(No Model.)

F. S. BELYEA.

DENTAL PLUGGER.

No. 570,864. Patented Nov. 3, 1896.

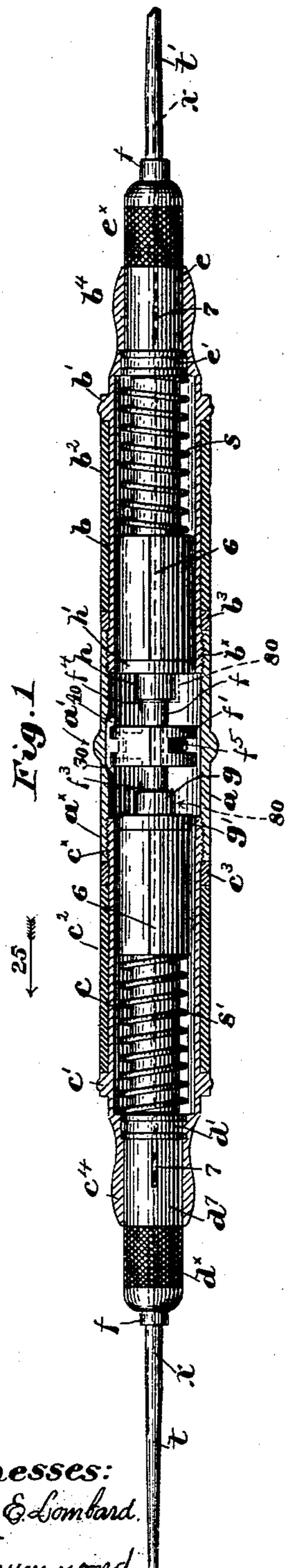

Fig. 1

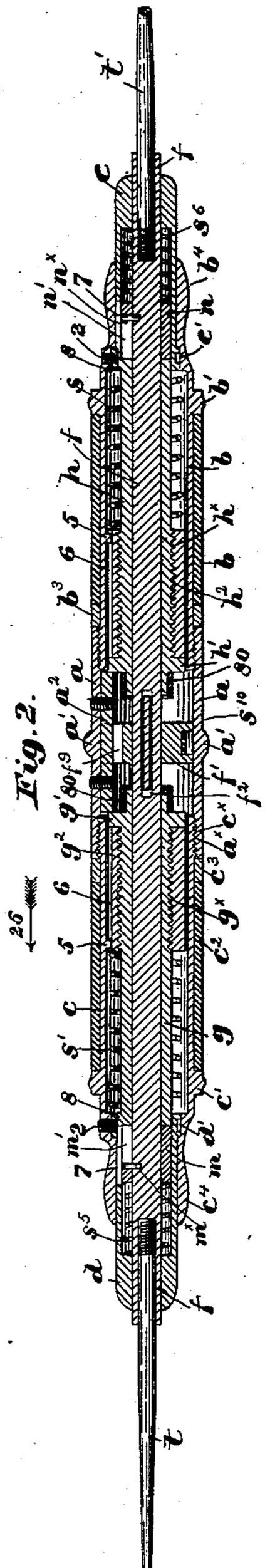

Fig. 2.

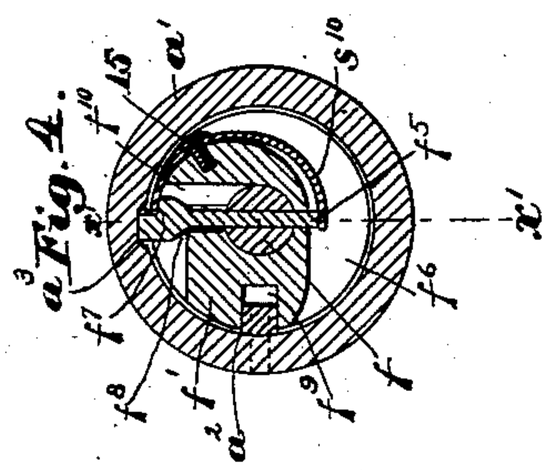

Fig. 4.

