



(No Model.)

3 Sheets—Sheet 2.

D. H. CAMPBELL.

WAX THREAD SEWING MACHINE.

No. 253,157.

Patented Jan. 31, 1882.

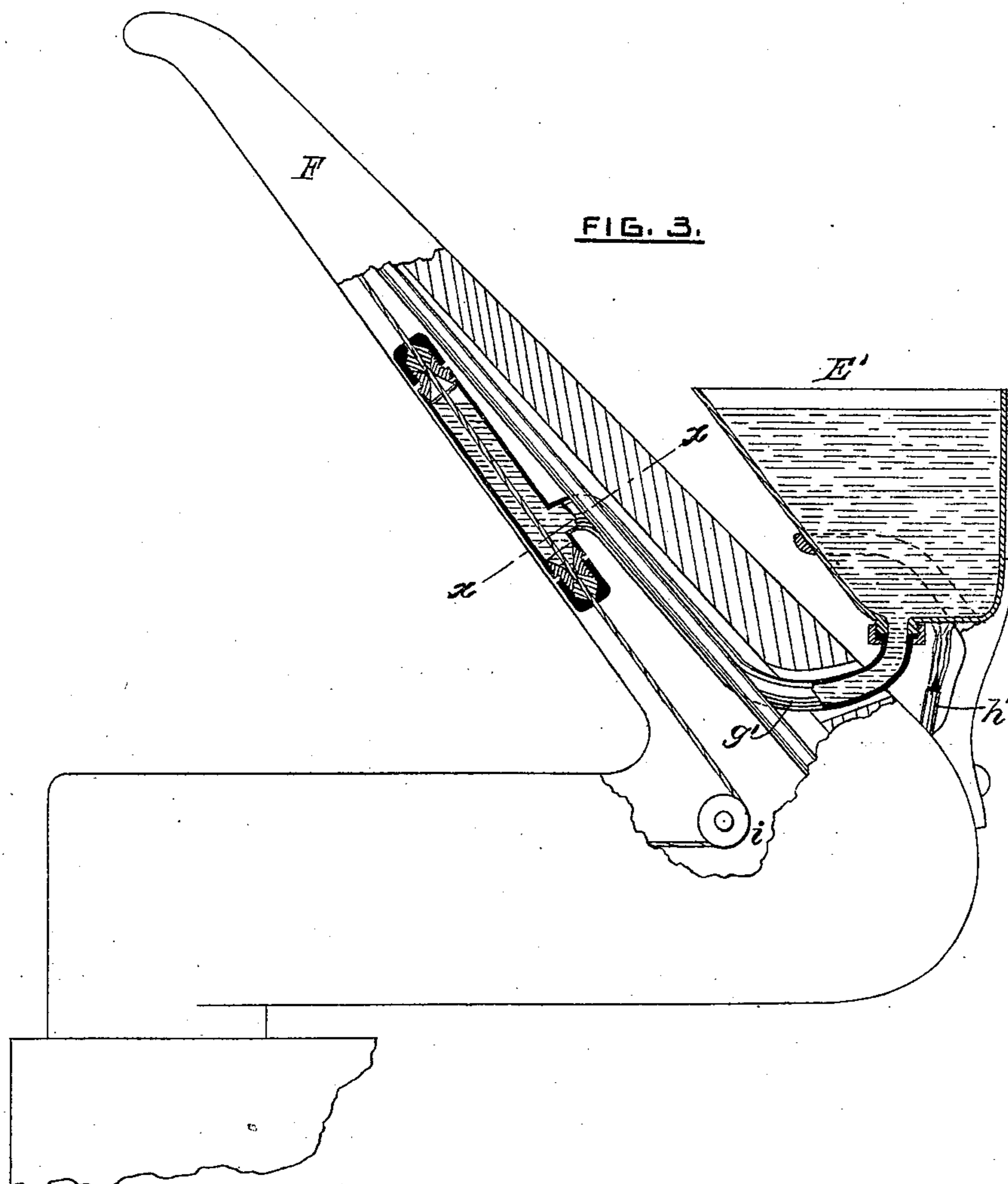
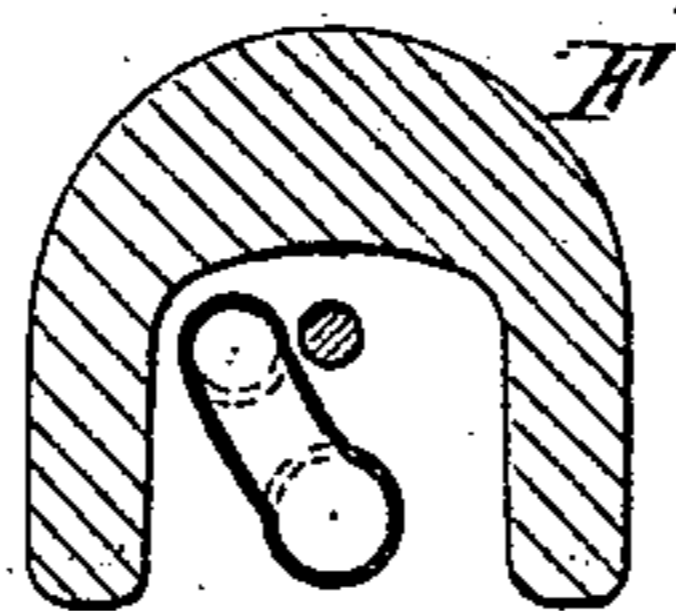


