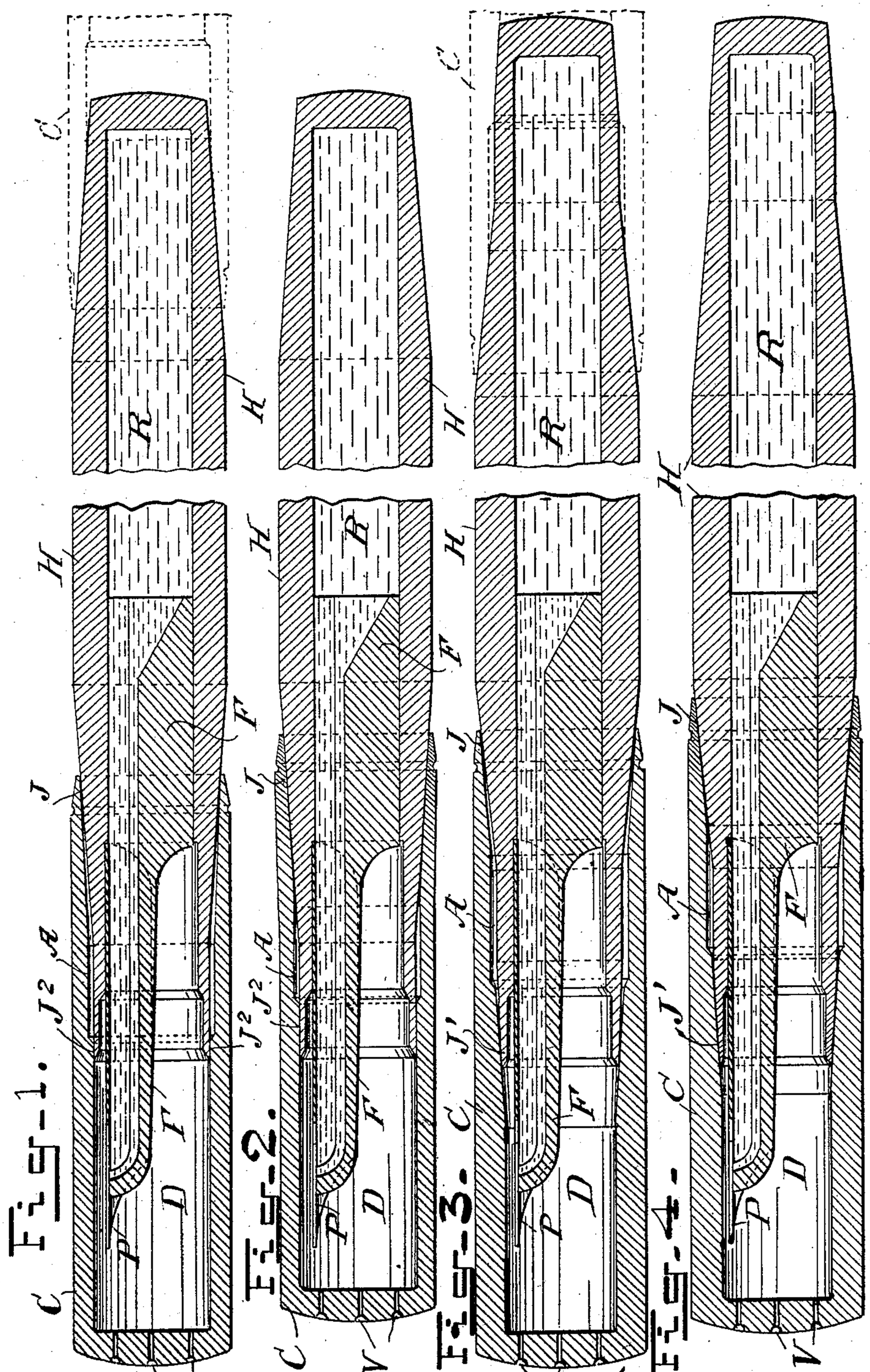
No. 682,574. Patented Sept. 10, 1901.

J. A. SKILTON.

FOUNTAIN PEN.

(Application filed June 3, 1901.)

