and for operating the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

9. In a knitting machine, a thread-changing device comprising a plurality of thread guides one for each thread, a thread support, a plurality of thread catchers cooperating with said support to form clamps, one for each thread acting upon the thread between the delivery end of its thread guide and the needles, guides formed in said support to direct the threads beneath their respective thread catchers, pattern controlled mechanism for moving any desired thread guide into or out of needle-feeding position, and for op-

erating the corresponding thread catcher accordingly to release the thread end after it has been caught by the needles, or to clamp and hold the thread taken from the needles.

5 10. In a knitting machine, a thread-changing device comprising a series of thread guides having tubular ends, levers for moving said guides towards and from the needle guide supports having inclines on which the guides
10 move and by which they are raised and lowered, cams for moving said levers, toothed wheels having long and short teeth, and pattern-controlled stationary pins for rotating said toothed wheels.

15 11. In a knitting machine, the combination of a series of thread guides, levers for actuating said guides, cams and toothed wheels

for moving said levers, the said toothed wheels moving in paths concentrically arranged, a corresponding series of thread
20 catchers, cams connected to the said toothed wheels for operating the catchers, and pattern-controlled pins for moving the toothed wheels to actuate the thread guides and
25 thereafter the catchers.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

WARREN D. HUSE.
LEON C. HUSE.

Witnesses:

GEO. T. MUNSEY,
O. J. GEORGE.

Correction in Letters Patent No. 879,821.

It is hereby certified that in Letters Patent No. 879,821, granted February 18, 1908, upon the application of Warren D. Huse and Leon C. Huse, of Laconia, New Hampshire, for an improvement in "Thread-Feeding Mechanism for Knitting-Machines," were erroneously issued to said "Huse and Huse" as owners of said invention; whereas said Letters Patent should have been issued to *The Paramount Knitting Company, a corporation of Illinois*, said company being owner by mesne assignments of the entire interest, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of March, A. D., 1908.

[SEAL:]

C. C. BILLINGS,
Acting Commissioner of Patents.

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