

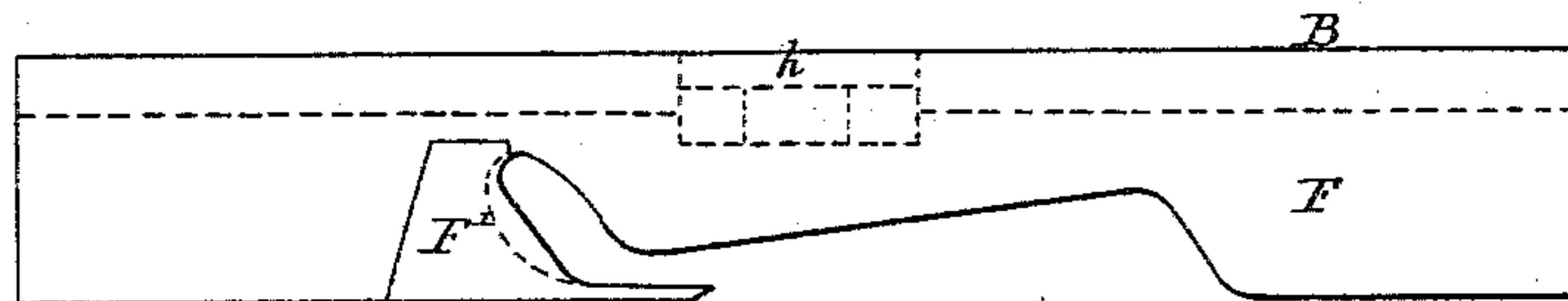
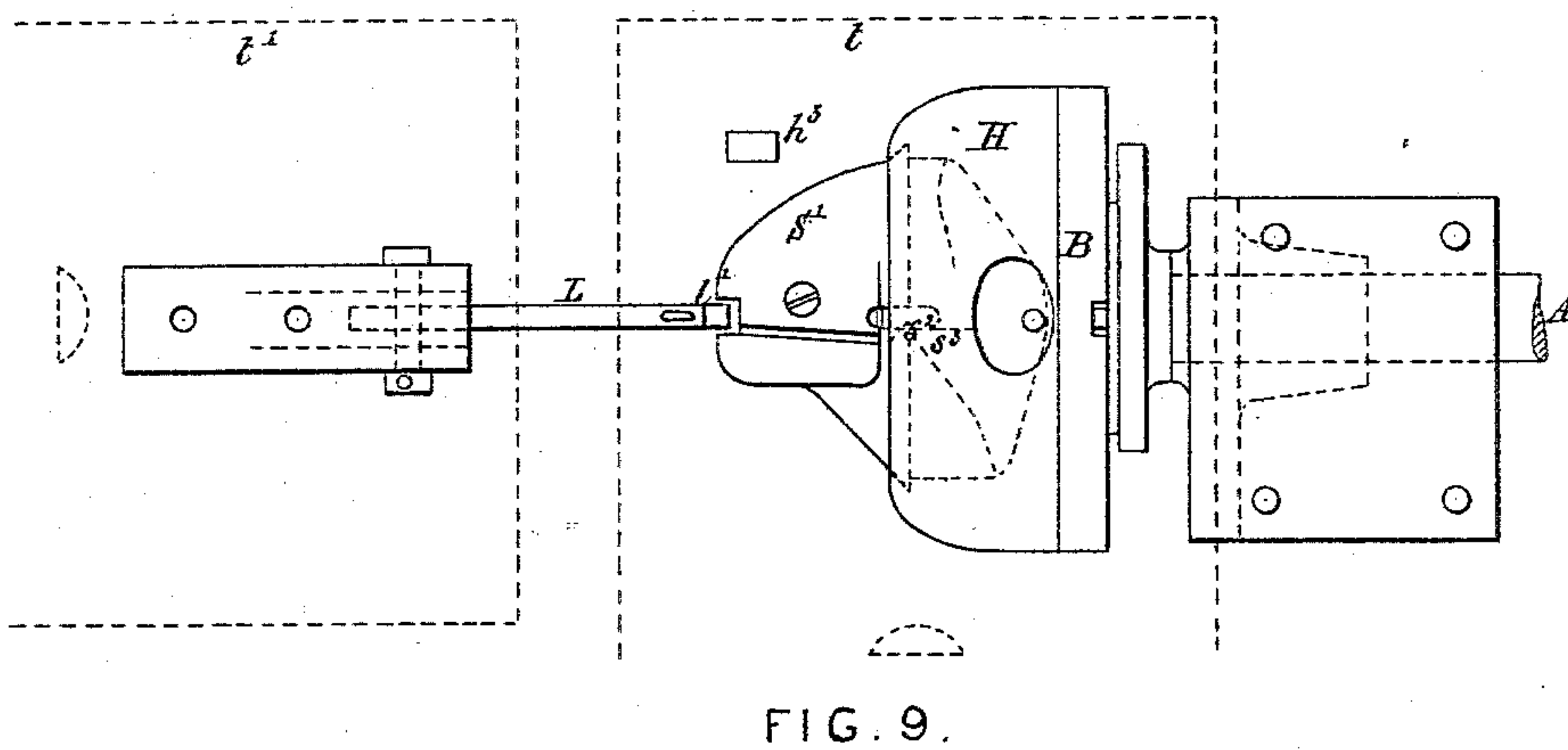
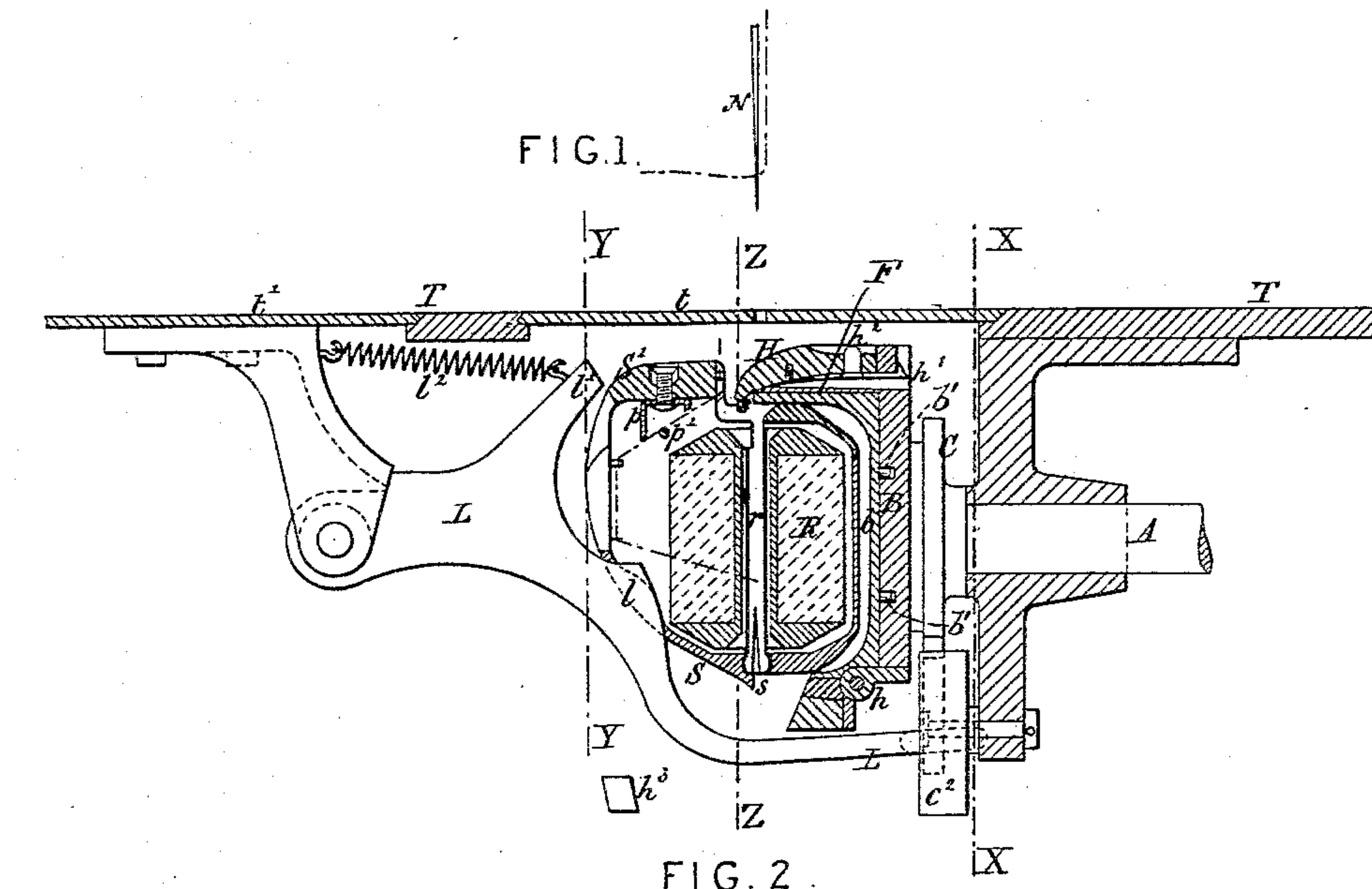
(No Model.)