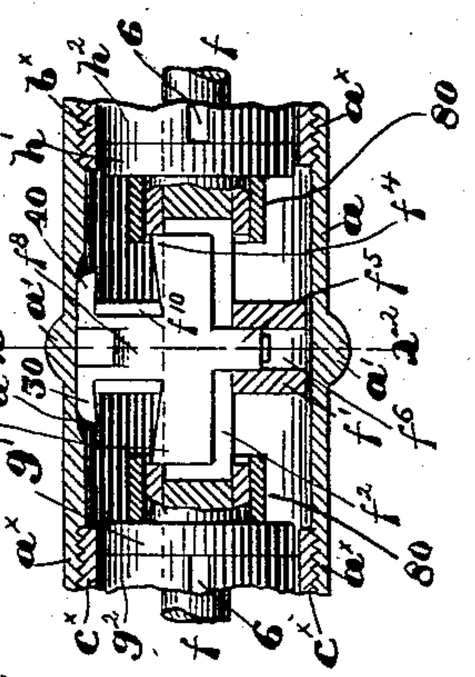

Fig. 3.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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DENTAL PLUGGER.

SPECIFICATION forming part of Letters Patent No. 570,864, dated November 3, 1896.

Application filed December 21, 1895. Serial No. 572,856. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. BELYEA, a subject of the Queen of Great Britain, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Dental Pluggers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to that class of hand-pluggers for dental use wherein the movement of the case or handpiece longitudinally operates to compress and then release a hammer-spring to deliver a blow upon the tool-carrier. Heretofore, so far as I am aware, such dental pluggers have been so constructed that either a direct or a reverse blow could be delivered, or, with a tool-holder at each end of the handle, direct blows could be given with a tool in the one holder and reverse blows with the tool in the other holder. This requires the use of two pluggers, or a reversal of the double tool when a change is desired from a direct to a reverse blow.

My present invention has for its object the production of a dental plugger wherein either direct or reverse blows can be imparted to a single tool as desired, the construction and arrangement being simple and effective, the plugger, as herein shown, being adapted to hold a tool at each end, both of which can deliver direct or reverse blows to the filling.

Figure 1 is a partial longitudinal section of a dental plugger embodying my invention, the tool-holding spindle and operative parts within the case or handpiece being shown in elevation. Fig. 2 is a longitudinal section thereof on the line $x\ x$, Fig. 1. Fig. 3 is a greatly enlarged sectional view on the line $x'\ x'$, Fig. 2, of the releasing device. Fig. 4 is a transverse section of the releasing device, also enlarged, on the line $x^2\ x^2$, Fig. 3; and Fig. 5 is a detail in side elevation, to be described.

I have herein shown the outer case or handle as composed, for convenience in construction, of a central cylindrical section a, which may be provided with an annular, preferably milled or roughened, enlargement a', the ends of the section being screw-threaded at $a^\times$ to engage the threaded inner ends $b^\times$ and $c^\times$ of the two like end sections b and c, respectively. Annular flanges b' and c' on said sections respectively retain tightly in place covers b^2 c^2 of vulcanite or other suitable material, affording a firm grasp for the fingers of the operator in manipulating the tool. Metal bands b^3 and c^3 shrunk or otherwise secured rigidly upon the sections adjacent their threaded portions prevent movement of the covers b^2 and c^2.

The outer ends of the two sections b and c are reduced in internal diameter to form the bearings b^4 and c^4 for two like rotatable and longitudinally-movable spindle-supports d and e, milled or roughened at $d^\times$ and $e^\times$. (See Fig. 1.)

A spindle f extends centrally through the tool, supported near its ends by and longitudinally movable in the supports d and e, the ends of said spindle having threaded holes into which are screwed the tools t and t', the latter being broken off in Figs. 1 and 2 to save space.

The supports d and e are annularly grooved at d' and e', Fig. 2, to be entered by projections shown as screws 2, inserted through the bearings b^4 and c^4, preventing longitudinal movement of the supports d and e relatively to the said bearings b^4 and c^4 of the case-sections b and c, respectively, while not interfering with their rotation.

