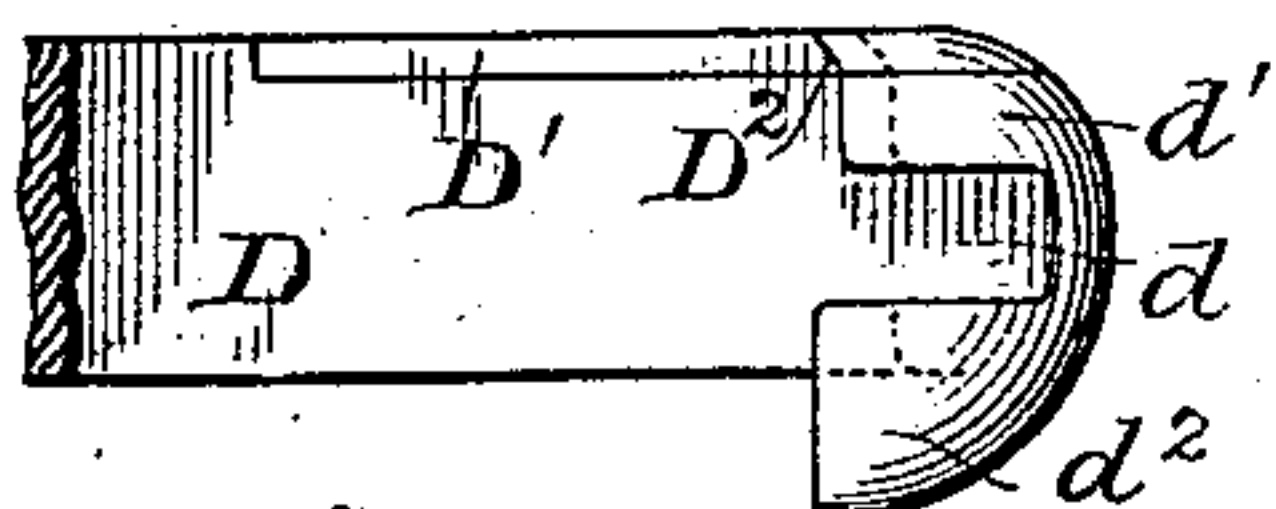
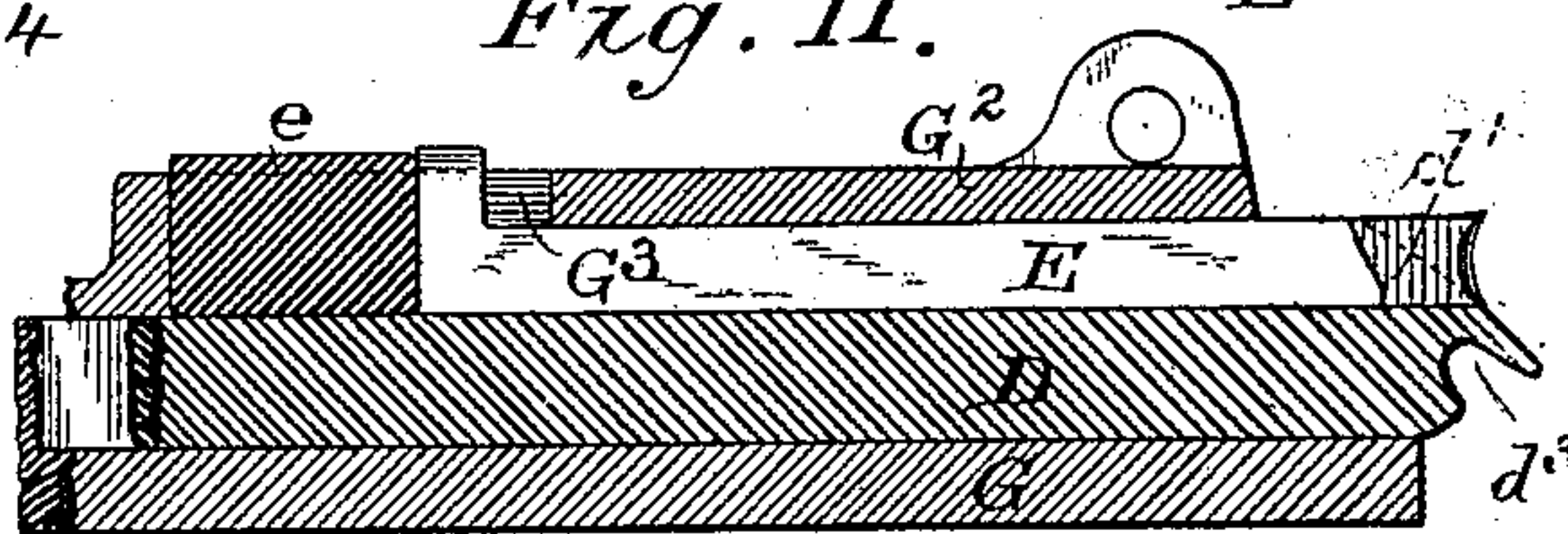
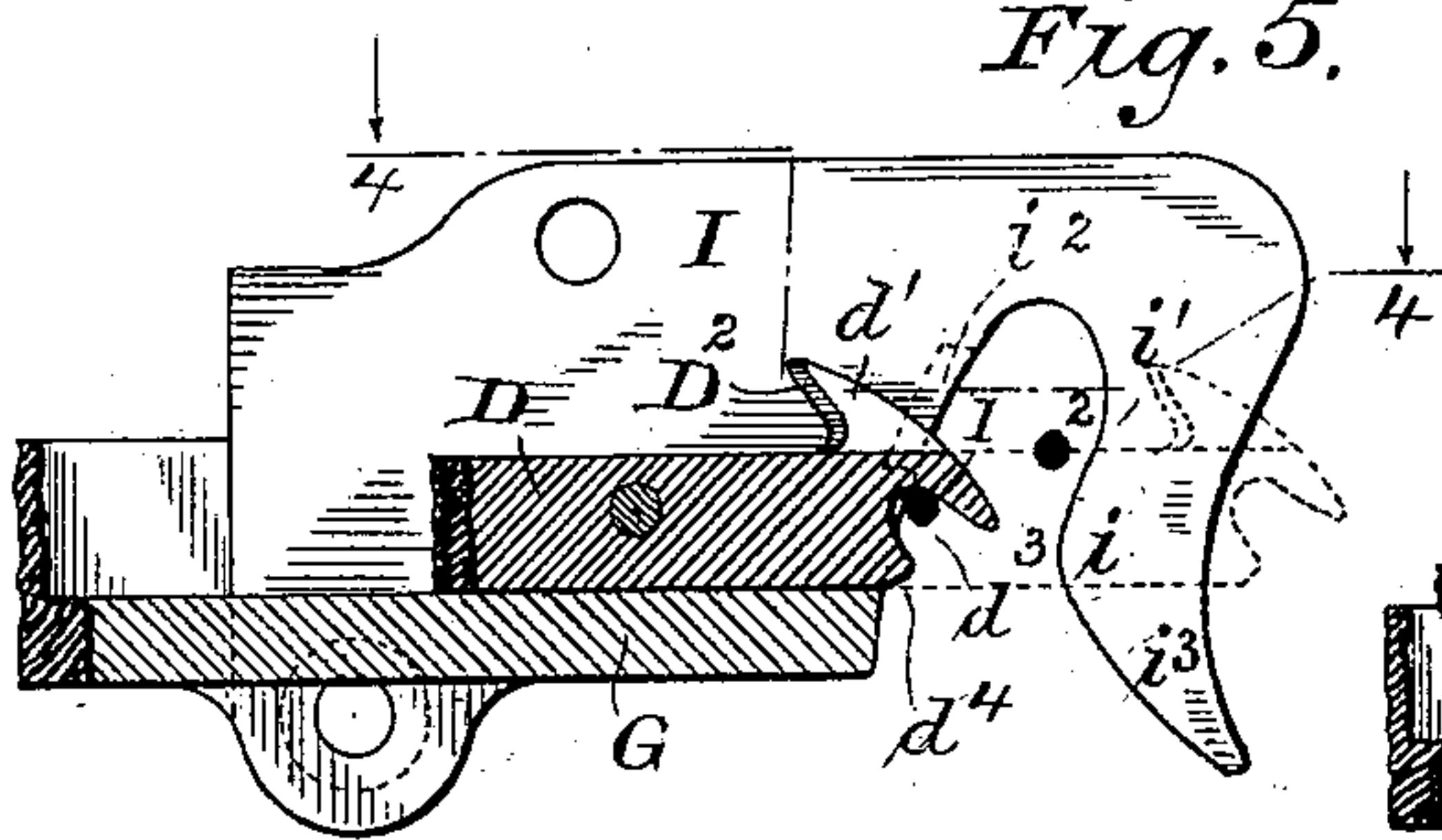