3 Sheets—Sheet 1.

H. GRELLIER.
SEWING MACHINE.

No. 300,598.

Patented June 17, 1884.



Witnesses.
Victor Doucet
Robert Everett.

Inventor.
Henry Grellier.
By James L. Norris.
Att'y.

(No Model.)

3 Sheets—Sheet 2.

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FIG. 4.

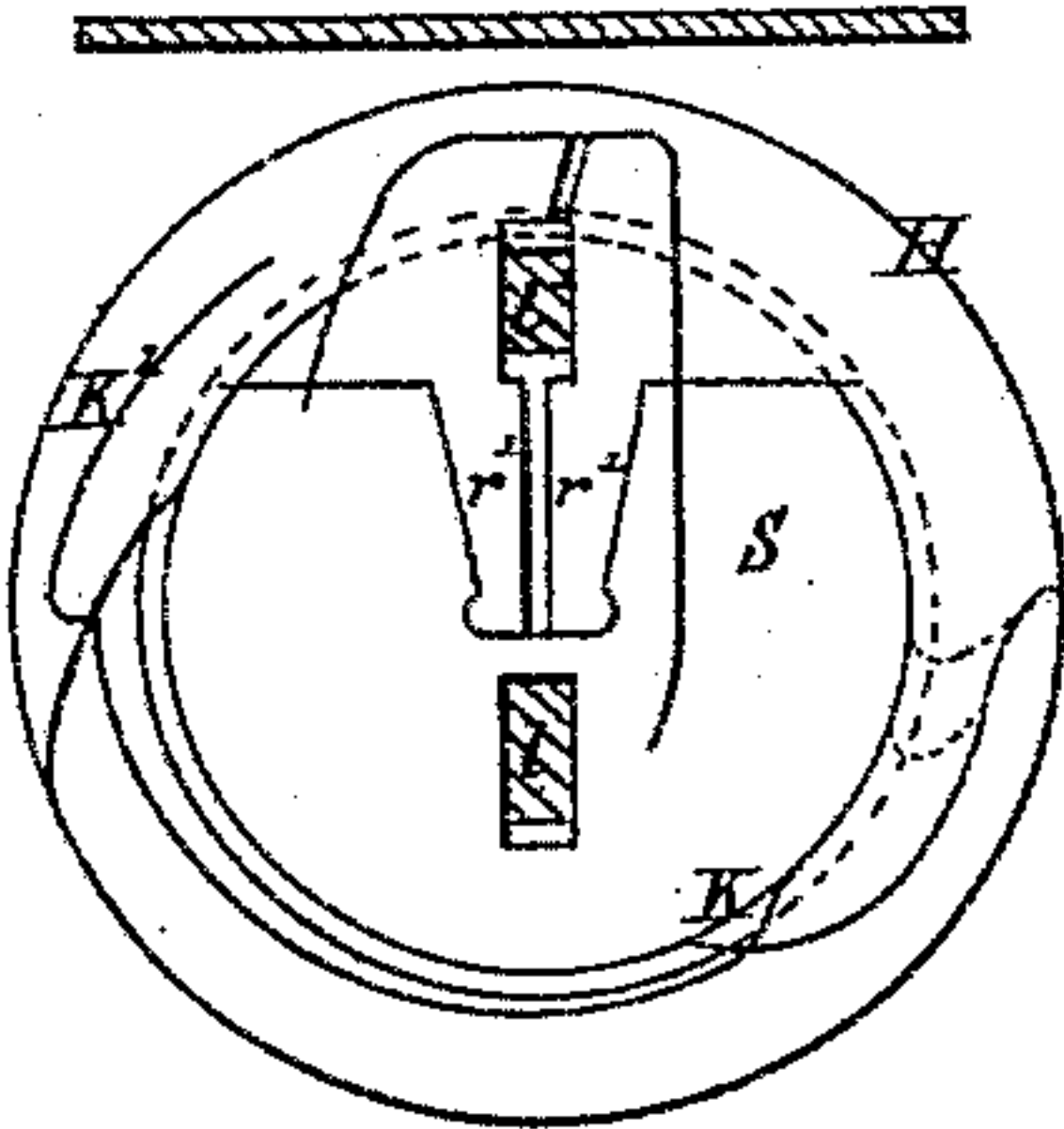


FIG. 5.

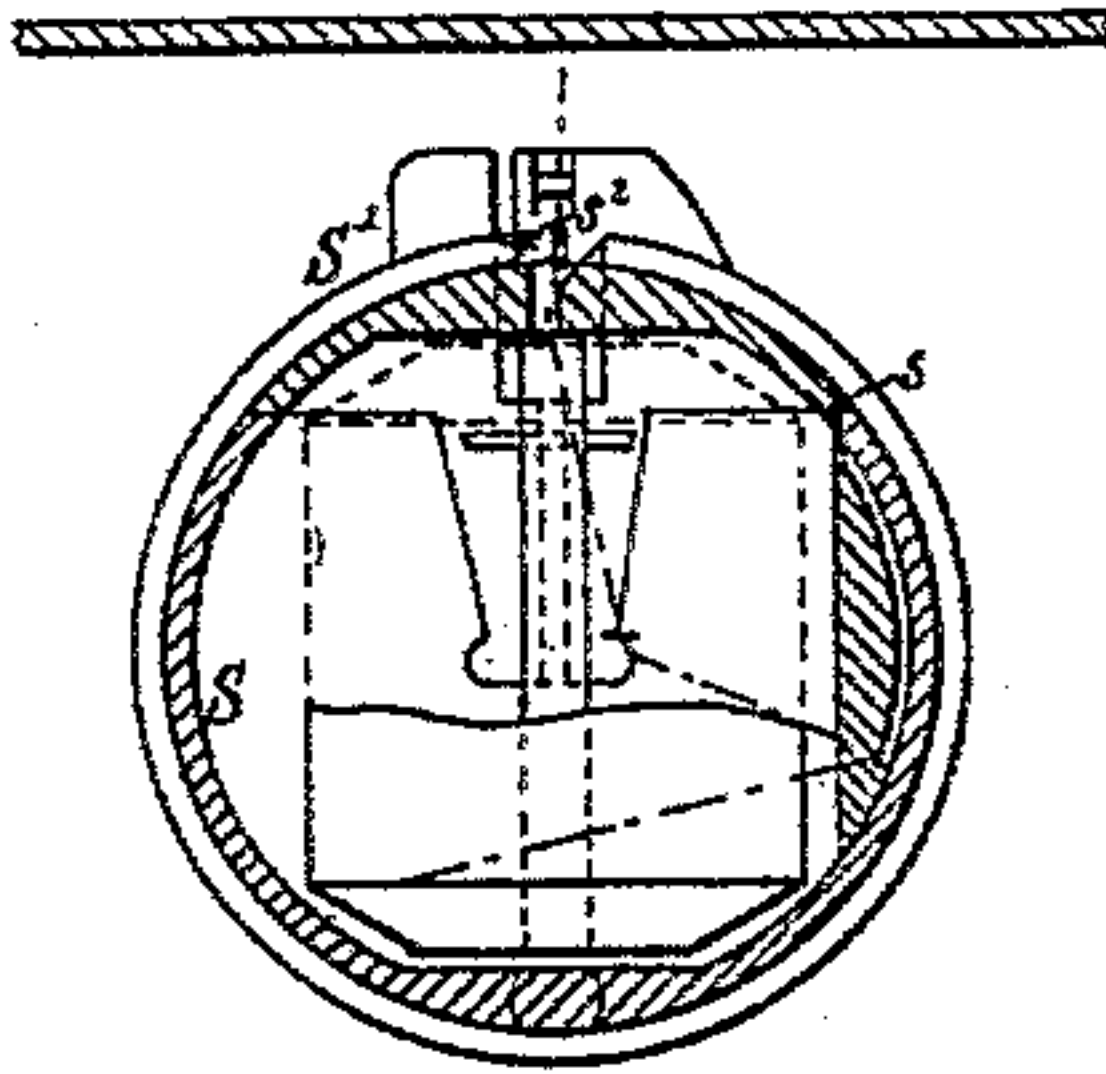


FIG. 3.