A collar f' is shrunk or otherwise secured to the spindle centrally between its ends, acting as an anvil and also forming the support for the hammer-releasing device to be described. At each side of said collar two long sleeves g and h are loosely mounted on the spindle, said sleeves being externally and preferably coarsely threaded at $g^\times$ and $h^\times$, Fig. 2, for a part of their length. Near their inner ends the sleeves are provided with flanges g' and h', which hold the sleeves in normal position, at such time abutting against a stop, shown herein in Fig. 2 as a rib a^2 on the inner side of the center section a, keeping the two sleeves equidistant from the center of the case. Heavy collars g^2 and h^2, internally threaded, engage the threaded portions of the sleeves, and are held from rotation by projections 5 on the interior of the end sections b and c, which enter longitudinal grooves 6 in the collars, strong spiral springs s and s' surrounding the sleeves between the outer ends of the collars and the

ends of the casing, the sleeves and their collars thus constituting spring-controlled hammers, the weight of the collars increasing the blow.

By making the spring-controlling collar a part of the hammer the weight of the tool is reduced, inasmuch as the hammer must have a certain weight to give the proper blow, whereas if the spring-controlling collar were independent of the hammer entirely it would be an additional or dead weight added to the casing.

Rotation of one or the other sleeve will move its collar longitudinally thereon toward or away from the center of the case to diminish or increase the tension of its particular spring, which always tends to press the hammer toward the collar f'. This rotation of the as they may be termed, is effected by rotation sleeves to adjust the "hammer-springs" s or s', of the spindle-supports d and e, they having longitudinal grooves 7 therein to receive lugs or projections 8 on the adjacent ends of the hammer-sleeves, to rotate the latter while permitting their free longitudinal movement.

The spindle f has loose thereon collars m and n longitudinally movable within the supports d and e, respectively, said collars being longitudinally slotted at m' and n' to embrace stop-pins $m^{\times}$ $n^{\times}$, in the spindle f, coiled springs s^5 and s^6 being interposed between the outer ends of the collars and the adjacent inner ends of the supports d and e.

It will be understood that when one of the tools, as t, is held from longitudinal movement by engagement with the tooth of the patient, the outer case or handle, grasped by the operator, can be moved relatively to the spindle f in the direction of the arrow 25, Figs. 1 and 2. This movement of the handpiece causes compression of the hammer-spring s, as the hammer h will be locked at the beginning of such movement by a device now to be described.

As best shown in Figs. 2 and 4, the spindle f is longitudinally slotted at its center, at f^2, to receive therein a trigger, shown as having two oppositely-extended detents f^3 f^4 wide enough to normally project slightly beyond the surface of the spindle f, as shown in Fig. 3, and engage the inner ends of the sleeves g and h, ho ding them from movement toward the center of the spindle. A depending lug f^5 on the trigger extends through the slot f^2 of the spindle and into a peripheral recess or groove f^6 in the collar f', one end of a spring s^{10}, (see Fig. 4,) secured in said groove by a screw 15, extending under the lug f^5, while its other end rests on a shoulder f^7 in one side of a trip f^8, extended oppositely from the lug f^5 and up through the transverse slot f^{10} in the collar, so that the trigger is yieldingly supported. The trip f^8 is normally held by the spring s^{10} in a longitudinal depression or recess a^3 in the interior of the handpiece, the ends of the recess being preferably rounded or beveled, as shown in Fig. 3, as are the corners 30 and 40 of the trip f^8.

A longitudinal groove f^9 in the collar f' is entered by the stop a^2 on the interior of the case to prevent rotation of the collar and spindle while permitting longitudinal movement thereof.