(No Model.) 2 Sheets—Sheet 1.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

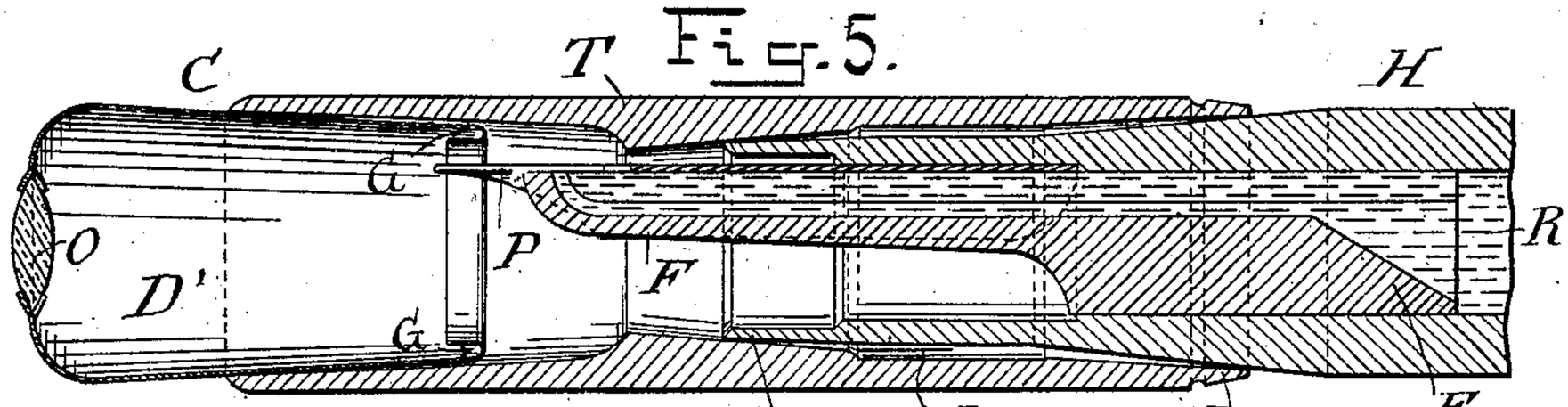


Fig. 6

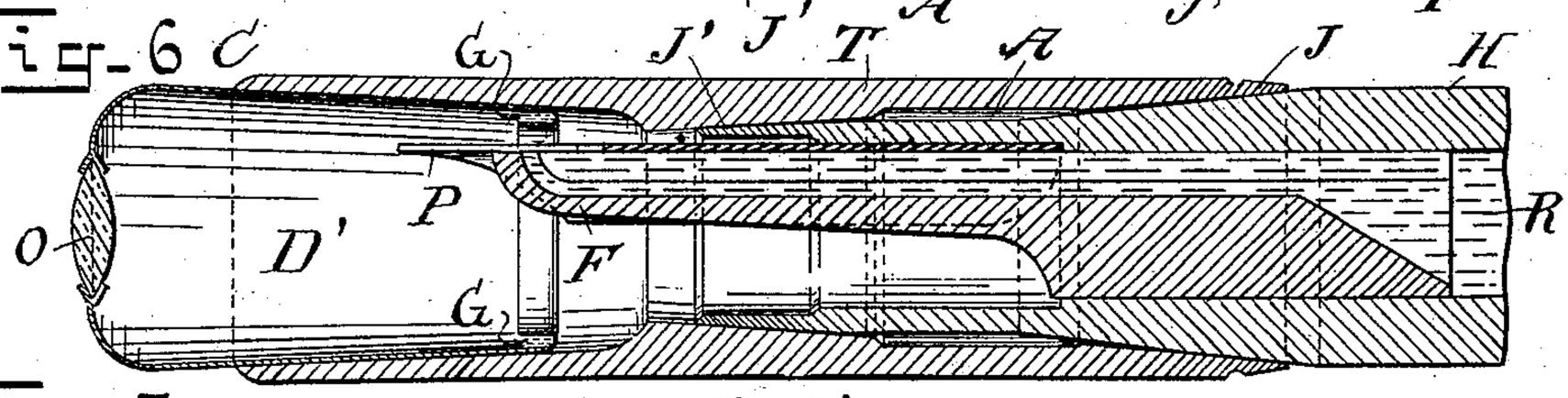


Fig. 7.