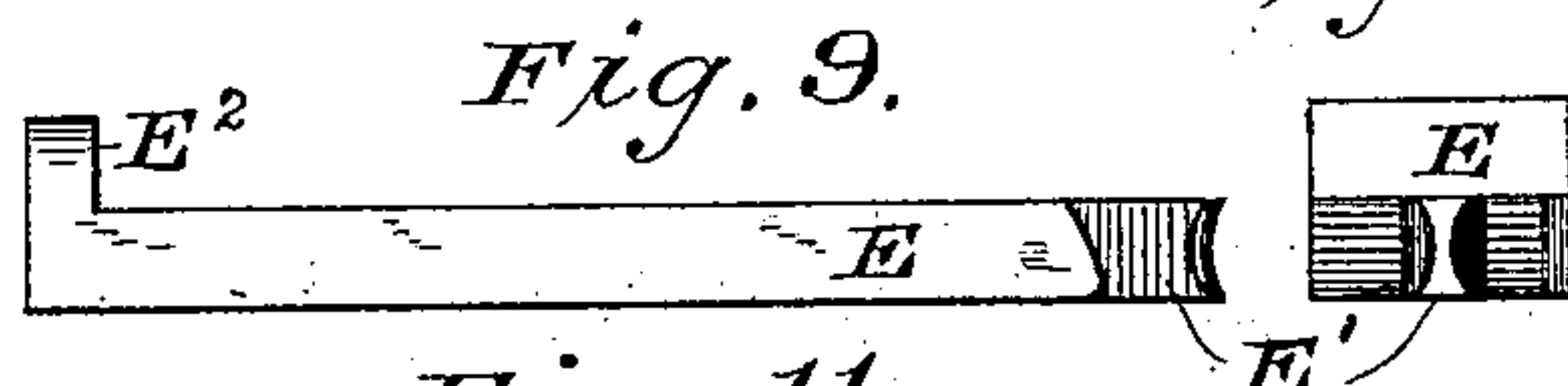
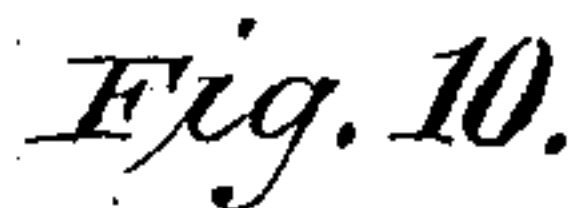
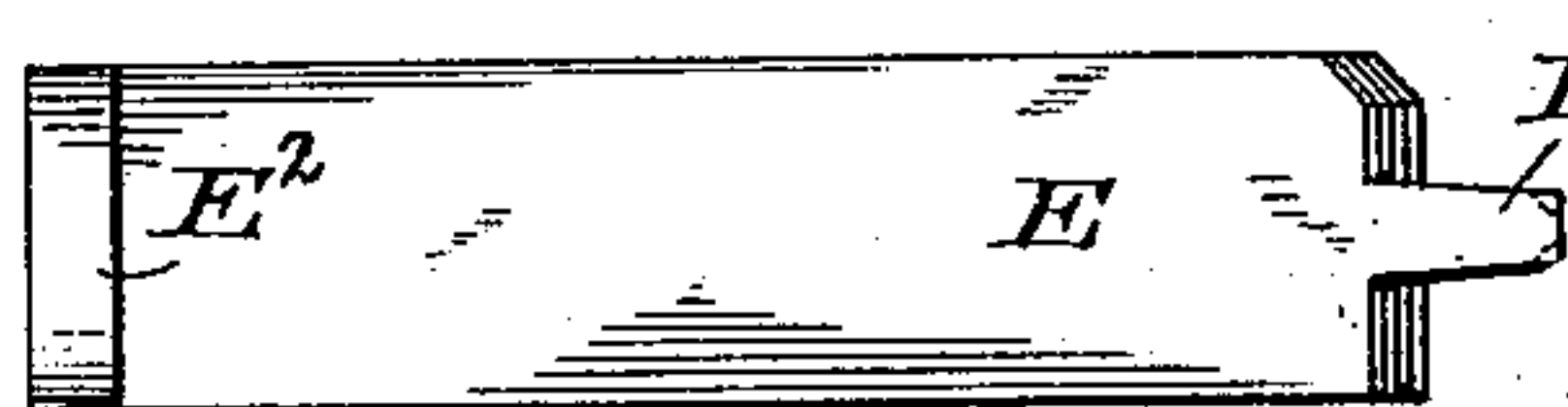