FIG. 4.



WITNESSES:

*Philip A. Larner.*  
*Howell Bartle.*

INVENTOR:

*Duncan H. Campbell.*  
*By [Signature] Attorney.*

(No Model.)

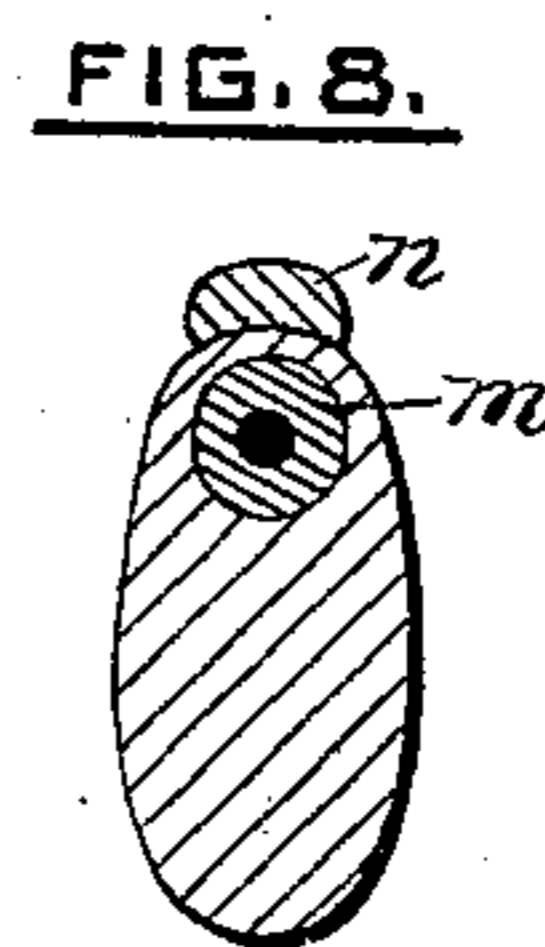
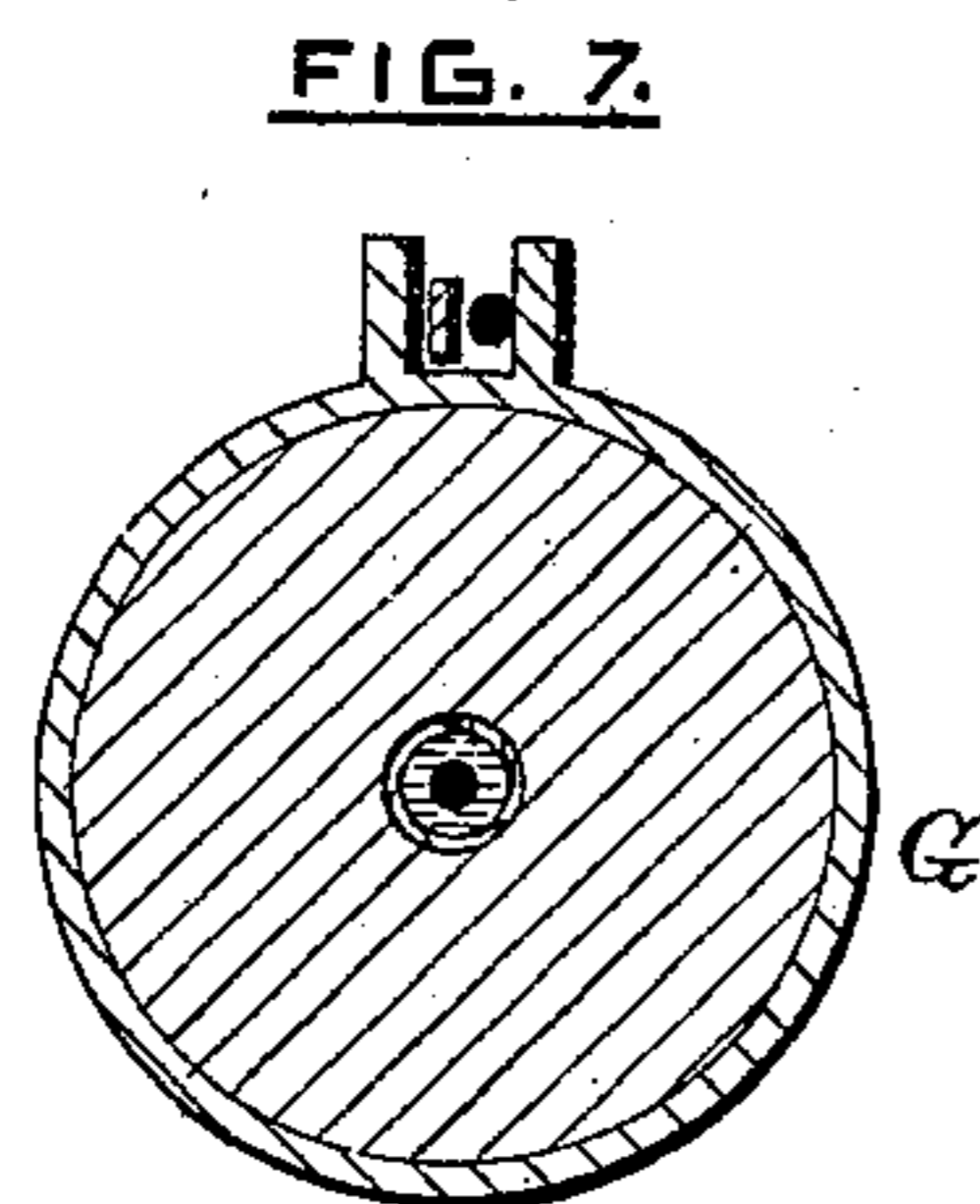