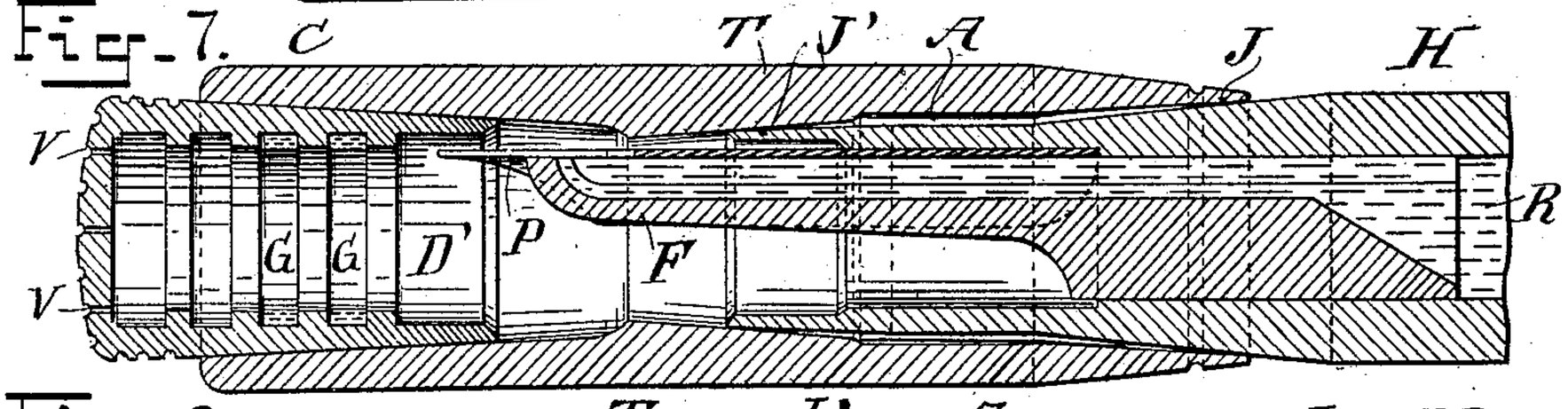


Fig. 8

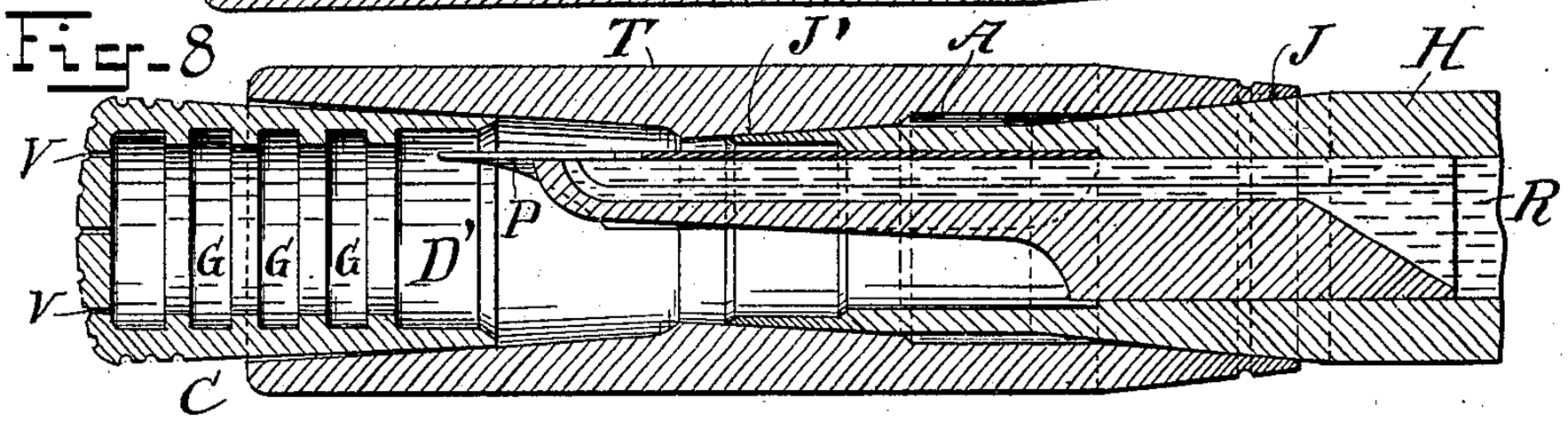


Fig. 9

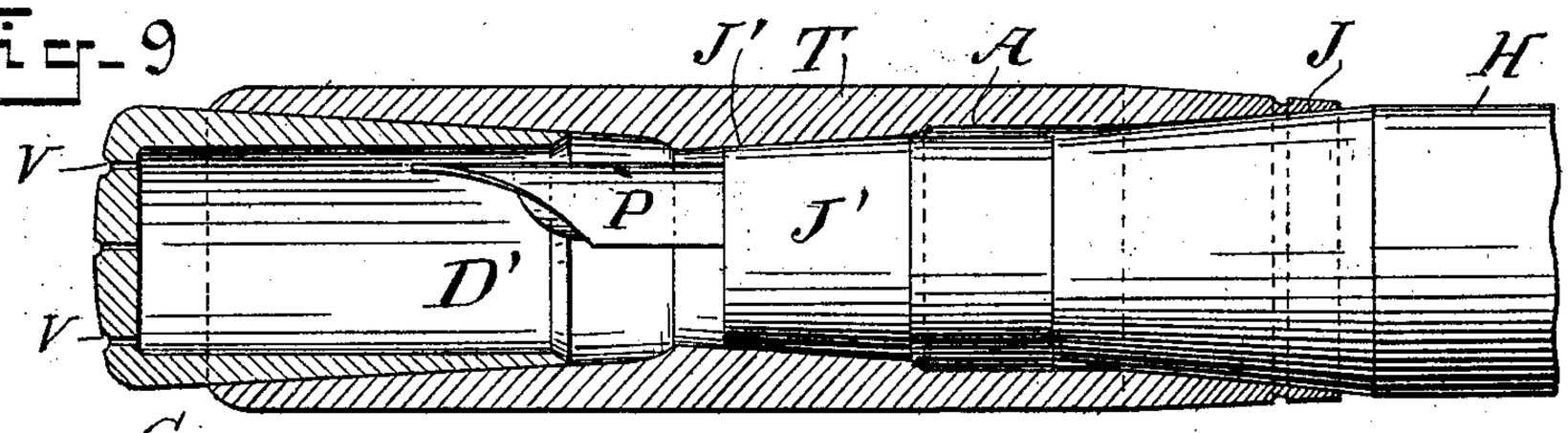
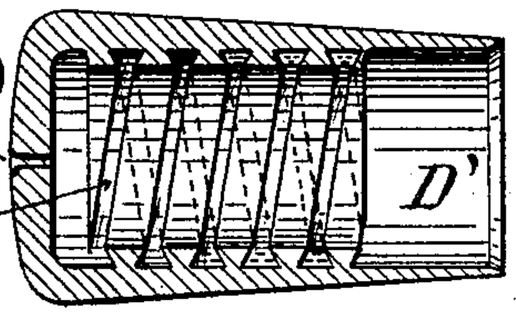


Fig. 10



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UNITED STATES PATENT OFFICE.

JAMES A. SKILTON, OF BROOKLYN, NEW YORK.

FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 682,574, dated September 10, 1901.

Application filed June 3, 1901. Serial No. 62,881. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. SKILTON, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city of New York, and State of New York, have invented a new and useful Improvement in Fountain-Pens, of which the following is a specification.

My invention relates to caps for fountain-pens; to joints between caps, holders, and other parts of such pens; to means, constructions, and combinations of parts to effect joint union and separation perfectly, easily, and quickly and to keep the different parts, and especially the fingered parts, of such pens clean and free from ink; to locate and control evaporation and condensation of ink, and to prevent the escape of the ink from those parts of the fountain in which it normally belongs; and the nature of my invention is definitely set forth and defined in the claims.

I attain the objects of my invention by the mechanism illustrated in the accompanying drawings, in which—

Figures 1, 2, 3, and 4 are longitudinal sectional views, Figs. 1 and 2 showing the inner joint in cylindrical form and Figs. 3 and 4 showing it in conical form. Fig. 5 is a sectional view showing the removable condensing-chamber in first contact in the cap-chamber. Fig. 6 is a similar view with the condensing-chamber in final contact. Figs. 7 and 8 are sectional views with the condensing-chamber in the two positions of final and first contact at the inner end of the inner member. Fig. 9 is a part elevation and part sectional view showing the condensing-chamber forming a conical joint with its seat in the upper end of the joint, and Fig. 10 shows the condensing-chamber with an interior spiral groove for holding or conducting the ink down toward the feed-bar and holder.

Similar letters refer to similar parts throughout the several views.