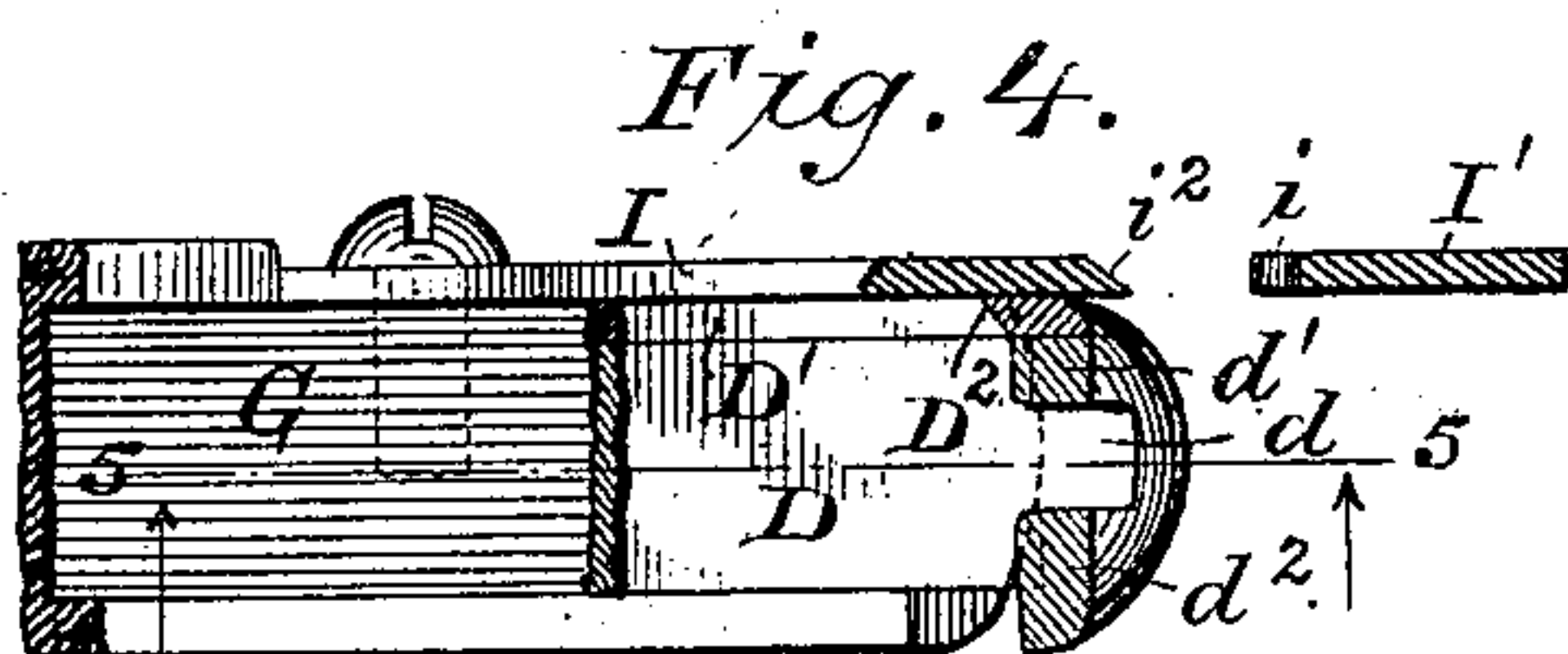
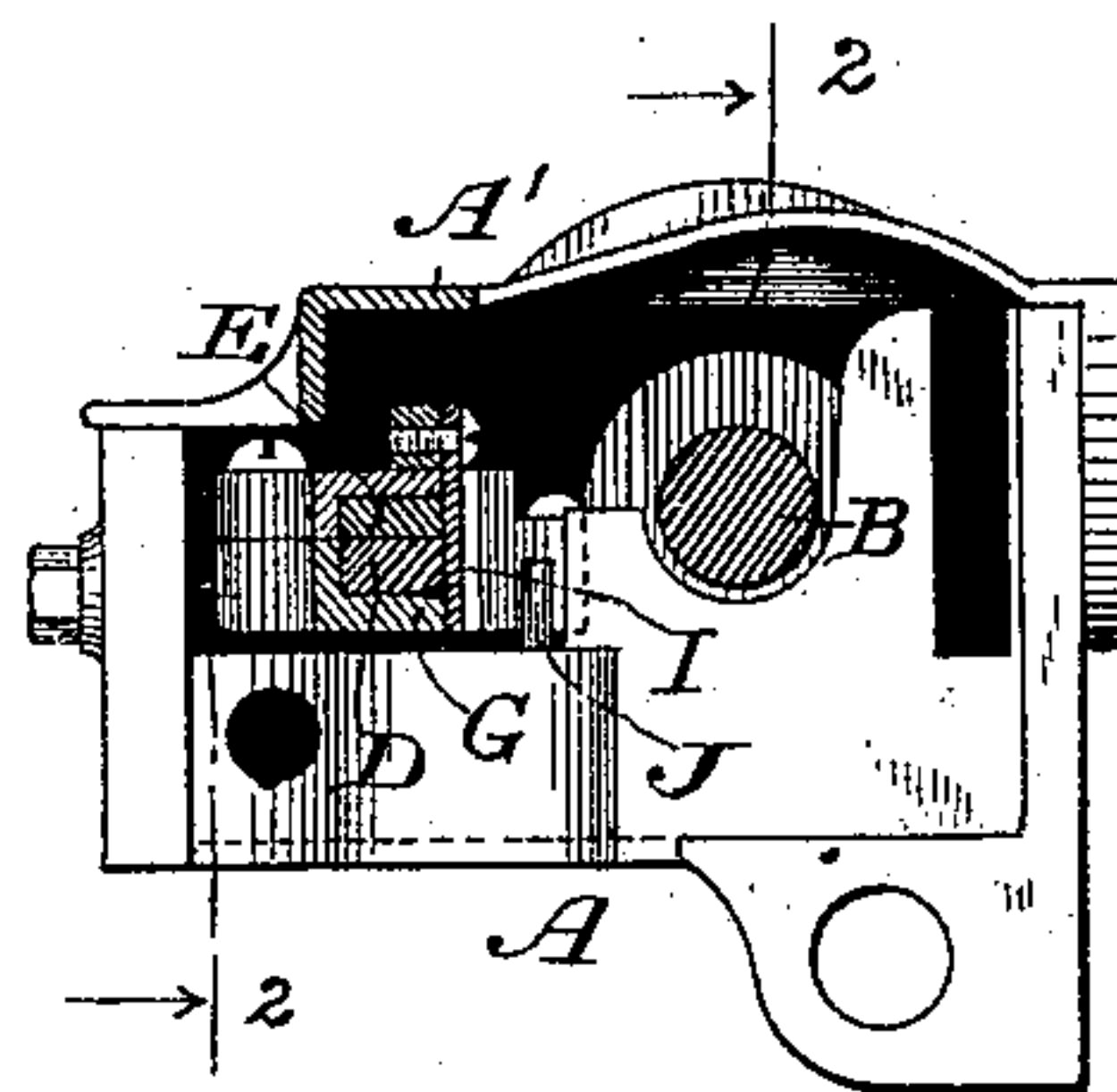
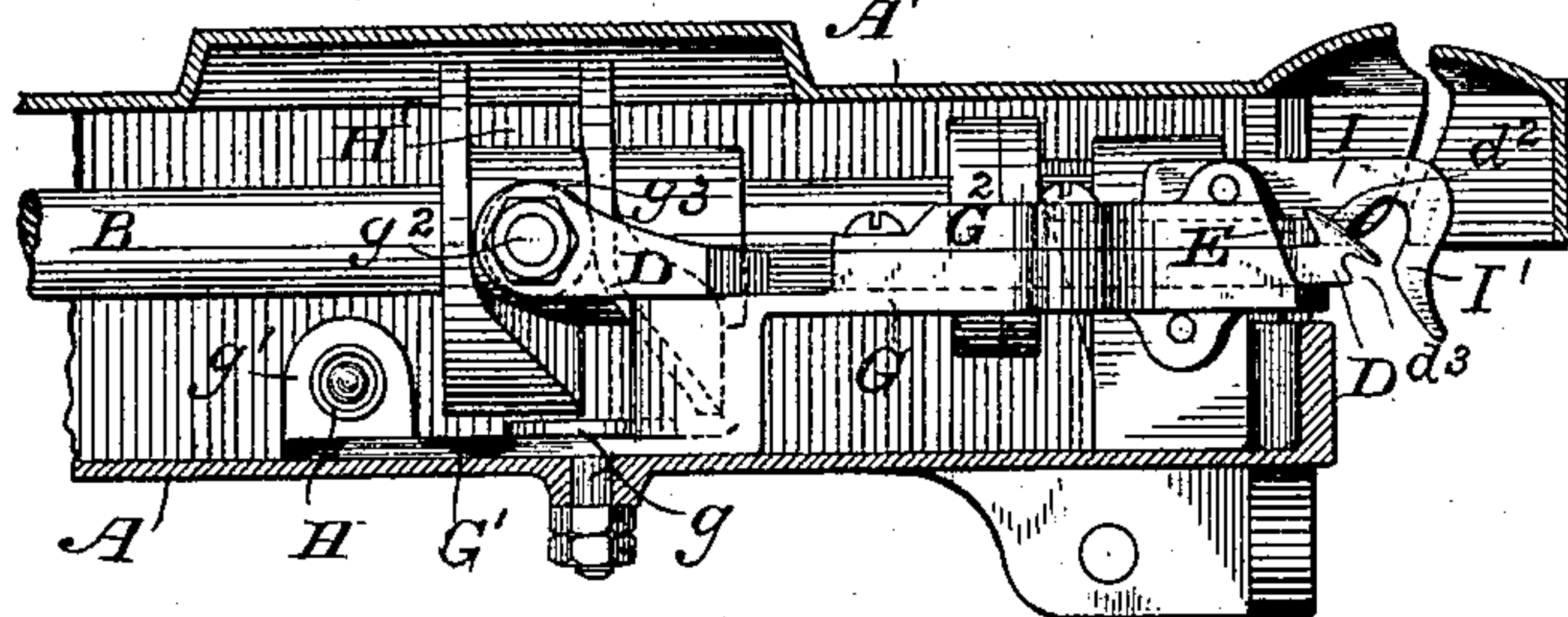