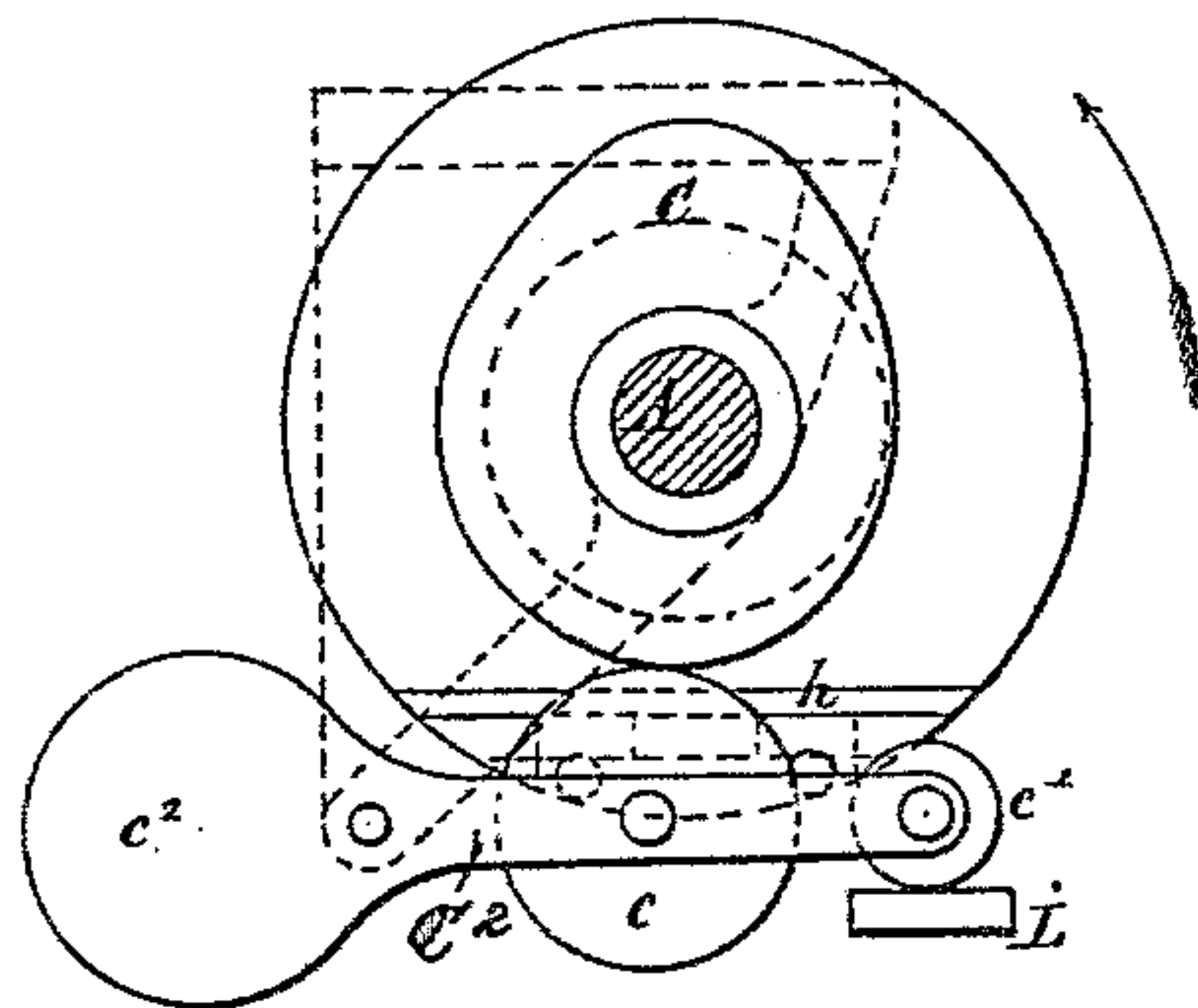


FIG. 6.

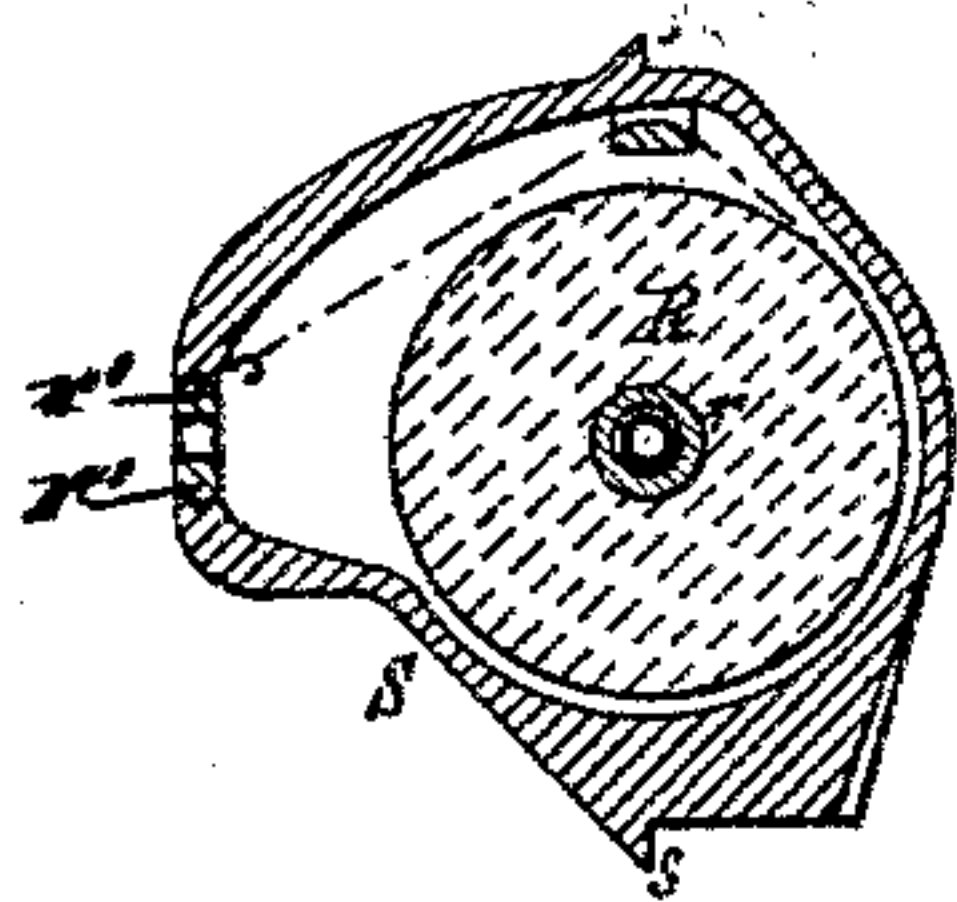


FIG. 7.

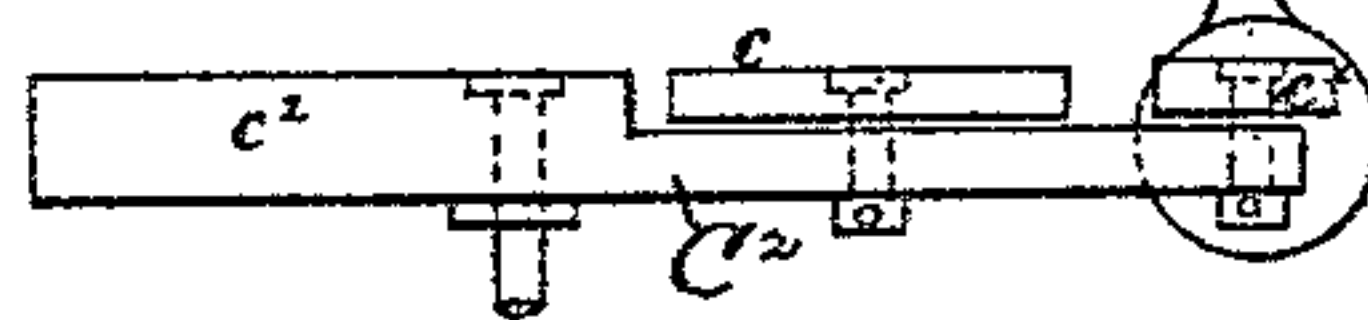


FIG. 10.