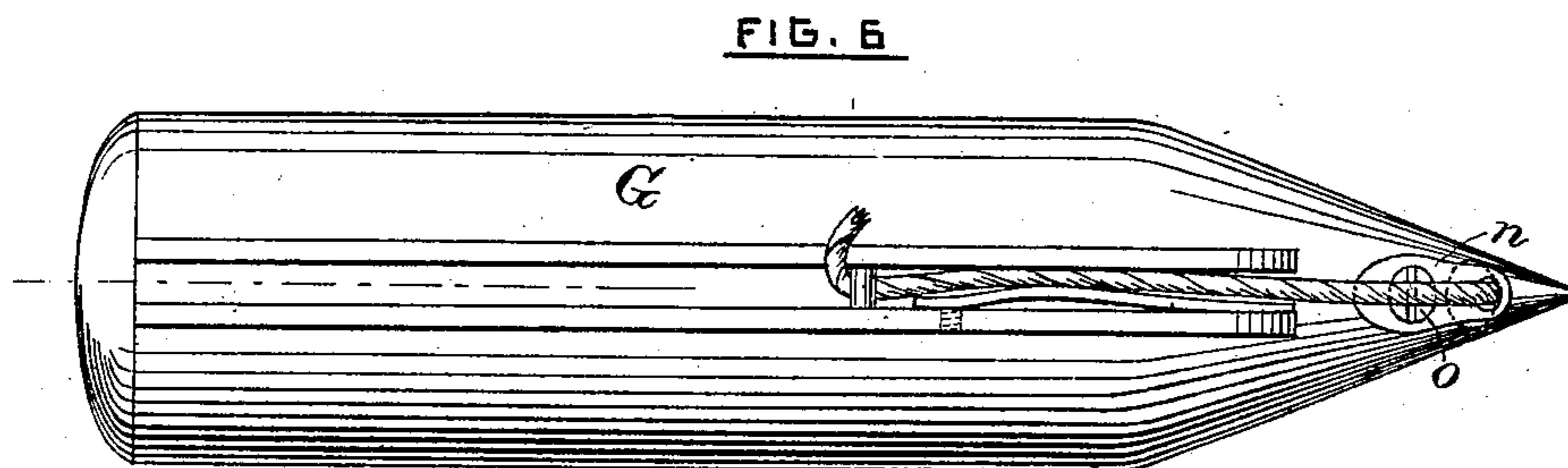
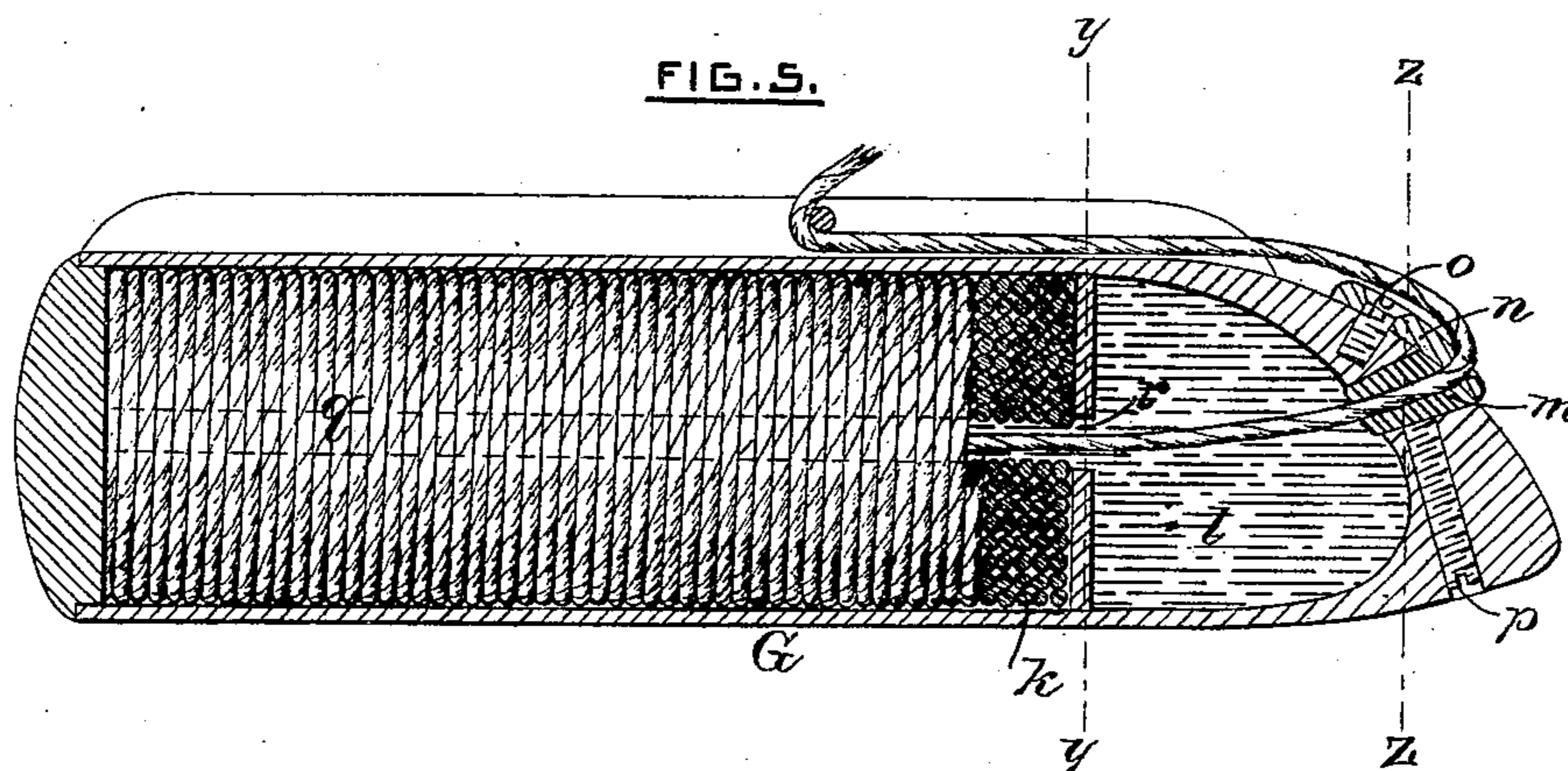
3 Sheets—Sheet 3.