3 Sheets—Sheet 1.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

Patented Apr. 9, 1889.

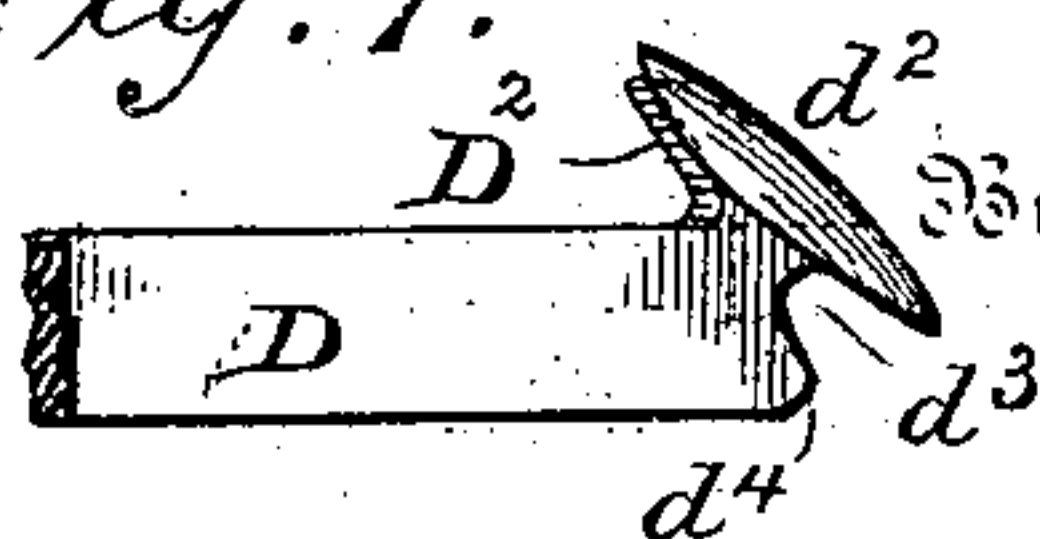


Inventor,

John S. Davis,

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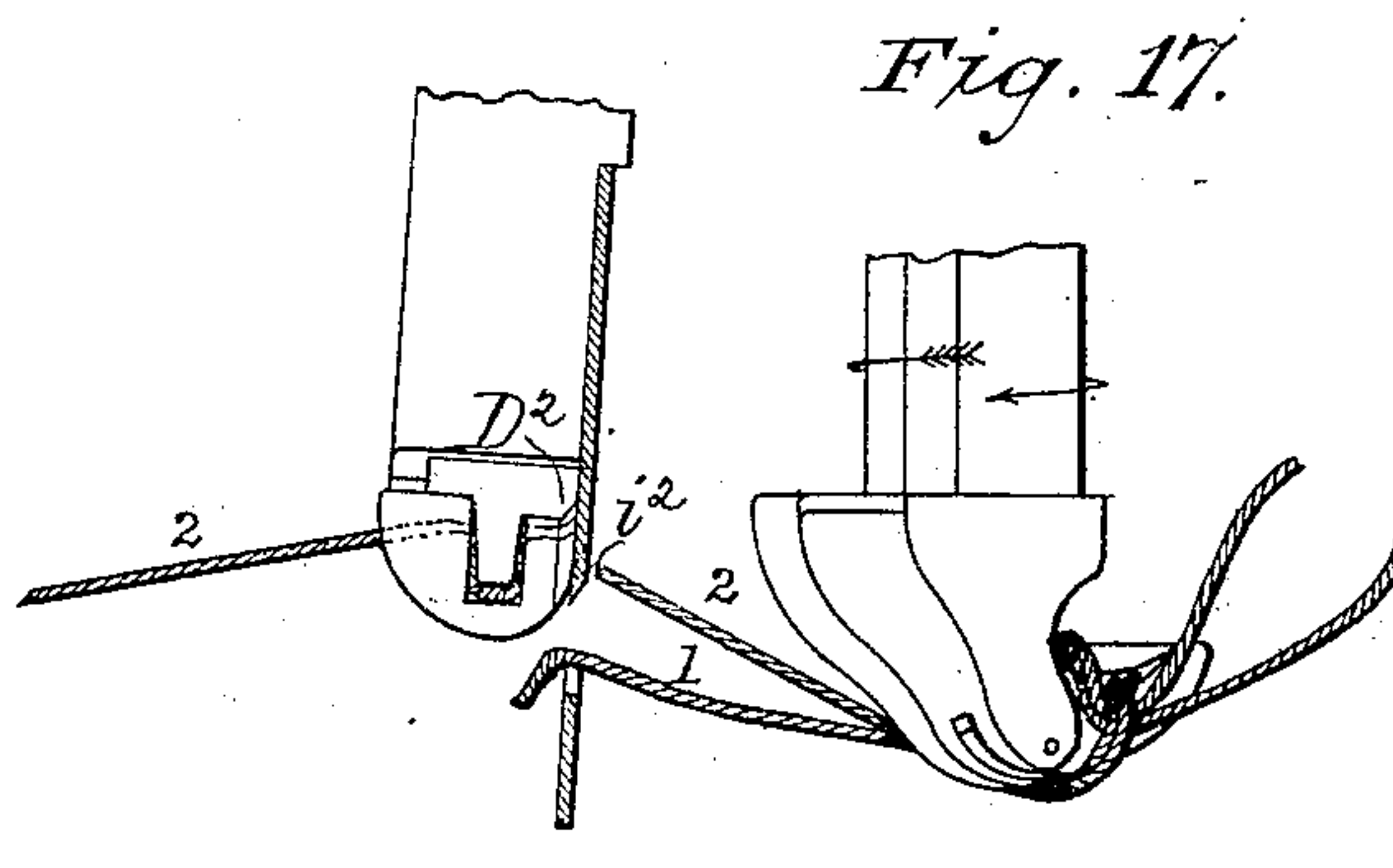