Now supposing the movement of the handpiece to be, as stated, in the direction of the arrow 25, the spring s will be compressed until the hammer h is unlocked, and this will occur when the movement of the handpiece has been sufficient to cause the corner 40 of the trip to be pushed down and out of the recess a^2. Such depression of the trip f^8 moves the detent f^4 into the slot f^2 of the spindle f out of engagement with and releasing the sleeve h, permitting the spring s to suddenly expand and bring the inner end of the hammer against the anvil or collar f', fast on the spindle, with a quick sharp blow, the force of which is transmitted through the tool t to the filling in the tooth. As the handpiece is moved forward it takes with it the stop a^2 away from the flange h', so that the sleeve h is held only by its detent f^4, said stop bearing against the flange g' of the sleeve g, moving it away from the collar f'; but its spring s' will not be compressed, as the outer left-hand end of the casing, viewing Fig. 2, is also moving in the same direction and at the same speed. The outer end of the sleeve g moves the slotted collar m to the left, the slot m' permitting such movement, it being remembered that the pin $m^{\times}$ on the spindle f is stationary, and the outward movement of the support d prevents compression of the spring s^5. At the same time the pin $n^{\times}$ prevents inward movement of the collar n, while the movement of the support e compresses the spring s^6.

When the hammer has been released and the blow thereof delivered upon the collar or anvil f', as described, the spring s^6 expands as soon as the pressure of the hand upon the casing is relaxed or when it is moved oppositely to the direction of the arrow 25, the spring being strong enough to restore the spindle and casing to relative normal position shown in the drawings. The springs s^5 and s^6 thus act as centering-springs to restore the parts of the plugger to normal position, and when the stop a^2 again engages the flange h' the hammer-sleeve h is moved on the spindle f to the right, Figs. 1 and 2, until the detent f^4 is exposed, whereupon its spring s^{10} immediately lifts it into locking position shown. The slotted collars m and n, coöperating with the centering-springs, accommodate themselves to any slight variations in the strength of the latter and hold the tool-carrying spindle truly to center when the plugger is not in use.

If the tool t' at the right-hand end of the spindle be used, the casing a will be moved to the right, in such instance the spring s' giving the hammer-blow, and the detent f^3 releasing

the hammer, the parts to the left of the center operating precisely in the same manner as has been described of the parts at the right, but moving in the opposite direction. Thus either end of the plugger may be used to give a direct hammer-blow, and the same is true if a reverse blow is desired, as will now be described.

Supposing that it is desired to impart a reverse blow, the operator for some reason finding it more convenient of manipulation or better adapted to the particular work in progress. The point of the tool having been inserted against the filling, a tool at the left-hand end of the spindle being used for purpose of illustration, the operator draws the handpiece or casing toward him or opposite to the arrow 25. The spring s' will be compressed, likewise the centering spring s^5, and when the casing has been moved far enough the corner 30 of the trip f^8 will be depressed to retract the detent f^3 and the hammer g will be released to deliver the blow. After the blow the spring s^5 returns the casing to normal position with the other parts.

It will be seen that a direct blow delivered on a tool in one end of the spindle calls into operation the same parts that operate to deliver a reverse blow on a tool held in the other end of the tool-carrier or spindle f, so that by the construction described I am enabled to deliver either a reverse or a direct blow without reversing the instrument, and not only that, but I can use different tools, one at each end, and can deliver the direct or reverse blow to either one.

The hammer-springs may be so adjusted that one will impart a hard and the other a soft blow, and similar tools can be secured in both ends of the instrument, so that by a simple reversal the operator can give a hard or soft blow without stopping to adjust the tension of the spring.

I prefer to interpose a washer 80 of vulcanized rubber or similar material between the hammer and anvil, as shown in full lines, Fig. 2, and dotted lines, Fig. 1, to give some elasticity to the blow, and thereby dull or deaden it, making it less painful to the patient than if two metallic parts came together.

The washer 80 is shown as a cylinder surrounding the hammer at its inner end and projecting slightly beyond it to act upon the anvil f' when the blow is delivered.

My invention is not restricted to the precise construction and arrangement of parts herein set forth, as the same may be modified or rearranged without departing from the spirit and scope of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an instrument of the class described, a spindle, a two-part hammer longitudinally movable thereon, a hammer-actuating spring, and means to rotate one of the hammer members upon the other to thereby adjust the tension of the spring, substantially as described.