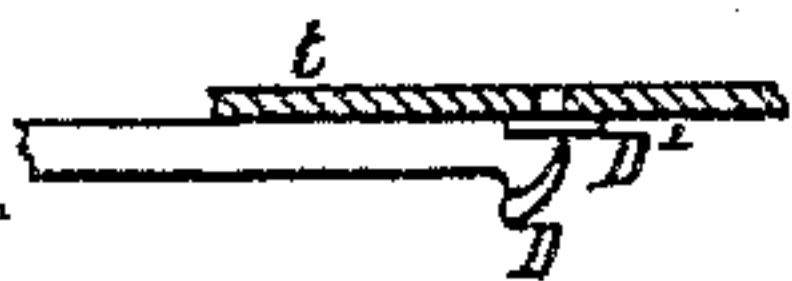


FIG. 11.

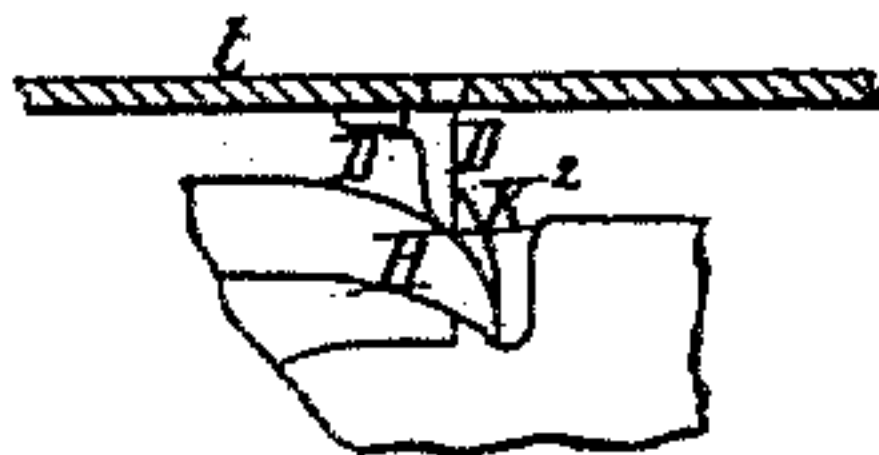


FIG. 15.

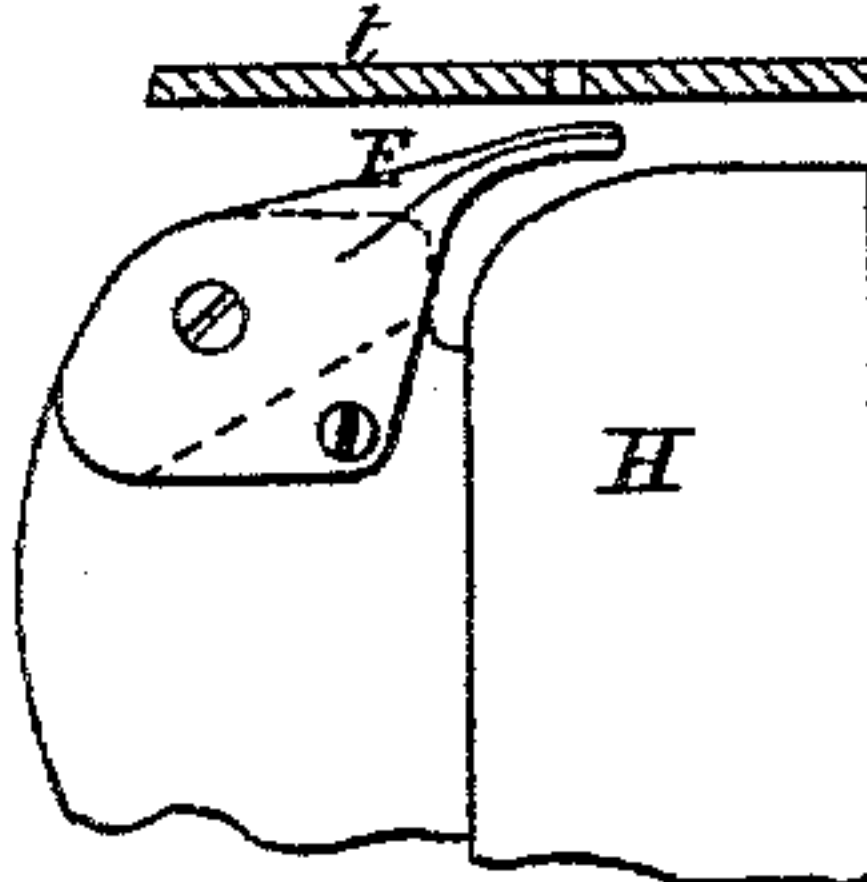


FIG. 13.

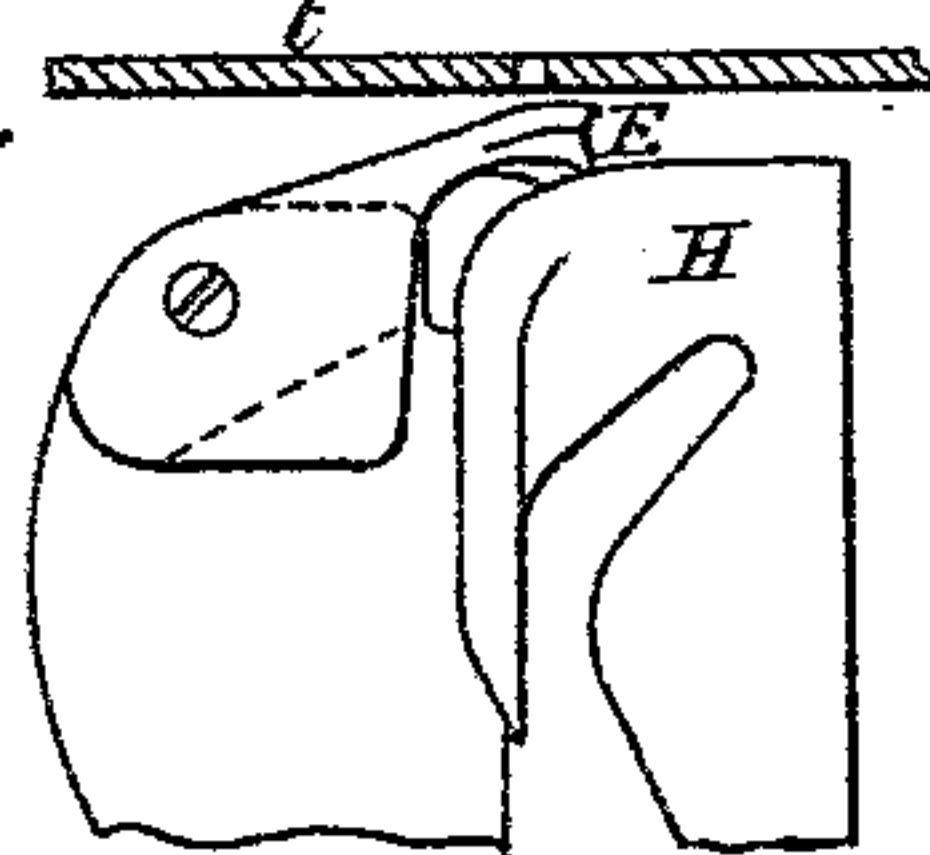


FIG. 12.