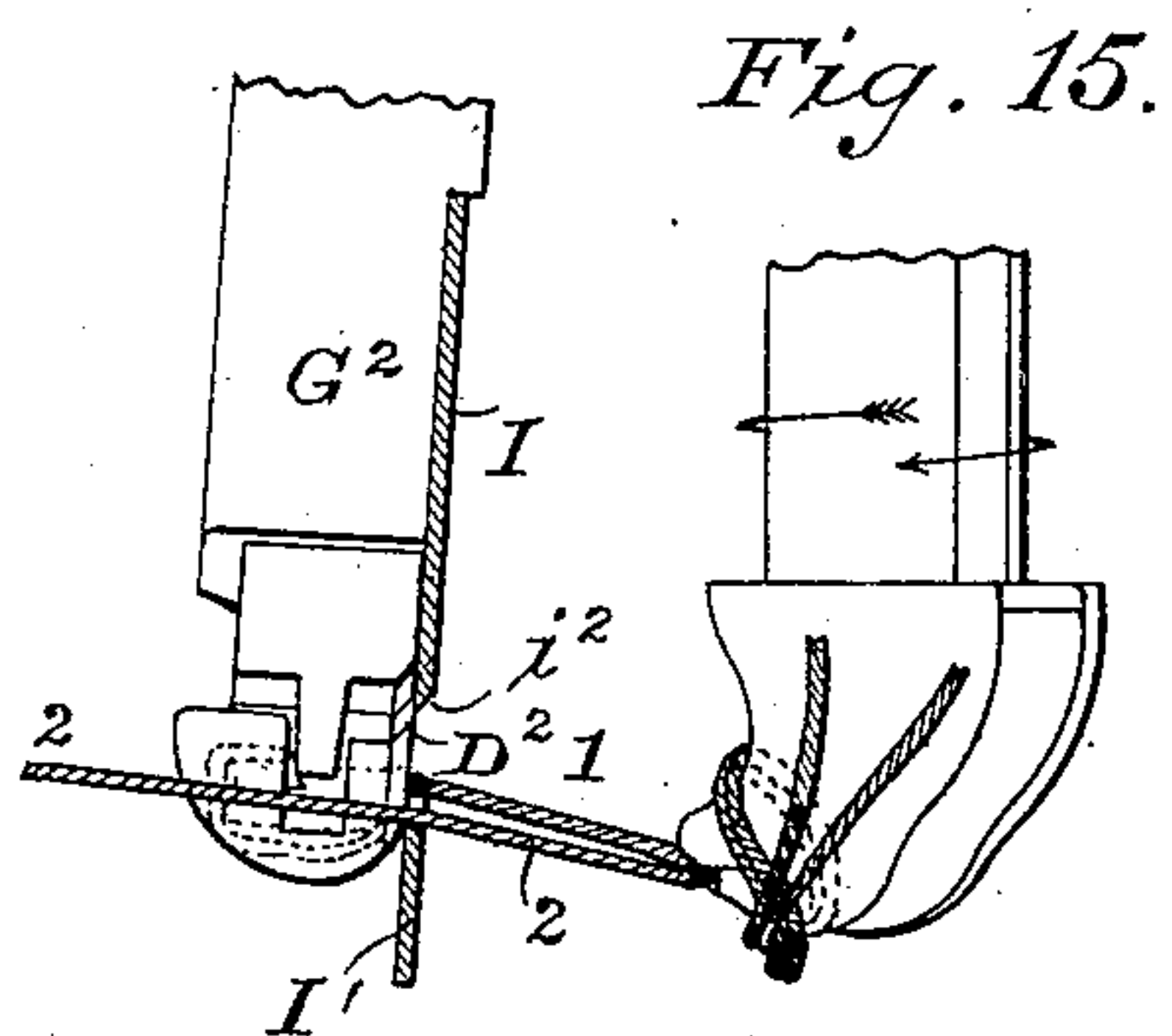
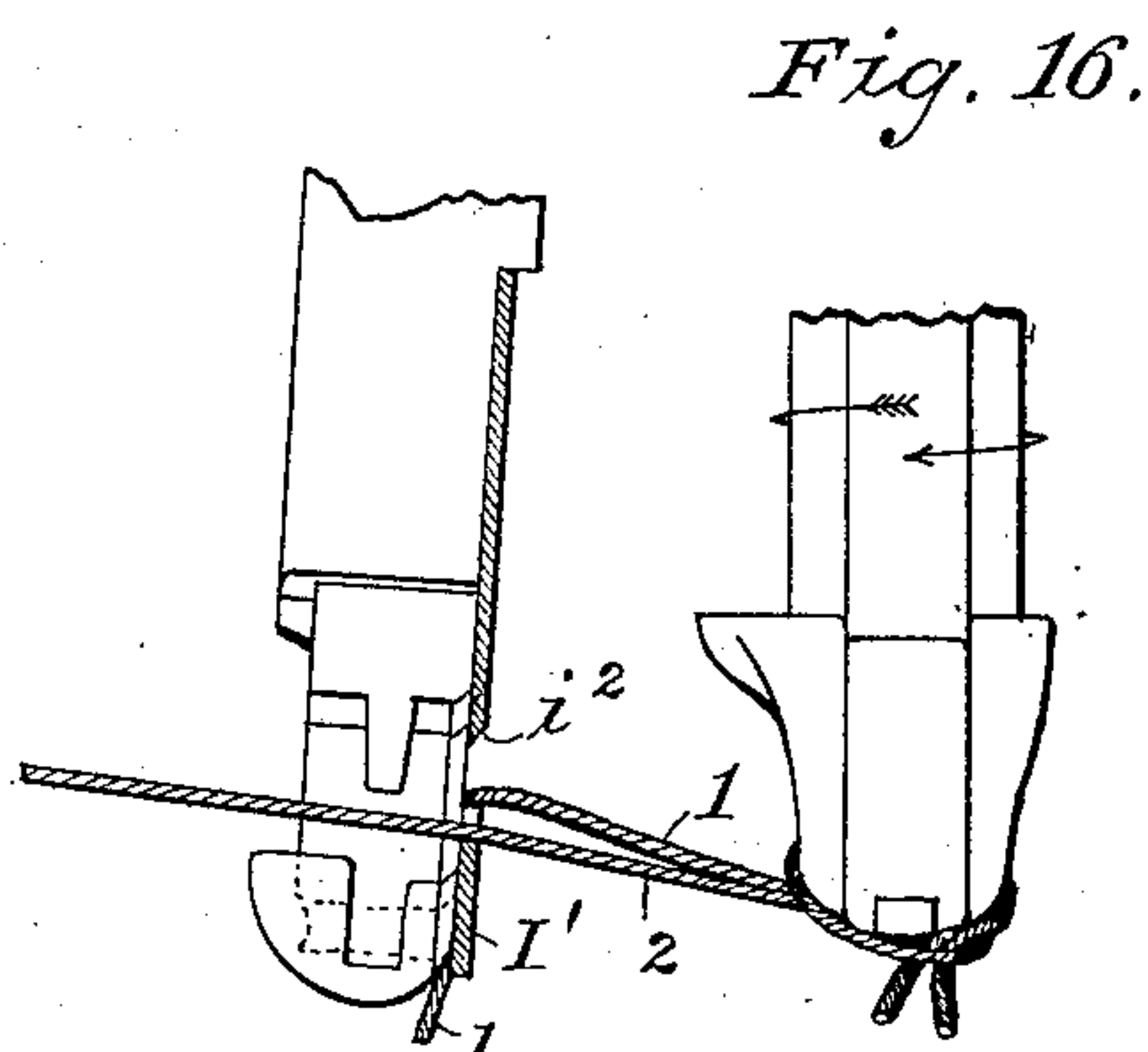
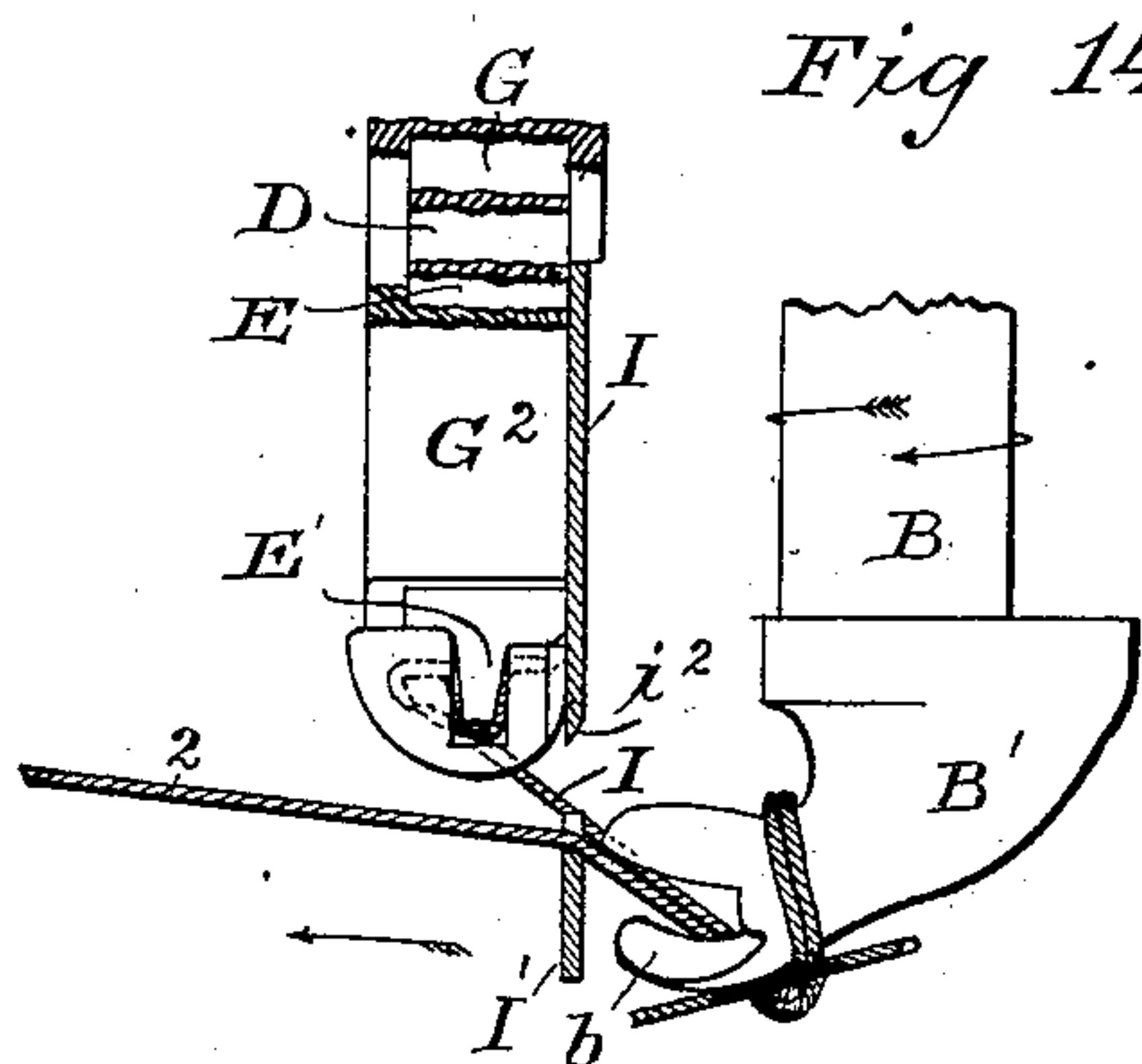
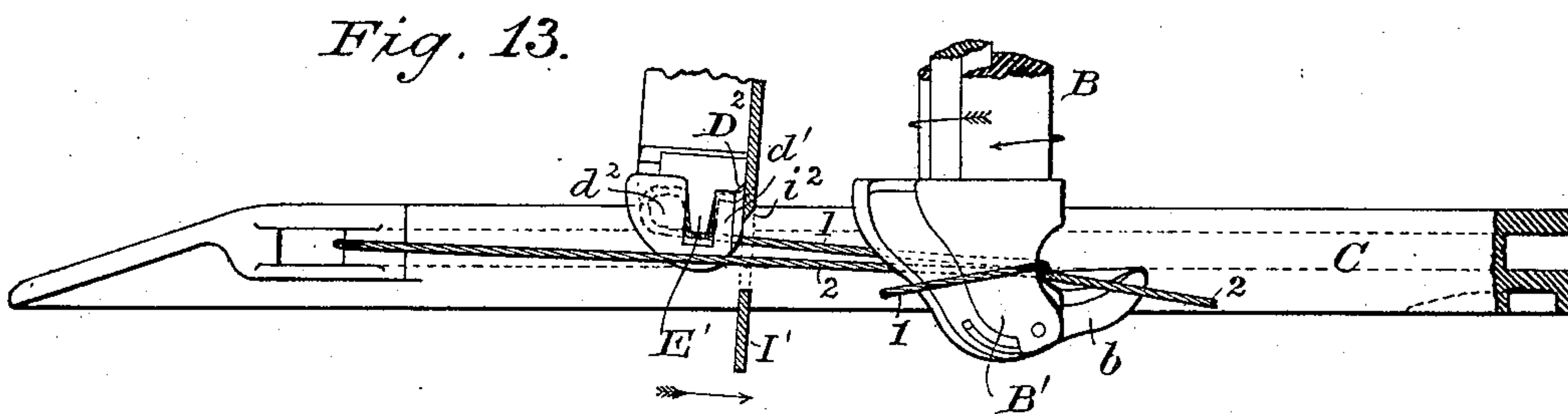
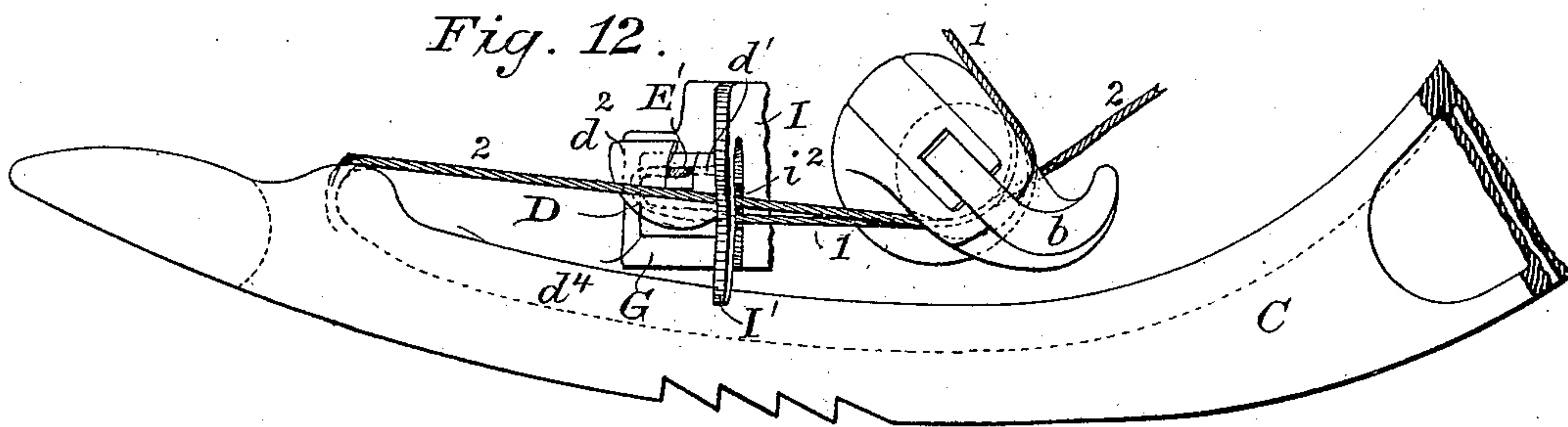