2. In an instrument of the class described, a tool-carrier, a longitudinally-movable hammer comprising a sleeve and a concentric collar, an actuating-spring for said hammer, and means to adjust said collar longitudinally on the sleeve to regulate the tension of the spring, substantially as described.

3. In an instrument of the class described, a tool-carrying spindle, a longitudinally-movable two-part hammer, an actuating-spring for the hammer, and means to move one of the hammer members on and relatively to the other, to adjust the tension of the spring, substantially as described.

4. In an instrument of the class described, a casing, a tool-carrier, a rotatable support therefor carried by the casing, in which said carrier is longitudinally movable, a sleeve movable on said carrier and forming one member of the hammer, and a hammer-spring, combined with a spring-controller carried by and rotatable relative to the sleeve, and constituting the other member of the hammer, and connections between said sleeve and carrier-support, to rotate the former, substantially as described.

5. In an instrument of the class described, a tool-carrier, a tool mounted in one end thereof, spring-actuated means to impart either a direct or a reverse blow to the carrier and its said tool, and means under the control of the operator for determining at will the direction of the blow to be delivered by said tool, substantially as described.

6. In an instrument of the class described, a tool, spring-actuated means to impart a direct or a reverse blow to said tool, a detent to maintain said means locked preparatory to delivery of the blow, devices to regulate the force of the blow, and means under the control of the operator to determine the direction of the blow and to move the detent into inoperative position, substantially as described.

7. In an instrument of the class described, a tool, independent actuating-springs to impart a direct or a reverse blow to said tool, a detent for each spring, and means under the control of the operator to compress one or other of the springs at will to determine the direction of the blow, and to thereafter release the detent of the compressed spring, substantially as described.

8. In an instrument of the class described, a tool-carrier adapted to receive a tool at each end, spring-actuated means to impart a direct or a reverse blow to either tool held in the carrier, and means controlled by the operator to determine the direction of the blow at will, substantially as described.

9. In an instrument of the class described, a tool-carrier adapted to receive a tool at each end, spring-actuated means to impart a direct or a reverse blow to either tool held in the carrier, means controlled by the operator to

determine the direction of the blow at will, and a centering device including two oppositely-acting springs to return the tool-carrier to normal position after delivery of the blow, substantially as described.

10. In an instrument of the class described, a casing, a tool-carrier, means, including two oppositely-acting springs, to impart a direct or reverse blow to the tool-carrier, and a locking device for each of the springs when compressed, relative longitudinal movement of the tool-carrier and casing compressing one of said springs and thereafter releasing it, substantially as described.

11. In an instrument of the class described, a casing, a tool-carrier therein, independent hammer-springs located at opposite ends of the casing and adapted to be compressed one at a time, a yieldingly-supported, tipping detent to coöperate with the compressed spring, means intermediate said springs and tool-carrier, to impart a blow thereto when the compressed spring is released, and a releasing device for the detent, controlled by relative longitudinal movement of the casing and tool-carrier, to tip said detent out of engagement with the compressed spring, substantially as described.

12. In an instrument of the class described, a tool-carrier, its tool, means, including a plurality of actuating-springs, to impart a direct or a reverse blow to the carrier and its tool, devices to independently regulate the tension of each spring, and means controlled by the operator, to determine the direction of the blow delivered by said tool, substantially as described.

13. In an instrument of the class described, a casing, a tool-carrier, supports therefor rotatable in the casing, a plurality of hammers and their actuating-springs, to impart to the carrier a direct or a reverse blow, means controlled by rotation of said carrier-supports, to regulate the tension of the springs, and hammer-detents, relative longitudinal movement of the casing and tool-carrier compressing a hammer-spring and thereafter releasing its detent, to impart a blow to the tool-carrier, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK S. BELYEA.

Witnesses:

JOHN COUPER EDWARDS,

FREDERICK LINCOLN EMERY.