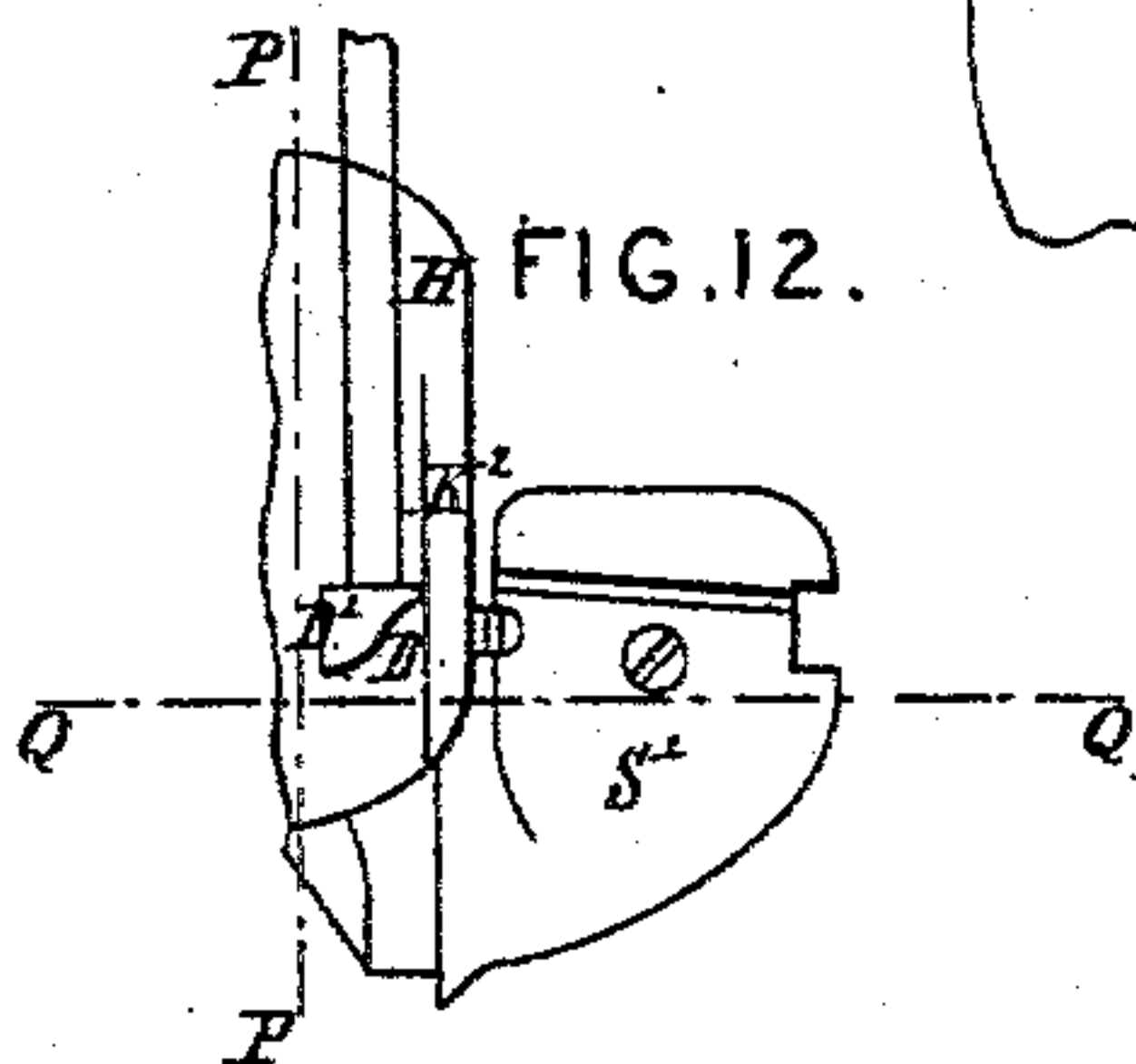
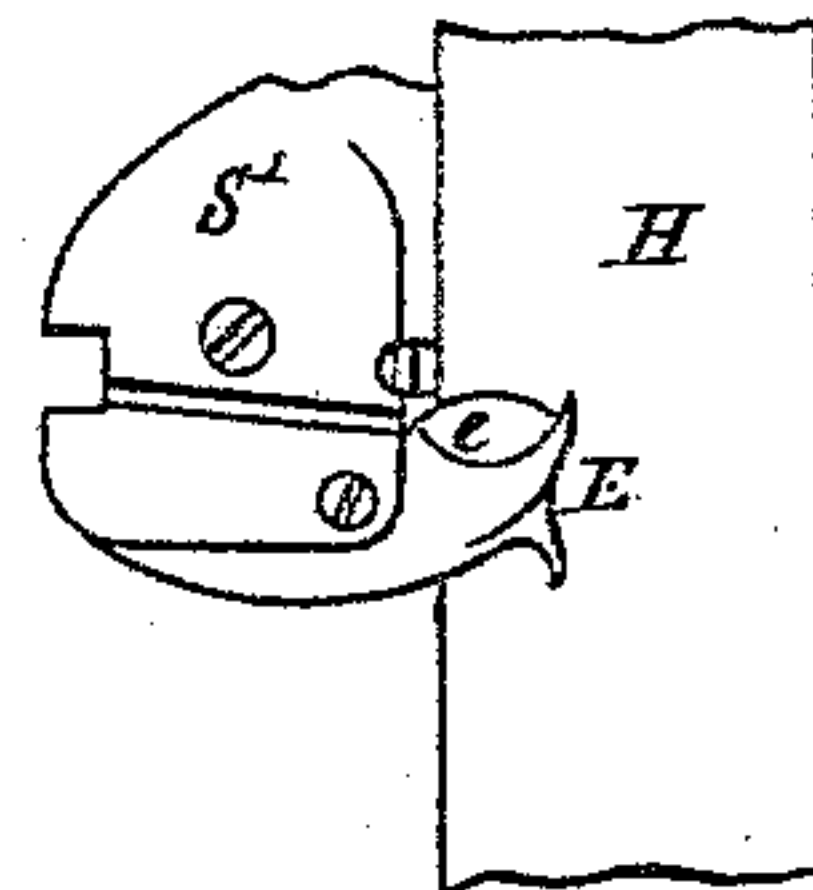


FIG. 14.



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(No Model.)

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Fig. 16.

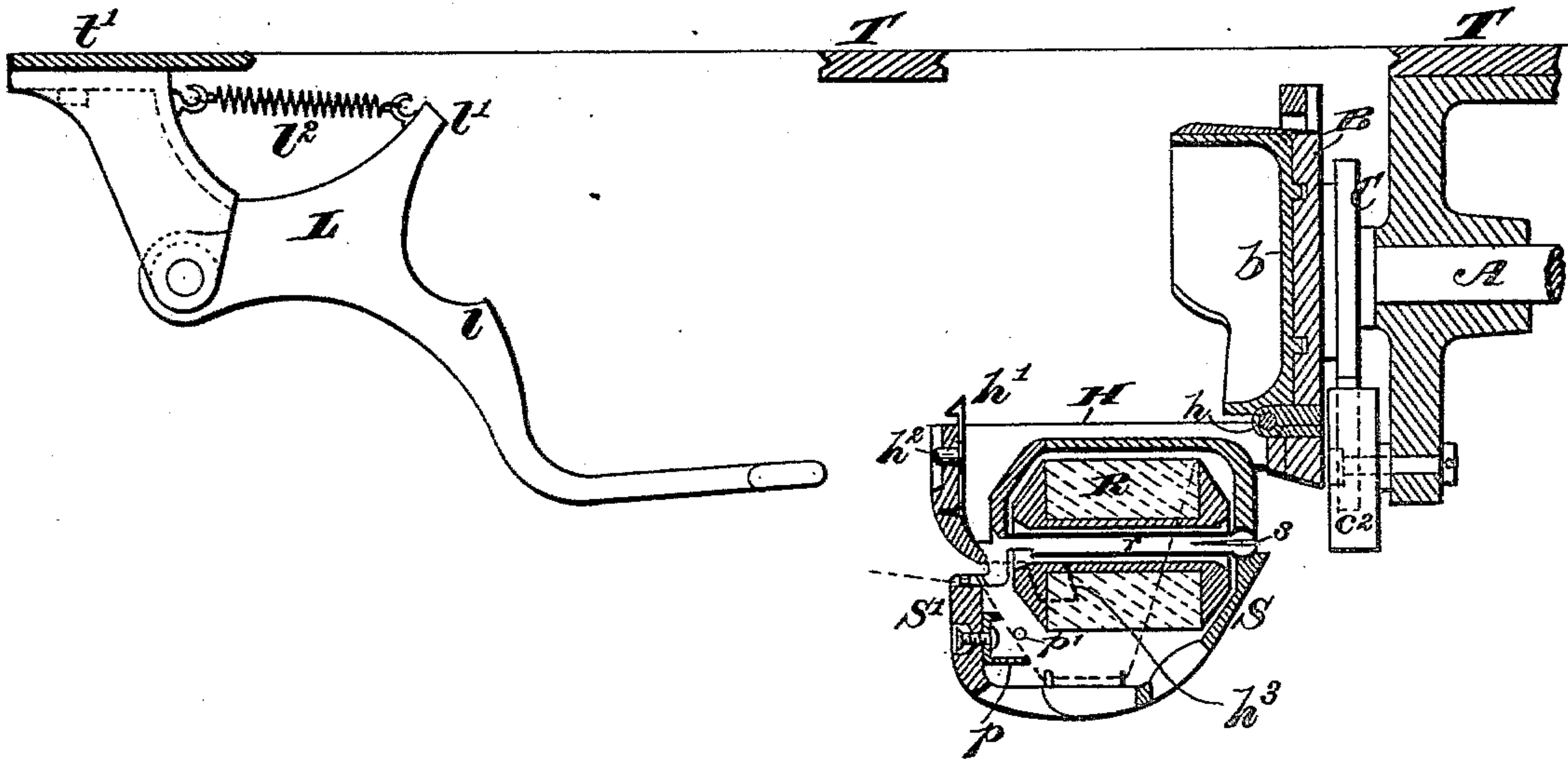


Fig. 17.