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WITNESSES:

Philip F. Larner,  
Howell Barthé

INVENTOR:

INVENTOR:  
Duncan H. Campbell.  
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Attorney.

# UNITED STATES PATENT OFFICE.

DUNCAN H. CAMPBELL, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR OF  
THREE-FOURTHS TO HENRY B. METCALF, FRANK E. COMEY, AND DANIEL  
McNIVEN, ALL OF SAME PLACE.

## WAX-THREAD SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 253,157, dated January 31, 1882.

Application filed November 11, 1881. (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 of the same, is a clear, true, and complete de-  
10 scription of the several features of my invention.

My said improvements pertain exclusively to thread-waxing, and they have been devised for use with single-thread chain-stitch ma-  
15 chines, and with two-thread shuttle-machines, whether the shuttle be operated below or above the work-plate, and in all cases the thread is thereby waxed immediately prior to the formation of a stitch.

20 After a full description thereof, the several features of my invention will be specified in detail in the several claims hereunto annexed.

Referring to the three sheets of drawings, Figure 1, Sheet 1, is a view of so much of a  
25 sewing-machine with my improvements applied as is deemed necessary for illustration. Fig. 2, Sheet 1, is a vertical sectional view of the waxing apparatus detached. Fig. 3, Sheet 2, is a vertical and partially sectional view of  
30 the waxing apparatus shown in Fig. 2, so far modified in form and arrangement as to adapt it for use in a post or horn, which is also shown. Fig. 4, Sheet 2, is a horizontal section on line *x x*, Fig. 3. Figs. 5 and 6, Sheet 3, are respec-  
35 tively a longitudinal section and top views of a shuttle embodying portions of my invention. Figs. 7 and 8 are sectional views respectively on lines *y* and *z*, Fig. 5.

Referring to Figs. 1 and 2, it will be under-  
40 stood that A denotes the head of one type of wax-thread machine, and B the tension and take-up mechanism as heretofore constructed. Below the head is a work-plate, C, of any de-  
sired form. These parts in no manner involve  
45 any portion of my invention, and may be almost indefinitely varied in their construction and arrangement.

The thread-tube D is an important portion of my waxing apparatus, and it is of value that

it be so located with reference to the front por- 50  
tion of the take-up mechanism and to the path of the needle *f* that it will occupy the path of the thread in a straight line from the take-up mechanism to said needle-path. Considered  
55 solely as a thread-tube, within which waxed thread is maintained in a soft and pliable condition just prior to its delivery to a needle, and located in the front portion of the head of the machine, as shown in Fig. 1, and in the  
60 direct path of the thread between the take-up and needle-path, this tube D constitutes a novel feature, described in a certain prior application for Letters Patent filed by me August 5, 1881, serial number 39,317. As now used,  
65 however, it serves as an auxiliary wax-cup, and is provided at its top with a slitted and perforated plug, *a*, Fig. 2, and at its bottom with a compressible conical plug, *b*, perforated centrally, a fixed plug, *c*, also perforated centrally and threaded externally, and an inter-  
70 nally-threaded sleeve, *d*, by means of which the conical plug *b*, which serves as a compressible packing around the thread *e*, may be more or less compressed for securing good packing-  
75 contact with the thread, which, as shown, extends from the front end of the take-up mechanism, on a straight line, through the plugs and the center of tube D to the needle-path at *f*. The plug *b* should be composed of cork,  
80 felt, or other compressible material which will resist the impairing effect of heat and destructive effects of the wax.

The upper plug, *a*, need not always be in close contact with the thread, for its function is mainly to serve as the close top of the tube 85  
used as a wax-cup for preventing the escape of heat and obviating undue evaporation of the hot wax; but said upper plug may also be relied upon as a stripper of hot wax from the  
90 thread, as well as thereby working the wax into the body of the thread. The lower plug, *b*, serves as a stripper, a worker of wax into the thread, and also as the bottom of the tube, serving as an auxiliary wax-cup.