The holder H is provided with a cap C, and they are so formed and constructed relatively as to be joined by and separated at the joints J and J′, Figs. 3 to 9, inclusive. The holder is preferably so constructed as to receive the cap at will at and upon either end—that is, while and where it is a cap and performs the functions of a cap for the writing-pen P and writing-pen end of the holder it may be temporily transferred or applied to the other, upper, and usually-closed end of the holder or reservoir as a convenient method of keeping it at hand for use as a cap. The outer joint J between the cap and the holder is preferably a conical shoulderless frictional progressive-wedge joint the outer member of which is yielding and capable of conforming to the inner member, and a joint, however constructed, that leaves the holder smooth and free from shoulders or angles that are objectionable or likely to be an annoyance to the fingers. It is also preferably a non-capillary or hermetical joint, as well as a union-joint. It may, however, without avoiding my invention be a mere cylindrical joint, a cylindrical frictional joint, or the surfaces may be out of actual contact and in only approximate joint and contact relations, provided the inner joint J′ is a conical-union or a hermetical progressive wedge frictional joint, in which case the mouth of the cap will make contact with the holder on very slight vibration, and thereby assist in maintaining the inner joint by preventing too much vibration of the cap and motion at or in the inner joint caused thereby. The joint J′ is an inner joint between the holder and the cap, located at and near and on the outer surface of the extreme open or pen end of the reservoir or holder. This joint also is preferably a conical frictional, progressive-wedge joint, as well as a hermetical or non-capillary joint, and a joint in which the inner member and joint-surface is the comparatively yielding, pliable, and elastic member, and whether normally externally conical in form or cylindrical in form finds its seat in a taper or conical chamber in the comparatively unyielding cap or outer member and conforms thereto. It may, however, like the joint J, be cylindrical, but should have still less play or room for vibratory motion, since the inner joint is nearer the ink and therefore more liable to attack by or from ink and condensed fluid; but in that case the joint must be the conical union or progressive-wedge or a conical friction and preferably a hermetical joint in order to hold the two parts together. Such a joint or joints and combination of parts is