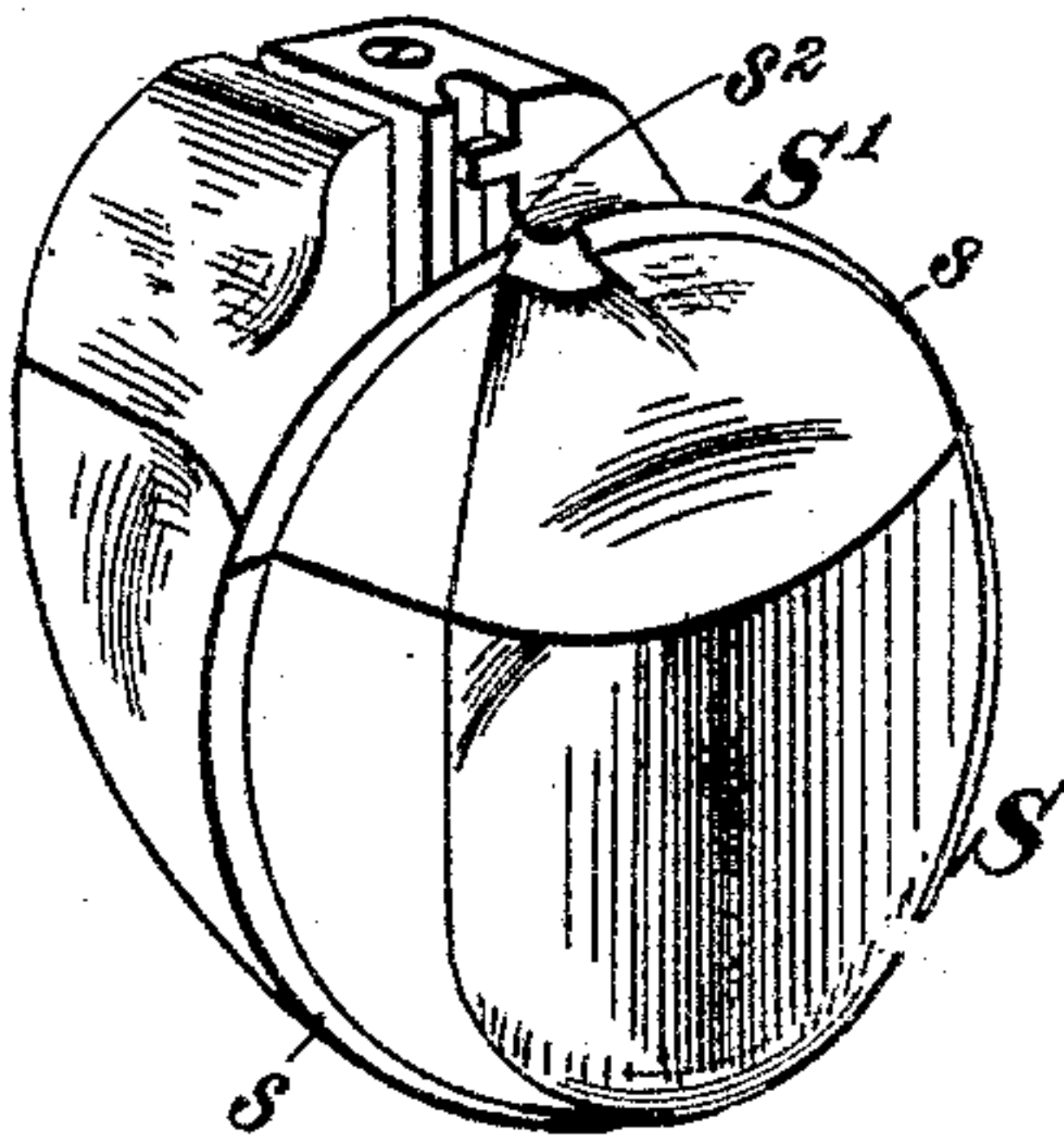
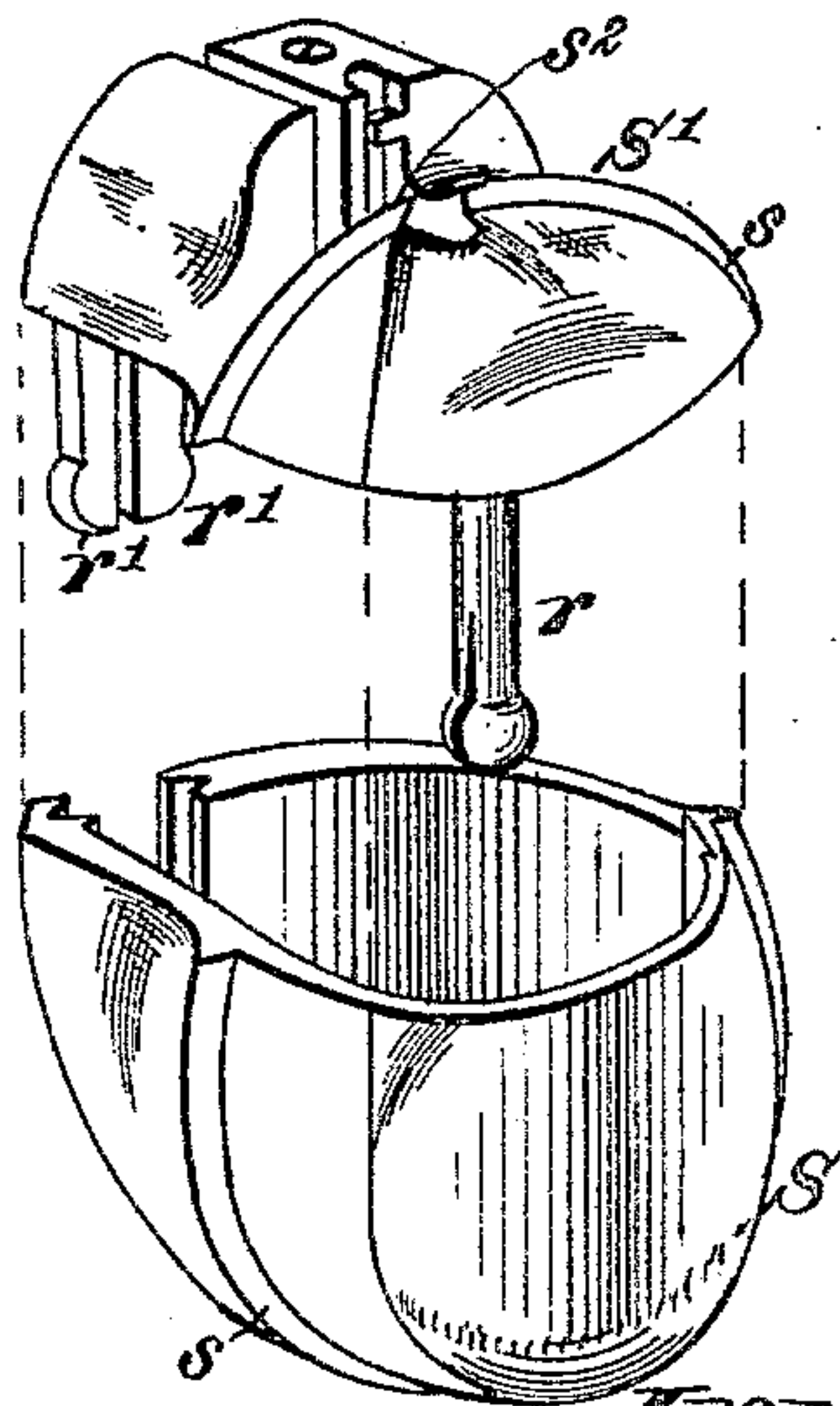


Fig. 18.