J. S. DAVIS.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

No. 401,013.

Patented Apr. 9, 1889.



Witnesses.
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Frank Neil.

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(No Model.)

3 Sheets—Sheet 3.

J. S. DAVIS.

BAND SECURING MECHANISM FOR GRAIN BINDERS.

No. 401,013.

Patented Apr. 9, 1889.

Fig. 18.

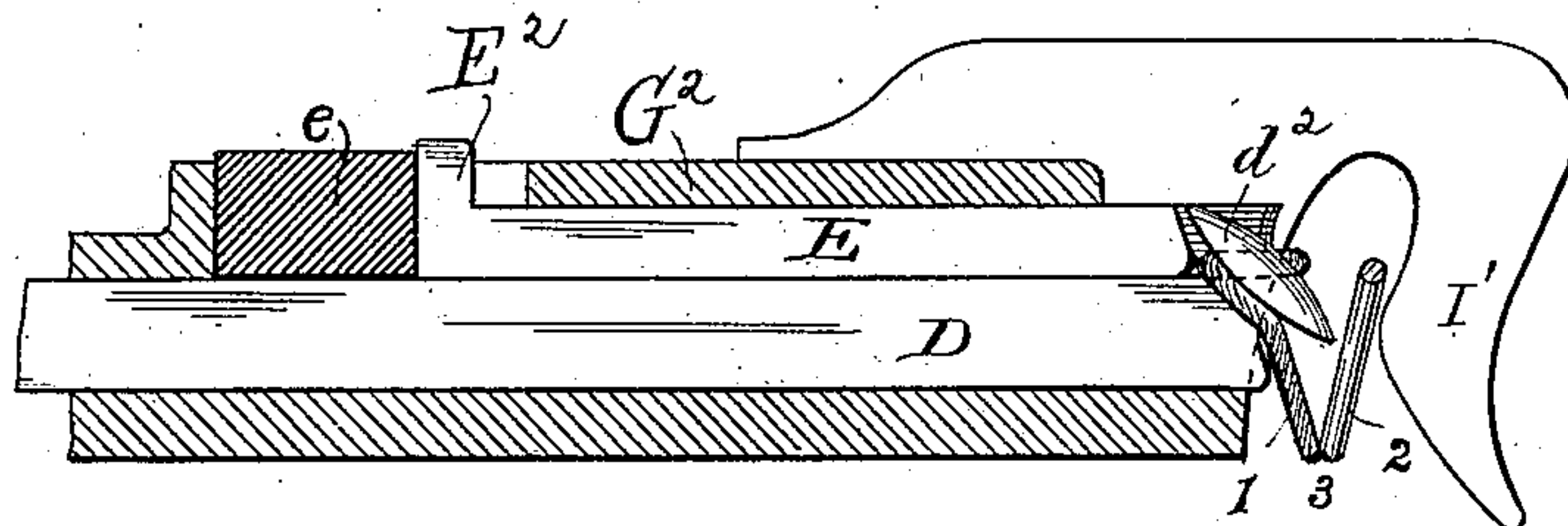


Fig. 19.

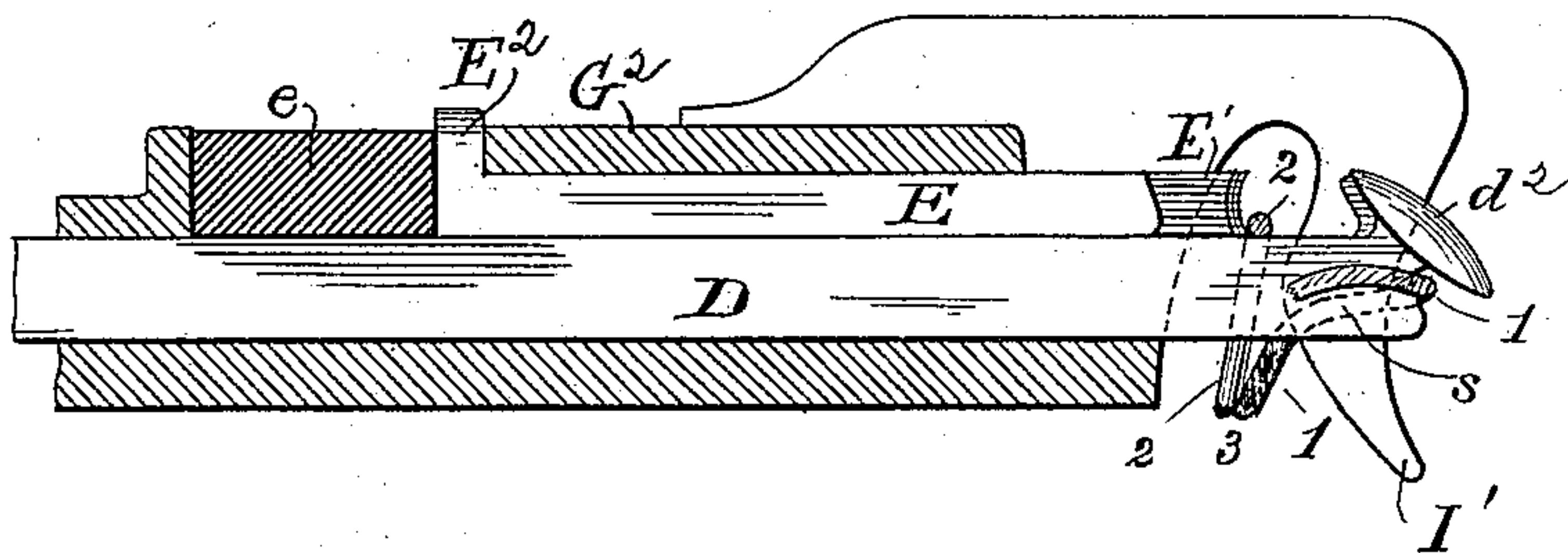
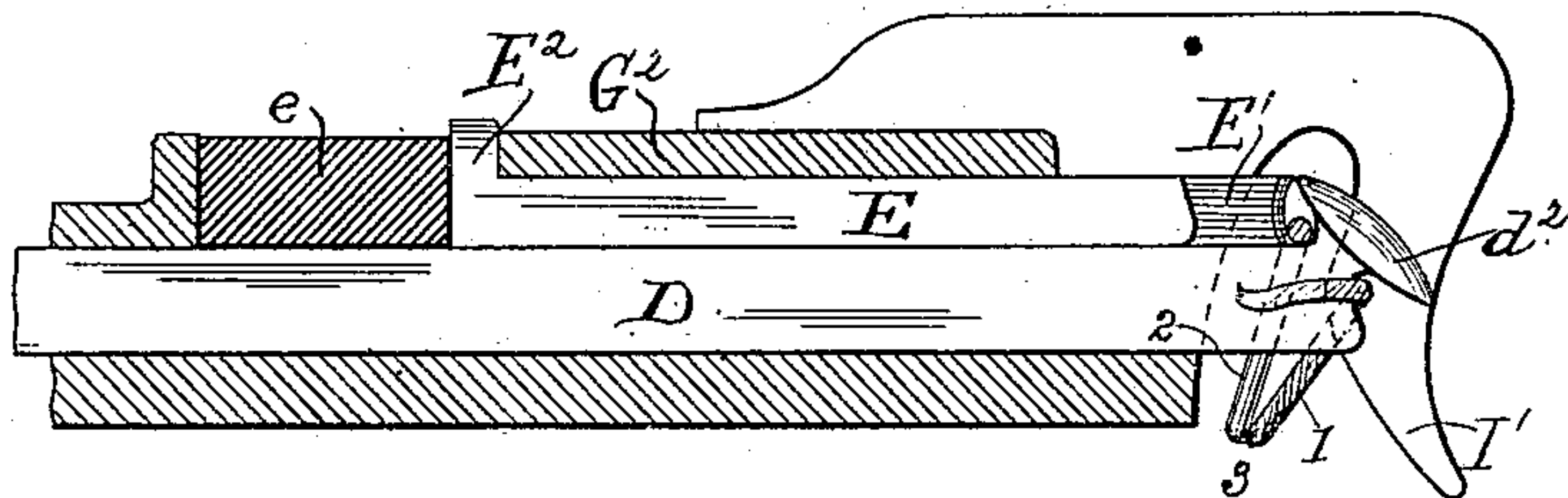