shown in Figs. 3 to 8, inclusive, in both first and final contacts, and in the case of the joint J′ it will, since the first contact and continuing joint stress is made and produced at and near the extreme outer end of the inner member, prevent the entrance of escaped or condensed ink into the joint J′ between the holder and the cap at and by the route of the outer end and contact-surfaces of the joint, and thereby keep the fingered portion of the holder free from ink or from water evaporated from the ink and condensed in the cap, and also keep the inner surfaces of the cap back of the joint J′ toward the joint J, as well as the joint J, free from ink or the approach of ink or condensed fluid or water thereto from within the cap.

The joints J and J′ are two different species of the frictional progressive-wedge union or hermetical joint at will. In these joints, preferably and to secure the best results and the greatest endurance, the opposite joint-surfaces of the joint should be tapered, and to obtain the most direct or immediate results the tapers should be disparate or unlike, and one member should be yielding and elastic and the other comparatively unyielding and inelastic and tapered, whether the opposite surface of the other member is tapered or not.

The terms "progressive-wedge joint" and "conical frictional joint" used in this specification distinguish these joints from a cylindrical frictional joint, which requires an independent shoulder or other positive stop to stop or locate the moving member and a frictional cylindrical contact of joint-surfaces to hold the two members together. They also distinguish these joints from a conical joint formed between two parate or equal conical surfaces or conical surfaces having equal angles, in which the first contact is also the final contact and the joint-surfaces are throughout also stop-surfaces, and there is no sliding frictional movement as a means or method of forming the joint, the joint-surfaces being shaped or formed in advance so as to fit accurately in order to form the parate joint and not depending on or to be brought into joint relation or to be improved by frictional contact. The progressive-wedge joint and the conical frictional joint are joints the joint-surfaces of which are disparate, and they are formed, made, or completed by the frictional progression of one of these surfaces upon the other, resulting in a conical or taper joint, in which the stop-surfaces are not coincident with the joint-surfaces throughout, as in the parate joint, but are differentiated therefrom and localized at or near the rear end of the joint wherever and whenever made, and thereby give the more purely joint-holding surfaces play and opportunity to conform and make and maintain joint relations and even increase, intensify, or diminish those relations when the parts are frictionally progressed or retreated, one upon the other, instead of relieving, undoing, or opening them, as in the case of the parate joint, when the parts are progressed in relation to each other. The progressive-wedge joint is a joint that is not only progressive in the sense of relative motion of one part upon or into another, but also in the sense of increase of tension or grip or pressure of one part in or upon another part and also in the sense of progressive wear due to friction between the parts and the consequent change or advance of the positions of the parts or of the joint. There may also be said to be progression in the progressive-wedge joint in the sense of an increase of contact and joint surfaces or area of joint contact between first and final contacts and highest joint tension produced by progression. In a progressive-wedge joint at least one member should be a yielding member in order to conform to and perfect the joint with the opposite and usually unyielding member, and thereby meet the difficulties of making preliminary joint fit or joint fit in advance of or before the act of bringing the parts together.

In the case of the material (hard rubber) generally used in the manufacture of fountain-pens the progressive-wedge joint properly formed is improved by wear instead of being injured or destroyed thereby, as are the cylindrical frictional and conical parate joints of the prior art. Preferably both of the joint-surfaces are conical or taper and so shaped in advance; but they may be disparate without both being taper or conical. This joint is a joint that peculiarly is not and cannot be formed in the shop and in advance as a joint by the maker of the article and its parts, but is and must be made and unmade on the instant by the user each time the parts are brought together and separated, and the intensity or strength of the joint action may be varied by the user accordingly and by him only.

As first used (in the Waterman patent of May 24, 1898) the term "progressive-wedge joint" identifies or designates a joint formed at or near and within the mouth of an outer comparatively yielding and elastic member progressed upon a necessarily-tapered unyielding inner member, and it is first made and the intensity of the joint grip is and always must be greatest at the outer or exposed end of the joint-surfaces.