The main wax-cup E is located without ref- 95  
erence to the path of the thread, and is accessibly mounted upon some convenient portion of the machine; but it is essentially so located

with reference to the auxiliary cup D that heated wax will flow from the main to the auxiliary cup through a suitable pipe, as at *g*. Said main cup is also supplied with a suitable heating medium—either steam-pipes, a lamp, or a gas-burner, as shown at *h*. It is preferable that the heat be applied at or near the bottom of the main cup and adjacent to the conduit-pipe *g*, so that the danger of overheating may be well guarded against, and also so that said conduit may be well heated; and it is best that the main and auxiliary cups, as well as the connecting-pipe, be composed of copper or other good conductor of heat, and in some cases the heating medium may also be applied directly to the auxiliary cup. Broadly stated, the main feature of one branch of my invention consists in the combination, with a main wax-cup, of an auxiliary wax-cup connected with and supplied by the flowage of wax from the main cup and located on a level with the main cup, within the path of the thread, whereby the latter may be drawn to and fro into, through, and from the auxiliary cup in a direct line, the wax being free to flow from the main to the auxiliary cup in proportion as it is taken up by the thread, my object being not only to properly wax the thread immediately before forming a stitch, but to do it in such a manner that the liability of breakage of the thread within the wax-cup will be reduced to a minimum, and this, as I believe, can only be practically accomplished by the employment of an auxiliary wax-cup, which, according to the particular type of machine with which it may be desired, can always be located in the path of the thread, so that the latter will be drawn to and fro therein in a practically straight line between the point where it last bears after leaving the take-up and the device by which it is drawn downward.

Heretofore a wax-cup has been mounted upon the front of the head, provided with heating devices and with a perforated rubber plug in its bottom, and compressing devices for closing said plug around the thread; but in drawing the thread downward through the cup it was drawn from the plug at an angle, thereby causing a liability of breakage at said plug, which liability can be wholly obviated by the employment of an auxiliary cup, because the latter can be located in the straight path of the thread, and serve in part as a guide-tube and permit the thread to enter and leave the tubular cup above and below in a straight line.

Heretofore a main wax-cup in the form of a cylinder and located below the work-plate has been provided with a piston automatically operated for forcing wax upward to a receptacle opening into the shuttle-race, so that the latter moved to and fro in the wax, and the loop carried down by the needle was dipped therein. A vertically-vibrating cup has also heretofore been used beneath a work-plate for dipping up wax from a main cup and delivering it so that the needle could dip its point therein every time it descended. By having my auxiliary and main cups on the same level I not only

obviate the necessity for the prior forcing and cup-lifting mechanism, but I thoroughly wax the thread on its way to the needle and work-plate, and obviate the wasteful and objectionable throwing of the melted wax, naturally incident to rapidly-operated mechanism in contact therewith.

The value of the auxiliary cup D is well demonstrated when the problem of waxing thread within a post or horn is considered.

As illustrated in Figs. 3 and 4, Sheet 2, the horn F is of that particular kind used in machines having a shuttle above the work-bed, but so far as my invention is concerned it might be such a horn or post as is used in single-thread machines.

As here shown, the main wax-cup E', the heating-burner *h'*, and the connecting-pipe *g'* are mainly as before described, differing therefrom only so far as is desirable or requisite for their employment in this particular connection. The auxiliary cup in this case has a compressible plug at both ends, is located within the horn, and its center is in line with the direct path of the thread between the angle-roll and the usual-exit aperture at the top of the horn. As here applied the auxiliary cup is wholly housed within the horn, and the main cup is outside thereof, but it presents no obstruction to the complete use of the horn for the purposes intended.

Considered with reference to its operation with the wax, my apparatus differs from the prior waxing apparatus hereinbefore referred to in several important particulars. In said prior apparatus the thread was reciprocated up and down into and out of the mass of melted wax, so that the thread was continually lifting the wax from the mass upward into the air, after the manner of dipping a candle, and the main body of wax was therefore kept in a more or less turbulent condition, which, with the lifting and comparative cooling of the wax in the air by the thread, was specially conducive to the evaporation of the valuable volatile matters contained therein, causing it to become grainy or flaky, and thereby impairing its value in the seam. In my main wax-cup no such movement of the wax occurs, and the wax in the auxiliary cup is wholly inclosed and guarded against evaporating or cooling influences.