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UNITED STATES PATENT OFFICE.

HENRY GRELLIER, OF BRIXTON, COUNTY OF SURREY, ENGLAND.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 300,598, dated June 17, 1884.

Application filed November 7, 1883. (No model.) Patented in England August 28, 1883. No. 4,159.

To all whom it may concern:

Be it known that I, HENRY GRELLIER, a citizen of England, residing at Brixton, in the county of Surrey, England, have invented a new and useful Improvement in Sewing-Machines, (for which I have obtained a patent in Great Britain, No. 4,159, dated August 28, 1883,) of which the following is a specification.

My invention relates to a construction and arrangement of those parts of a sewing-machine which deal with the thread below the table, so as to make lock-stitches, employing an ordinary reel or spool for the under thread, or to make chain-stitches without an under thread, or to make several kinds of compound lock-and-chain stitches, at the will of the operator. For this purpose I provide, instead of the disk-shaped spool-case, such as is used in sewing-machines of the Wheeler & Wilson kind, a spool-case approximately spherical in shape, which can be taken apart in halves, so as to introduce into it a reel or spool of thread. This thread is passed through suitable guide-eyes and tension-guides in the spool-case, and issues through a hole at its upper part adjoining another hole, into which descends the needle. At the side of this latter hole there is a projecting undercut point, and a revolving hook is made to pass over this point, so as to seize the loop of the needle-thread and carry the loop round the spool-case while the loop is still held by the point until a recessed part of the revolving hook comes round and permits the loop to draw off the said point. Thus, at every stroke of the needle the lower or spool thread is engaged in the loop of the needle-thread, making a lock-stitch. In order to keep the loop which is in its passage over the spool-case clear of the next stitch, the said case is made with a protuberance, chiefly on its upper front side, so as to fill out the loop. To prevent the spool-case from turning, round horns or projections on a lever which is worked by a cam alternately engage in notches of the spool-case, these horns being moved aside to allow the loops of needle-thread to pass. The spool-case is held in position by an equatorial rim on it engaged in a groove in the cylindrical casing which carries the hook. When it is desired to make simple chain-stitches, the lower thread is dis-

pensed with, and a catch-hook is slid forward under the table into such a position as to retain the loop of the needle-thread, with which the revolving hook engages it, until the needle at its next descent passes through the loop. A compound lock-and-chain stitch can be made by retaining the under thread, while the catch above mentioned is in use for effecting the chain-stitch; also, the spool-case may have placed in it two reels or spools of thread, one above the other, and these threads, suitably guided, constitute double under threads for lock-stitches; or they may be used along with a catch fixed on the spool-case, so as to make a stitch compounded of chain-stitch with double lock-stitch. Chain-stitches with a twist in each stitch can also be made by modifying part of the revolving hook, so that the needle is made to pass through the previous loop before it becomes untwisted.

In the accompanying drawings I show those parts of a sewing-machine which embody my improvements, omitting parts to which my invention does not relate—such as the mode of working the needle and of feeding the fabric—it being understood that these operations may be effected by the usual mechanism, and that the fabric is fed in a direction opposite to that in which the revolving hook moves in the upper part of its revolution.

Figure 1 is a longitudinal sectional view taken in the plane of the needle N, showing the apparatus according to my invention, which is arranged under the cloth-table T. Fig. 2 is a plan of the apparatus, the cloth-table being supposed to be removed, so as to show the mechanism under it. Fig. 3 is an elevation on the line X X, looking toward the left. Fig. 4 is an elevation taken on the line Y Y, looking toward the right, the lower portion of the lever L being omitted for greater clearness; Fig. 5, a vertical section on line Z Z, looking to the left. Fig. 6 is a horizontal sectional view of the spool-case. Fig. 7 is a plan of the lower part of the mechanism shown in Fig. 3. Figs. 8 to 15, inclusive, are detail views, which will be hereinafter referred to. Fig. 16 is a view similar to Fig. 1, but with the parts in proper position for the removal of the spool-case from the hook or its insertion therein. Fig. 17 is a perspective view

of the spool-case; and Fig. 18 is a similar view, with the two parts of said case detached from each other.

In this apparatus an ordinary cotton reel or spool, R, is contained within a hollow spool-case, which is made to take apart for admission of the spool, and therefore consists of a lower part, S, and an upper part, S'. To the upper part, S', is attached in any suitable manner, as by soldering or otherwise, a tube, *r*, which passes down the center of the spool R and into a recessed hole in the bottom of S, in which it is held with a certain tightness by bulging the end of the tube and splitting it some distance upward, so that it is sprung into its place, the bulge of the tube engaging in the recess of the hole. The upper part, S', of the spool has also on its front side two prongs, *r* and *r'*, Figs. 4, 5, and 18, with a slit between them projecting downward into a recessed notch of the lower part, S, and these prongs are swelled a little at their lower ends, so that they have to be sprung into their seat when the upper part, S', is pushed onto the lower part, S. The two parts S and S', when put together with the spool R inside, constitute the spool-case, which remains stationary during the working of the machine, and this spool-case is so shaped as to present in its middle an equatorial rim or ridge, *s*, having its edge in a vertical plane nearly coinciding with, but a little in front of, that of the needle N, and of the center of the reel-tube *r*, down into which the point of the needle descends at each downstroke. This rim terminates at the side of the needle-hole with a point, *s*², Figs. 2, 17, and 18, slightly undercut, so as to form a hook. Within the spool-case are suitable guide-eyes, by which the thread from the spool R is led up through a slit at the top, so as to lie in the line with, but a little in front of, the needle N when it descends. The tension of the spool-thread can be increased by screwing down from the top a piece, *p*, so as to bend the thread over a pin, *p*'. The terms "front" and "rear" as herein used mean to the left and right, respectively, in Figs. 1 and 2. In the axial line of the equatorial rim *s* of the spool-case is mounted a spindle or shaft, A, which is connected to the other moving parts of the sewing-machine by any convenient gear, so as to revolve uniformly with the shaft or spindle that works the needle, and therefore to make one revolution while the needle N makes an up and a down stroke.

On the shaft A is fixed a disk, B, on which is fitted the shell II of the revolving hook, so as to revolve with the disk B. Fig. 8 is a developed plan of the shell II as it would appear if it were cut across at the part which is shown highest in Fig. 1 and were flattened out. It is hinged to the disk B by a hinge at *h*, and held in position on the disk by a spring-latch at *h'* entering a hole in the disk B. By pressing a stud, *h*², projecting up from the spring of *h'*, the catch can be released, and the shell can be folded down to lie on a stop, *h*³, which

may be fixed to any part of the machine. In order to give access to the parts below, the part *t* (indicated by dotted lines in Fig. 2) of the cloth-table T is fitted to slide transversely, and another part, *t'*, is fitted to slide longitudinally. On a bracket attached to *t'* is mounted a lever, L, which has a long arm extending backward below the spool-case and the revolving hook, and has two projecting horns, *l* and *l'*, which are fitted to enter recesses in the front of the spool-case—the one, *l*, in its lower part, S, and the other, *l'*, in its upper part, S', as indicated in Fig. 4. A spring, *l*², draws the lever L, so as to keep the horn *l* engaged in the spool-case, except when said horn is disengaged, and the horn *l'* is engaged by the action of a cam, C, fixed on the spindle A. This cam acts on a roller, *c*, mounted on a lever, C², which carries another roller, *c'*, that bears on the end of the lever L. The lever C², carrying these two rollers, is kept up by a counter-weight, *c*², a little in excess of their weight. By withdrawing slide *t'* the lever L is withdrawn with the bracket that carries it, and the face of the spool-case being thus left exposed, the slide *t* can be withdrawn, and the catch *h'* can be released by pressing down the stud *h*², whereupon the hook-shell II can be turned down on its hinge *h*, to rest on the stop *h*³, and the spool-case consisting of the two parts S and S', and containing the spool R, can then be laid into the hook-shell II, its rim *s* bearing against the front inwardly-turned edge of the hook-shell, as clearly shown in Fig. 16. The shell containing the spool-case can then be again turned up on its hinge and fastened by the latch *h'*, the slides *t* and *t'* can be replaced, and the apparatus is ready for action in the following manner: The needle N descends, its point entering some depth into the tube *r*, and as it begins to ascend a loop is formed of the needle-thread. The point K of the revolving hook enters this loop and draws one limb thereof to one side, while the other limb of the loop is caught on the point *s*² of the equatorial rim *s* at the side of the needle-hole. The hook, continuing to revolve, carries the loop of the needle-thread round to the under side of the spool-case, one limb of the loop—namely, that which extends from the hook *s*²—passing behind the spool between it and the disk B, and the other limb sliding off the rounded face of the hook-shell II, and passing along the front of the spool-case till it reaches the horn *l*, when the hook K, having left this loop behind, enters another loop of the needle-thread. At this moment the cam C acts on the lever L so as to move the horn *l* out of the lower recess of the spool-case and the horn *l'* into the upper recess, the one horn entering before the other is out, so that the spool-case is never left free to turn by both horns *l* and *l'* being out of their notches at the same time. The horn *l*, being thus moved a little away from the face of the spool-case, allows the loop to pass, and before it reaches *l'* the cam C allows the spring *l*² to bring the