One of the progressive-wedge joints of this present invention is a joint of a second and different species and is a joint in which the joint is formed at or near and on the outside of the mouth of a comparatively yielding and elastic inner member progressed into a necessarily-tapered seat or chamber in a comparatively unyielding outer member. In this last joint the grip or the resisting pressures are first made and intensified and are the greatest at or near the opposite or inner or concealed or unexposed end of the joint-surfaces

and end of the inner member. In the first of these two joints the inner member is an unyielding wedge and in the second it is a yielding wedge. The terms "progressive-wedge joint" and "conical frictional joint" therefore cover and fitly characterize at least two different joints that are generically similar, but specifically different. They may therefore properly be called "generic" terms covering a new genus in or of joints containing at the present time at least two new species of joints and of conical joints. Whether thus properly or improperly described and characterized both of these joints are shown in the drawings, the first of them indicated by the letter J and the second by the letter J'. As shown, these two joints stand "back to back," so to speak, and present the most tightly-closed and intensified parts of the joint in opposite directions, the first exposed and outwardly and the second unexposed and inwardly and toward the ink or in the direction from which the ink must approach and which it therefore excludes from any and every part of the joint, since it meets the insidious capillary attraction at the very threshold and effectually resists its entrance.

The cylindrical frictional joint, but without an immediately-associated stop that belongs particularly to that joint, is shown in Fig. 2 of the drawings and is indicated by the letter J^2.

The construction shown divides the space between the cap and the holder into four sections, chambers, or parts, as follows: first, the writing-pen and condensing-chamber D; second, the joint space or chamber of the joint J'; third, the annular air and non-capillary space or chamber A, and, fourth, the joint space or chamber J. When the cap C is in place, any escaped or condensed ink or vapor is held or prevented from outward escape from the chamber D into or through the hermetical joint J' by the non-capillary character of the joint J', which prevents escape from the chamber D at that point, and when the cap end is uppermost any escaped or condensed ink in the chamber D will be guided, conducted, or led back into the feed-bar F and thence into the reservoir R, from whence it came, without getting access to the outer surface of the holder back of its open pen end.

The ink in the chamber D will pass down out of the chamber into the mouth of the holder and into contact with the capillary spaces in and around the feed-bar when the pen is held with the cap uppermost, there being no shoulders or corners or pockets within the cap so shaped and located as to detain the ink, but the surfaces being so shaped and related as to allow the ink to pass back into the mouth of the holder. If, however, through carelessness or accident any ink reaches or gets into the joint J', it will be retained therein and will not pass into the space back of that joint, the air or non-capillary chamber A or its opposite surfaces not being in capillary relations. Consequently the ink will not be led or conducted to or toward the joint J or to, along, or upon the surface of any adjacent part of the holder H, but will be kept therefrom by the chamber A and its lack of capillary powers acting as a block or dam to capillary action and transfer.

Instead of the joint J', Figs. 3 and 4, the joint J^2, Figs. 1 and 2, may be used. The joint J' is conical, and the alternative joint J^2 is cylindrical or formed between opposite cylindrical surfaces. Preferably the joint-surfaces of the joint J^2 when or if used should be in frictional cylindrical joint relations and should be at least in such capillary relation as to hold back any ink or condensation and not act as a thoroughfare for ink, but should prevent its even getting into the joint from the condensing-chamber D in a continuing stream or current or in any other way to a sufficient extent to escape into the annular air-chamber A and upon the holder-surfaces back of the joint J' by any continuing current.

I much prefer to make both joints J and J' frictional conical, progressive-wedge, and hermetical joints, as shown in Figs. 3 and 4; but they may both or either of them be made cylindrical, as shown and stated, and yet answer in a partial way, because the non-capillary air-chamber separates them and prevents the formation of a capillary film and the resulting ink movement and transfer to and upon the holder-finger surface, or both or either of them may be of the ordinary conical type or also of that conical type in which the joints, while conical in the sense of having corresponding joint-surfaces, have a yielding elastic member—outer, as in J, or inner, as in J'. The hermetical conical joints of the two kinds shown in Figs. 3 and 4 and also in Figs. 5 to 9 are, however, preferred, since both the union and the hermetical features are stronger, more durable, and in every way better for the purpose than in any other kind or type of joint.