In the aforesaid prior apparatus the mass of wax was of necessity kept in a uniform and highly-heated condition, because the thread passed through the main body of the wax, and under those circumstances, as well as with wax-cups as heretofore commonly used, the wax is liable to frequent injury from overheating. In my main cup only the lower portion of the wax need be kept well heated, leaving it always sufficiently cool at the top to obviate evaporation, and at the same time to so modify the heat below as to render it practically impossible for the wax to be overheated and thereby injured. As arranged in each of the instances illustrated, the level of the wax

in the auxiliary cups will be determined by the quantity of wax in the main cups.

For passing the thread through the auxiliary cup a long slender eye-pointed needle is used, and said needle may be entered from above or below, as may be most convenient in each case. The fixed plugs are bell-mouthed or funnel-shaped at their inner ends, which renders it an easy matter for the point of the threading-needle to be passed into and through the thread-holes. With my improvements, as described, I am enabled to employ hard wax with better results than have heretofore been obtained with soft or liquid wax, which is well known to be objectionable, and the thread as waxed by me is so soon thereafter embodied in stitches that no requirement exists for heating the thread after waxing it.

As thus far described I have only shown how I wax threads to be delivered to looping mechanism, or delivered so as to lock with a second thread carried by a shuttle, whether the latter be above a work-plate, post, or horn or below a work-plate; and I will next describe how I wax, or preferably rewax, a previously waxed shuttle-thread just prior to forming a stitch. Heretofore mechanism has been devised for this purpose which in general terms may be described as involving a brush or pad or arm which is at intervals vibrated from a supply of heated wax to the thread between the shuttle and the throat-plate of the machine, whereby the surface of the thread is intermittently charged or anointed with wax. I have, as I believe, for the first time embodied within the shuttle a waxing device whereby as the thread passes therefrom it is waxed or rewaxed.

As shown on Sheet 3, the shuttle G is internally divided by a partition into a thread-chamber, *k*, and wax-chamber *l*. As preferred by me, the wax-chamber is located at the front or nose of the shuttle, and the thread passes through the center of the flexible packing *m*, which is secured in a tapered hole by the clamping-plate *n* and set-screw *o*, having its seat in the wall of the shuttle, as clearly shown. The packing *m* is rendered adjustable by aid of the compressing-screw *p*, which enters from the underside of the shuttle through its solid nose. The solidly-wound cop *q* of waxed thread is located in the chamber *k*, the internal end drawn out, passed through the central aperture, *r*, in the partition, and thence through the packing in the nose of the shuttle, and thereafter suitable tension-bars on the exterior of the shuttle engage therewith. The shuttle shown is straight and centrally pointed, and provided with a recessed web on its upper side; but these features are not essential in connec-

tion with my present invention. The shuttle thus provided with a wax-chamber will require a good heating arrangement, many of those heretofore devised being suitable for the purpose. The aperture *r* need not be tightly occupied by the thread, for it will be in no manner disadvantageous if some of the wax passes into the thread-chamber, because the thread cannot become so charged with wax that the packing will not properly strip the thread as it passes from the shuttle. In charging the shuttle with wax and thread, the previously heated shuttle is held nose downward, the end of the thread from the cop passed through the wax-chamber and through the packing, a charge of wax poured in from the heel and the cop inserted; or the cop may be first put into position and the melted wax poured through the hole which contains the packing, the latter being readily removable and as readily replaced while on the thread. The rapid reciprocating motions of the shuttle, as in use, will so agitate and throw the inclosed body of wax as to cause it to be properly applied to the thread, even if the wax-chamber be only partially filled.

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

1. The combination, in a wax-thread sewing-machine, of a main wax-cup, and an auxiliary wax-cup on a level with the main cup, adapted to be supplied with wax by flowage from the main cup, and arranged to be traversed by the thread on its way to the work-plate, substantially as described.

2. The combination, in a wax-thread sewing-machine, of a main wax-cup, and an auxiliary wax-cup connected with the main cup and located between the take-up mechanism and the work-plate, and in the straight path of the thread, substantially as described, whereby the thread enters and leaves the auxiliary cup in a direct line, as set forth.

3. In a wax-thread sewing-machine, a tubular wax-cup traversed longitudinally by the thread on its way to the work-plate, and provided at top and bottom with perforated plugs, substantially as described, whereby the wax is inclosed and guarded against injurious exposure, as set forth.

4. A wax-thread shuttle having a thread-chamber, a wax-chamber, and an aperture provided with packing for stripping the surplus wax from the thread as it leaves the shuttle, substantially as described.

DUNCAN H. CAMPBELL.

Witnesses:

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DANIEL MCNIVEN.