lever L back to the position shown in Fig. 1, with the horn *l* inserted and the horn *l'* clear of the spool-case, so as to allow the thread-loop to pass it. The spool-case is made, as shown, with a considerable bulge on its front side, so as to occupy the expanded loop while it is being drawn up by the action of the hook K in expanding the succeeding loop. Each loop is thus made to embrace within it the thread from the spool R, thus forming lock-stitches. The positions of the hook K on its shell H and of the backward stop K' are arranged to suit the movement of the needle, K' being a little clear of the needle as it descends, and the base of the hook being clear of it when it ascends.

It will be understood that when it is necessary, for any purpose, to remove the spool-case from the hook-shell, the latter will be turned down on its hinge, as shown in Fig. 16, when the spool-case, with its inclosed spool, can be readily lifted therefrom.

The disk B has a projecting annular flange, F, which, over part of its circumference, bears against the shoulder of the rim *s* of the spool-case, keeping the said case in position, but which is in other parts cut away in correspondence with the hook-shell surrounding it, as shown in the developed view, Fig. 9. A piece, F', instead of being made as part of the annular flange, F, is made as part of and solid with the inside of the hook-shell H, as indicated by the dotted lines F' in Fig. 8, so that there may be no slit at the point of the hook K such as might catch and entangle the thread.

When it is desired to make chain-stitches, the spool R and its thread are dispensed with, and a catch-hook is fixed to the under side of the slide *t*, as shown in Figs. 10, 11, and 12, Fig. 10 being part of a transverse section taken on line P P of Fig. 12, which is a part plan with the plate *t* omitted, and Fig. 11 being a part longitudinal section on line Q Q of Fig. 12. This catch-hook D projects down, so as almost to touch the rounded face of the hook-shell H, and it has a horizontal lip, D', projecting from its hinder side, to prevent the thread from passing over it. The main hook K catches the loop of the needle-thread and carries it round under the spool-case, as already described; but, instead of the limb of the loop being allowed to slip off the rounded face of the hook-shell H, it is held by the catch-hook D until the part K' of the hook-shell comes round, and then the needle descends in front of the limb of the loop so held, and consequently inside the loop, so that when the hook K returns to form a succeeding loop it forms it inside the previous loop, which is then drawn up, as described above, completing the chain-stitch. In order to insure the action of the catch-hook D, I form on part of the rounded face of the hook-shell H, near the inclined edge K', a projecting ridge, K², (see Fig. 4,) which has the effect of keeping the thread upon the catch-hook D until the said ridge has passed and the needle descends.

While the catch-hook D is used as described, the spool R, with its thread, can also be used, and thereby a stitch be produced which is a combination of lock-stitch and chain-stitch, each loop of the needle-thread engaging within it the shuttle-thread, as well as the next succeeding loop of the needle-thread. The chain-stitch or the combined lock and chain stitch may be produced, as above described, by employing, instead of the catch-hook D, which is fixed to the table, a catch-hook, E, (shown in elevation at Fig. 13, and in plan, Fig. 14,) which is fixed to the upper part, S', of the spool-case. By employing the hook E and two spools within the spool-case a compound stitch can be formed in the following way: One of the spool-threads is led in the usual direction to the front side of the needle, the other is brought round a guide-groove, *e*, sunk in the upper face of the hook E, so that it has to lie on the rear side of the needle. Thus as the chain-stitches are formed, they embrace within them the two spool-threads, which appear symmetrically arranged in the chain-stitches.

A twisted chain-stitch, which may be termed "cable-stitch," can be produced by adding to the hook-shell H a back hook, K³, projecting from the part K' where the needle descends. This back hook, K³, prevents the limb of the loop of the needle-thread from sliding back along the inclined edge K' until after the descent of the needle, so that the needle enters a twisted loop, which, when drawn up, gives the appearance of a cable to the chain. This action is rendered more certain by the shoulder *s'* of a depression that is formed in the upper rear part of the spool-case. When the back hook, K³, is employed, the hook E (shown in Figs. 13 and 14, is modified, as shown in Fig. 15, by making it without the part that projects downward at its outer end; and then with the hook E, so modified, acting in combination with the back hook, K³, and using two spool-threads, there is formed a twisted or cable chain with the two spool-threads passing along it.

As the ridge *s* of the spool-case is always between the turned-in part of the hook-shell H, which bears on its sloping front side and the edge of the flange of the disk B, which bears against its hinder face, in order to provide for taking up the wear of these rubbing parts and to prevent shake, I prefer to place within the hollow of the disk B a shell, *b*, having its flange bearing against the rim *s* of the spool-case, this shell being capable of being advanced a little, so as to take up the wear, by placing behind it, between it and the face of the disk B, a thin packing of paper or other material. In order that the shell *b* may always turn with the disk B, it is held in position on said disk by steady-pins, such as *b'*, leaving it free to advance, but not to revolve, independently of B.

Having thus described my invention, what I claim is—

1. In a sewing-machine, the combination of a revolving hook having an inwardly-turned outer edge, a stationary spool-case having an equatorial rim adapted to be engaged by the inwardly-turned edge of the hook and provided with recesses, a lever having horns adapted to enter said recesses, and means for operating said lever to bring said horns alternately into engagement with said spool-case, substantially as described.

2. The combination of the disk B, having a projecting flange, F, the annular hook-shell H, hinged to the said disk, and provided with a hook, K, a spool-case having an equatorial rim, s, and means adapted to permit of the passage of loops of needle-thread, for preventing the rotation of said spool-case with said hook-shell and hook, substantially as described.

3. The combination of a revolving hook having an inwardly-turned edge, a spool-case provided with an equatorial rim, s, adapted to engage said inwardly-turned edge, said rim having an undercut recess at one part to form a hook, s², and means for preventing the rotation of said spool-case with said hook, substantially as described.

4. The combination of the revolving hook, the stationary spool-case having recesses, the shaft A, the cam C, the lever C², having rollers c and c', and counter-weight c², the lever L, having horns l and l', and the spring T, substantially as described.

5. The combination, with the disk B and the revolving hook-shell and hook operated thereby, of the stationary spool-case having an equatorial rim, s, and the shell b, carried by said disk and adjustable relatively to said rim, substantially as described.

6. The combination of the disk B, the hook-shell H, hinged thereto, and a spring-catch for holding said hook-shell in its operative position, substantially as described.

7. The combination, with a revolving hook and a stationary spool-case having a hook, s², for dividing the loops of needle-thread, of a stationary catch-hook adapted to co-operate with said revolving hook and spool-case to produce chain-stitches, substantially as described.

8. The combination, with the revolving hook and stationary spool-case, of the slide t, the catch-hook D, secured thereto, and provided with the horizontal lip D', substantially as described.

9. The combination, with the revolving hook-shell H, having the hook K and the projecting ridge K², of a stationary spool-case, and a catch-hook adapted to co-operate with the rotating hook to produce chain-stitches, substantially as described.

10. The combination, with the revolving hook-shell H, having the hooks K and K³ and projecting ridge K², of a stationary spool-case, and a stationary catch-hook, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of October, A. D. 1883.

HENRY GRELLIER.

Witnesses:

OLIVER IMRAY,
HAROLD IMRAY.