As so far described, the cap C is composed of one single continuous piece of material. Without other change and so as to carry out the invention, as above described, the cap may, however, be made in two or more parts, as shown in Figs. 5 to 9, inclusive. In this variation the main part of the cap may consist of the tube T, which is open at both ends, associated with an independent condensing-chamber, consisting of the separate part D' to be seated in and close or open the outer end of the cap-tube T and preferably joined thereto by the inner one of the two types of the conical frictional elastic joint type already described. So constructed and related the condensing-chamber D' may be used to receive and hold the condensed ink or fluid and may be removed to be cleaned, while when in position it otherwise answers the same purpose as the chamber D. This sepa-

rable condensing-chamber may have a smooth interior surface to facilitate the return of the ink into the holder, or inside the chamber D′ may have one or more annular grooves or cups G at or back of the mouth, as shown in Figs. 7, 8, and 10, to catch and hold or retain the condensed fluid, so that it will not reach or penetrate any joint-surface or be returned into the holder. The chamber D′ may, instead of being made of rubber, be made of gold or other suitable metal not subject to deterioration through ink and acid contact. So made of metal the condensing-chamber, especially if any considerable portion of it projects from the rubber tube T, may act more rapidly in condensing ink-vapor and also to some slight extent in checking evaporation, according to surrounding conditions, by keeping down the temperature of the ink and air in the holder and cap and also that of the body of the cap and holder. So made of metal the exposed portion of the chamber D′ may be given various ornamental forms and designs, either of simple or of elaborate kinds, according to the taste of designers and purchasers.

To facilitate the return of condensed ink to the reservoir, the plug portion of the feed-bar F may be traversed longitudinally and otherwise by properly-located capillary fissures, one or more, to connect the condensing-chamber and the feed devices with the reservoir. The smooth interior surface, facilitating the return of the ink into the holder, is shown in the separable condensing-chamber D′, Fig. 9.

The capillary fissures are to be cut or formed in the external part of the plug portion of the feed-bar F and should be first longitudinally disposed in that surface, and these longitudinal fissures may be connected by annular or spiral fissures cutting the longitudinal fissures at any desired angle, all of these fissures being, however, external or cut into the outer surface of the plug portion of the feed-bar and not directly connected with the fissures shown in the groove in the top of the feed-bar F.

Sharp angles and corners should be avoided and surfaces made as smooth as possible when it is desired to facilitate the return of ink to the reservoir.

It is evident that the mouth in the cap being protected from ink contacts the cap may be applied to the upper or closed end of the holder in the manner shown in Fig. 1 in dotted line without soiling the finger portions of the same, a disagreeable feature of all fountain-pens in the present state of the art.

The cap used in this invention may be well ventilated, preferably by small perforations in or near its closed end, to admit air thereat when the cap and holder are separated, and thereby prevent the drawing of ink from the condensing-chamber into the joint J′ and onto the outer end of the holder at the instant of starting the cap.

As a further protection against the tendency to draw ink into the joint J′ or J² a non-capillary chamber between the extreme end and mouth of the holder and the feed-bar should or may be provided for keeping the ink so far back from the mouth of the holder that any suction developed by removing the cap will not draw ink into those joints or onto their respective surfaces. In this connection it should be stated that the conical joint clears itself or opens quicker than a cylindrical joint of the same length, since because of its construction the joint-surfaces separate more quickly, and therefore quickly relieve suction. The more perfect ventilation of the cap having several vent-holes V also contributes to relief from suction and its effects in jumping ink in case of sudden cap removal out of the holder and upon near-by surfaces.

The cap may have its two joint bearings or surfaces in contact with the holder when applied at the closed end thereof, as shown in dotted line in Fig. 3, but I prefer in all cases to have the cap and holder united there only by or at the outer joint near the mouth of the cap.

The feed used may be the feed-bar shown in the drawings, or any other suitable feed device or system may be used instead.

The conical surfaces of all the conical joints shown in the drawings constitute the stop or develop the stop action in each one of these conical joints.

Instead of the joint J, which, as shown, is a conical frictional progressive-wedge joint, an ordinary cylindrical joint may be used, in which case the stop in or connected with the progressive-wedge joint J′ will act as a sufficient stop to fix the position of the cap upon the holder. Whether the joint and joint-surfaces be conical or cylindrical it is desirable to make them as short as possible in order that whenever they become leaky or not tight for any reason the ink-soiled portion of the holder will be limited, and the ink will not therefore reach the fingered portion of the holder.

The condensing-chamber D′ may have the spiral groove G′ to receive and guide or hold condensed ink. The metal condensing-chamber D′ may have a gem or other ornament O at or in its top or head. Either one of the hermetical joints J or J′ shown will seal the outer or upper end of the tube T and prevent the escape of ink there.

I claim as my invention—

1. In fountain-pens, a cap and a tapered holder engaged and held together by two joints the innermost joint of these two joints being a conical, union, hermetical, progressive-wedge and frictional joint, substantially as shown and described.

2. In fountain-pens, a cap and a holder engaged and held together by two joints one of

which, located at or near the mouth of the inner member, is a conical, union, hermetical, progressive-wedge and frictional joint, substantially as shown and described.

3. In fountain-pens, a cap and a holder engaged and held together by two separate, conical, union, hermetical, progressive-wedge and frictional joints, one located at or near the mouth of the cap and the other located at or near the mouth of the holder, substantially as shown and described.