Fig. 20.



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Wm. A. Skinkle

UNITED STATES PATENT OFFICE.

JOHN S. DAVIS, OF CLEVELAND, ASSIGNOR TO THE DAVIS PLATFORM
BINDER COMPANY, OF ROCKPORT, OHIO.

BAND-SECURING MECHANISM FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 401,013, dated April 9, 1889.

Application filed November 2, 1887. Serial No. 254,034. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. DAVIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga, State of Ohio,
5 have invented certain new and useful Improvements in Band-Securing Mechanism for Grain-Binders, of which the following is a description.

My invention relates to the knot-tying or
10 band-securing mechanism for a grain-binder of the type shown in Letters Patent granted to me July 4, 1882, No. 260,668; June 5, 1883, No. 279,082; July 31, 1883, No. 282,445; July 8, 1884, No. 301,808, and June 16, 1885, No.
15 319,963; and it consists of an improved automatically-yielding cord-holder, as will hereinafter be fully described.

In the accompanying drawings, which show my invention in the best form now known to
20 me, Figure 1 is a plan view of the rear portion of a knotter box or casing with the cover removed. Fig. 2 is a longitudinal section therethrough on the line 2 2 of Fig. 3, and Fig. 3 a vertical transverse section on the
25 line 3 3 of Fig. 1. Fig. 4 is a plan view, on an enlarged scale and partly in section, on the line 4 4 of Fig. 5, of a portion of the lower member of the cord clamp and shear and its guideway. Fig. 5 is a vertical longitudinal
30 section of the same on the line 5 5 of Fig. 4. Fig. 6 is a plan view of the lower member of the clamp and shear detached. Fig. 7 is a side elevation of the same. Figs. 8, 9, and 10 are respectively plan, side elevation, and
35 end view of the upper member of the cord-clamp. Fig. 11 is a view in vertical longitudinal section of the two members of the cord-clamp and the casing or guideway in which they reciprocate and swing. Figs. 12
40 to 20, inclusive, are diagrammatic views to illustrate the action and the several relative positions of the cord-holder and tying-bill, respectively, during the operation of forming a knot, as will hereinafter be explained.

45 The knotter box or casing A, and its cover A' are somewhat similar in construction to those shown in the before-mentioned patents and shaped to best adapt them to inclose and protect the tying mechanism. At the proper
50 time in the binding operation the actuating-

shaft B is rotated and the tying-bill head B' engages the two ends of the cord that has been placed about the gavel and within its reach by the needle-arm C, forming the knot therein in a manner well understood by those
55 skilled in this class of mechanism. Suitable means for rotating the shaft and operating the pivoted jaw b of the bill-head are shown in the patents hereinbefore referred to.

The main object sought to be accomplished
60 by this my present invention is similar to that of the inventions covered by my patents numbered 279,082, 282,445, and 301,808, before mentioned—viz., to prevent unduly
65 straining the cord around the bundle during the formation of the knot and to supply the material from which the knot is formed from that portion of the cord that lies between the knotter and the cord-holder, and not from the
70 portion which passes from the knotter to and around the bundle, and to insure greater certainty in the operation of the holder.

The reciprocating members D and E of the cord-holder rest upon and are guided by a swinging bracket, G, pivoted at g to the bot-
75 tom of the casing and provided with a broad base and extension-piece, G', against a lug, g', on which a thrust-spring, H, bears to keep the holder normally away from the knotter-head. The guideway G of the bracket is offset or
80 elevated above the base G' to the plane of the knotter-head, as shown, and it is channeled out for the reception of the reciprocating clamping-bar D. At its advanced end one side
85 of the guideway is formed by a steel plate, I, bolted or otherwise attached to the bracket and extending beyond its end to form the hook or cord-guiding horn I' and one member of the shearing device i'. The advanced
90 end of the clamping-bar D is inclined and rounded off on its upper side and front edge. The inclined side extending above the surface of the bar is divided by the groove d, forming
95 two projections, d' d'', which are correspondingly sloped or undercut on their back sides to form hooks. The hook d'' is deeper and wider than the hook d', and projects beyond the side of the bar, as shown, to insure a grip on the new strand about to be clamped by
100 the holder and its being properly laid on the

holder by the needle-arm. The under side of the end of the bar is notched or recessed to form a throat, d^3 , into which the new strand is placed by the retreating needle-arm. The projection d^4 at the lower side of the recess is rounded off on its lower side to allow the string to slip freely past it and into the throat as the needle-arm goes out. A steel plate, D' , is let in flush with that side of the bar nearest the knotter-head and slides against the steel plate I , which forms the side of the guide. The plate D' follows the conformation of the hook d' , projecting slightly beyond it on the under or inclined side, and is beveled, as at D^2 , to form a member of the shear. At its back end the bar is slightly offset, as shown, and carries a stud-axle, g^2 , upon which is mounted a roller, g^3 , taking into the groove of a cam, H' , on the actuating-shaft, the cam being properly shaped and timed to reciprocate the clamping-bar, as will be hereinafter explained.

The point of contact of the roller with the working side of the cam-groove is coincident with the axis of the pivot g of the swinging guide-bracket when the roller lies in the straight part of the cam and the clamping-bar is in its normal retracted position, so that the swinging of the guide-bracket toward the knotter-head, which occurs at this time, will not reciprocate the clamping-bar or affect the grip of the clamp on the cord.

The cap or cover G^2 is securely fastened above the guideway in any suitable manner, and is itself grooved and recessed for the reception of the bar E , which forms the other member of the clamp. This bar has a central tongue or finger, E' , projecting from its advanced end and fitting into the groove d between the hooks of the bar D , the shoulders at each side of the tongue being inclined to fit under the inclined insides of the hooks and beveled on one corner to clear the edge of the shear D^2 , against which it would otherwise strike. The end of the tongue is slightly chamfered or rounded, as shown, to prevent the cord from accidentally slipping up and off. At its back end the bar is turned up to form a lug, E^2 , which plays in a slot, G^3 , in the cover, against the front end of which it is urged by a spring, e , when the bar is free to move. This spring is shown as consisting of a rubber block packed into the slot behind the end of the bar E ; but any form of spring that will urge the bar forward will do as well as this. A stop-pin, J , fixed in the casing, stops the swing of the holder toward the knotter, while the set-screw J' limits its retreat therefrom, and by adjusting the latter the lengths of the cord ends which are given up by the holder to form the knot may be regulated as desired. The tension on these ends when the knotter-head is revolving and drawing the holder toward the stop-pin J may also be varied by means of the adjusting-nut J^2 , against which the spring H bears.