4. In fountain-pens, a cap and a holder engaged and held together by two conical, union, hermetical, progressive-wedge and frictional joints, one located at or near the mouth of the cap and having a yielding, elastic outer member, and the other located at or near the mouth of the holder and having a yielding, elastic inner member, substantially as shown and described.

5. In fountain-pens, a cap and a holder engaged and held together by two separate, conical, union, hermetical, progressive-wedge and frictional joints, one located at or near the mouth of the cap and the other located at or near the mouth of the holder, the two joints being separated by an annular chamber-space the opposite surfaces of which are not sufficiently near to develop a capillary film and movement of ink by and between them, substantially as shown and described.

6. In fountain-pens, a conical, union, hermetical, progressive-wedge and frictional joint formed by and between a cap and a holder and located at or near the mouth of the holder but making joint contact with an adjacent inner part of the cap-chamber back from the mouth of the cap, substantially as shown and described.

7. In fountain-pens, a conical, union, progressive-wedge and frictional joint formed by and between a cap and a holder and located at or near the mouth of the holder but making joint contact with an adjacent inner part of the cap-chamber back from the mouth of the cap, substantially as shown and described.

8. In fountain-pens, a conical, union, hermetical, progressive-wedge and frictional joint formed between a cap and a holder within the body of the cap and near the mouth of the holder, the open end of the cap extending beyond the joint over and upon the holder and thereby maintaining the joint and keeping the joint-surfaces in coöperative relations, substantially as shown and described.

9. In fountain-pens, a conical, union, progressive-wedge and frictional joint formed between a cap and a holder within the body of the cap and near the mouth of the holder, the open end of the cap extending beyond the joint over and upon the holder and thereby maintaining the joint and keeping the joint-surfaces in coöperative relations, substantially as shown and described.

10. In fountain-pens, a conical, union, hermetical, progressive-wedge and frictional joint and stop formed between a cap and a holder within the body of the cap and at or near the mouth of the holder, the open end of the cap extending beyond the joint over and upon the holder and thereby maintaining the joint and keeping the joint-surfaces in coöperative relations, substantially as shown and described.

11. In fountain-pens, a conical, union, progressive-wedge and frictional joint and stop formed between a cap and a holder within the body of the cap and at or near the mouth of the holder, the open end of the cap extending beyond the joint over and upon the holder and thereby maintaining the joint and keeping the joint-surfaces in coöperative relations, substantially as shown and described.

12. In fountain-pens, a cap and a holder engaged and held together by an inner frictional joint which is a conical, union, hermetical, and progressive-wedge joint and stop, located in or near the interior or middle portion of the cap-chamber, substantially as shown and described.

13. In fountain-pens, a cap and a holder engaged and held together by an inner frictional joint which is a conical, union and progressive-wedge joint and stop, located in or near the interior or middle portion of the cap-chamber, substantially as shown and described.

14. In fountain-pens, a cap provided at its outer end with an open chamber in combination with a removable condensing-chamber seated in the cap-chamber and forming a frictional union-joint therewith, substantially as shown and described.

15. In fountain-pens, a cap provided at its outer end with an open conical chamber in combination with a removable condensing-chamber seated in the cap-chamber and forming a frictional joint therewith, substantially as shown and described.

16. In fountain-pens, a cap provided at its outer end with an open chamber in combination with a removable condensing-chamber seated in the cap-chamber and forming a conical, union, hermetical, progressive-wedge and frictional joint therewith, substantially as shown and described.

17. In fountain-pens, a cap provided at its outer end with an open conical chamber in combination with a removable condensing-chamber seated in the cap-chamber and forming a conical, union, hermetical, progressive-wedge and frictional joint therewith, substantially as shown and described.

18. In fountain-pens, a cap provided at its outer end with an open conical chamber in combination with a removable condensing-chamber seated in the cap-chamber and provided with ledges or sockets to receive and hold condensed ink, substantially as shown and described.

19. In fountain-pens, a cap and a holder engaged and held together by a conical, progressive-wedge and frictional joint in which the inner member is a hollow, comparatively yielding, elastic member and the joint is

formed at or near the extreme open end and on the outside of the inner member, substantially as shown and described.

20. In fountain-pens, a conical, progressive-wedge and frictional joint in which the inner member is a hollow, comparatively yielding, elastic member and the joint is formed at or near the extreme open end and on the outside of the inner member, substantially as shown and described.

21. In fountain-pens, a cap provided at its outer end with an open chamber, in combination with a removable condensing-chamber seated in the cap-chamber and provided with ledges or pockets to receive and hold condensed ink, substantially as shown and described.

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