The operation of the mechanism I have thus

described is as follows: Starting with the several parts in the positions shown in Fig. 12, the end 1 of the cord is gripped by the clamp and passes around below the bar D , through the throat d^3 , and inside the hook I' to the knotter-head, thence around the bundle, and returning to form the end 2, which also passes inside the hook I' and stands in a plane above the point of the clamping-bar D , as shown in Figs. 12 and 13, and also in Fig. 5 by the black dots, and thence to the point of the needle-arm C . At this stage the hooks on the bar D (which is in its most retracted position) bear against the end of the bar E and force it back against the spring-cushion e , as shown in Figs. 1 and 11, so that the gripping contact between the two bars is maintained by a strong but yielding pressure, that admits of some simultaneous movement of the two clamping-bars after gripping the string, for a purpose to be hereinafter explained. As the knotter-head revolves to the position shown in Fig. 14, it engages the cord with its bill-hook and, winding the cord upon itself, draws the holder over to the position shown in this figure. At this moment the roller g^3 enters the inclined portion of the cam H' and advances the bar D to about the position shown in Fig. 15, the bar E , being urged by the spring e , following it until checked by the end of the slot G^3 , when the clamping-surfaces begin to pull apart, and as their grip on the cord relaxes it slips between them, and the holder, urged by the spring H , swings back to its normal position remote from the knotter-head. The cord end is not, however, cast entirely free by the holder, for before the clamping-surfaces lose their grip the bar D will have crossed the space within the horn I' and re-engaged the end 1 of the cord between itself and the projection i on the inner edge of the horn, holding it with a firm but yielding embrace, which draws the cord well into the mouth of the bill-hook before the end 1 is finally released. As the bar D continues to advance to the position shown in Fig. 16, the end or new strand 2 of the cord will ride up over the inclined point and fall in behind the hooks d' , the horn I' preventing the spring from being sprung sidewise by the advancing bar, while the peculiar shape of the inner edge of the horn at i' facilitates its rising above the points of the hooks. At this stage the formation of the knot on the bill-hooks is nearly completed, and the two cord ends which form the bight of the knot are firmly grasped by the jaws of the tying-bill. The bar D of the holder rapidly retreats across the space under the horn I' , releasing the end 1 of the cord and pushing the end 2 before its hooks, laying it around the end of the tongue E' , and clamping it when the hooks meet the inclined shoulders of the bar E . In the further retreat of the bar D it pushes the bar E back against its spring-cushion e , constantly increasing the pressure of the grip on the cord and carrying it against the fixed member i^2

of the shear, between which and the moving member D^2 it is cut, as shown in Fig. 17. As both ends of the band are held by the holder under sufficient tension until the bight is positively grasped by the tying-bill, and as the new end (No. 2) is firmly gripped by the holder before it is brought between the shears and cut, the cord is always presented to the knotter and holder in exactly the same relation, and the absolute certainty of the performance of these parts is insured.

Instead of the operation just described, the holder may be made to grasp cord No. 2 while it is in its most advanced position near the knotter-head and before it slips its grip on cord No. 1 by so adjusting the force of the spring H that it will not overcome the grip on cord No. 1 and retract the holder. When the spring is thus adjusted, it will be noted that so long as the end of the clamping-jaw D holds the end of cord No. 1 by pressing it against the horn I' the holder cannot swing away from the knotter, and it does not release the said end until the strand No. 2 has been gripped by the holder and cut at the nearest possible point to the knotter-head. The grip upon cord No. 1 between the clamping-jaw D and the horn I' is released when cord No. 2 is fairly grasped by the holder, so that the full pressure of the holder, retractile spring, and the pull of the knotter-head, strains cord No. 2 to its highest tension when it is presented to the knife and facilitates the cutting thereof. (See Figs. 18, 19, and 20, in which the parts are illustrated at several stages of their operation.) The bar D in going out passes beneath the strand No. 2, which falls behind the hooks $d' d^2$. When the bar D retreats to the position shown in Fig. 20, its hooks will push strand No. 2 against the waiting end of the bar E and begin to clamp it, while strand No. 1 is still between the bar D and the horn I' , as at s. Now, if the retractile spring H is properly adjusted it will not have force enough to overcome the final grip on cord No. 1 between the side of bar D and horn I' , and will not push the holder away from the knotter until this final grip is released and strand No. 2 cut by the shears. On the other hand it may be so adjusted as to overcome said final grip and cause the strand No. 1 to slip between the bar D and horn I' , as originally described, in which event strand No. 2 would not be grasped by the holder and cut until the holder had swung away from the knotter. By the former means I am enabled to cut the cord close up to the knotter and save from one to one and one-half inch of cord on every bundle. This method of operation has some advantages not possessed by that last-described; and would in many instances be preferred to it.

The lower curved edge, v^3 , of the horn guides the incoming cord to its proper position, as shown in Fig. 5.

The retracting face of the cam-track H' ,

against which the roller g^3 bears, is shown as having a slight rise or increase, h , which will be encountered by the roller at the beginning of the knotting operation. This is for the purpose of increasing the gripping-pressure of the clamps on the cord through which the knotter-head draws the clamp over against the resistance of the spring H. This is not essential, as the holder might be left in its state of rest with the clamping-bars under their highest pressure; but I prefer to let the mechanism rest under easier conditions and to put on the pressure only when necessary.

The rubber cushion behind the bar E also serves the purpose of compensating for any wear in the actuating-shaft or in the cam and traveler roller g^3 , or for any other cause that would effect the endwise movement of the clamping-bars.

As the bar D is moved positively by the cam, if the bar E were a fixed member of the clamp, any wear or looseness in fitting would cause a slackness in the contact of the gripping-surfaces that might allow the cord to slip through, while on the other hand, if the parts were nicely adjusted to grasp the ordinary thickness of cord, a burr or any unusual thickness in the cord or a foreign substance might cause breakage of the unyielding parts. It will also be noted that the cam H' operates directly on the clamping-bar D through its roller g^3 , thus dispensing with any intermediate connecting mechanism such as has heretofore been used, making the device more simple in construction and positive in its operation.

What I claim as new and of my own invention is—

1. The combination of the knotter, the reciprocating cord-holder and the laterally-moving guide-bracket in which it is mounted, a spring to press the bracket away from the knotter, an adjustable stop to limit its outward movement, and a fixed stop to limit its movement toward the knotter, substantially as and for the purpose hereinbefore set forth.

2. The combination of the guiding-horn I' , the bar D, reciprocating across the recess under the horn, and the spring-actuated bar E, which follows the bar D partly across the recess, holding the cord end until it is freshly gripped between the bar D and the horn.

3. The combination of the guiding-horn I' , the bar D, reciprocating across the recess under the horn and inclined at its front end to ride under the cord, the hooks or clamping-abutment $d' d^2$ on the upper surface of the bar, and the spring-actuated bar E, against the end of which the abutment bears to clamp the cord, substantially as set forth.

4. The combination of the guideway and its fixed horn I with the reciprocating bar D, inclined and rounded at its front end and formed with projecting hooks or abutments on its upper side and a recess or throat on its lower side, substantially as hereinbefore set forth.

5. The combination of the bar D, inclined

and formed with a clamping hooked projection on its front end, the clear groove *d*, dividing said hook into two separate parts, the spring-actuated bar E, formed with a tongue, 5 E', on its front end that slips into the groove, and having the shoulders at each side of the tongue shaped to fit into clamping-hooks on the bar D, substantially as hereinbefore set forth.

10 6. The combination of the knotter, a laterally-moving guideway, a cord-holder consisting of bars D and E mounted therein, the horn I', and shear *i*², mounted on the guideway,

which is adapted to be drawn toward the knotter by the cord held in the grasp of the holder, with a spring, H, which urges the holder away from the knotter, and means by which its force may be adjusted, substantially as and for the purpose hereinbefore set forth. 15

In testimony whereof I hereto affix my signature in presence of two witnesses. 20

JOHN S. DAVIS.

Witnesses:

HENRY W. WELKER,
J. B. COFFINBERRY.