

(Model.)

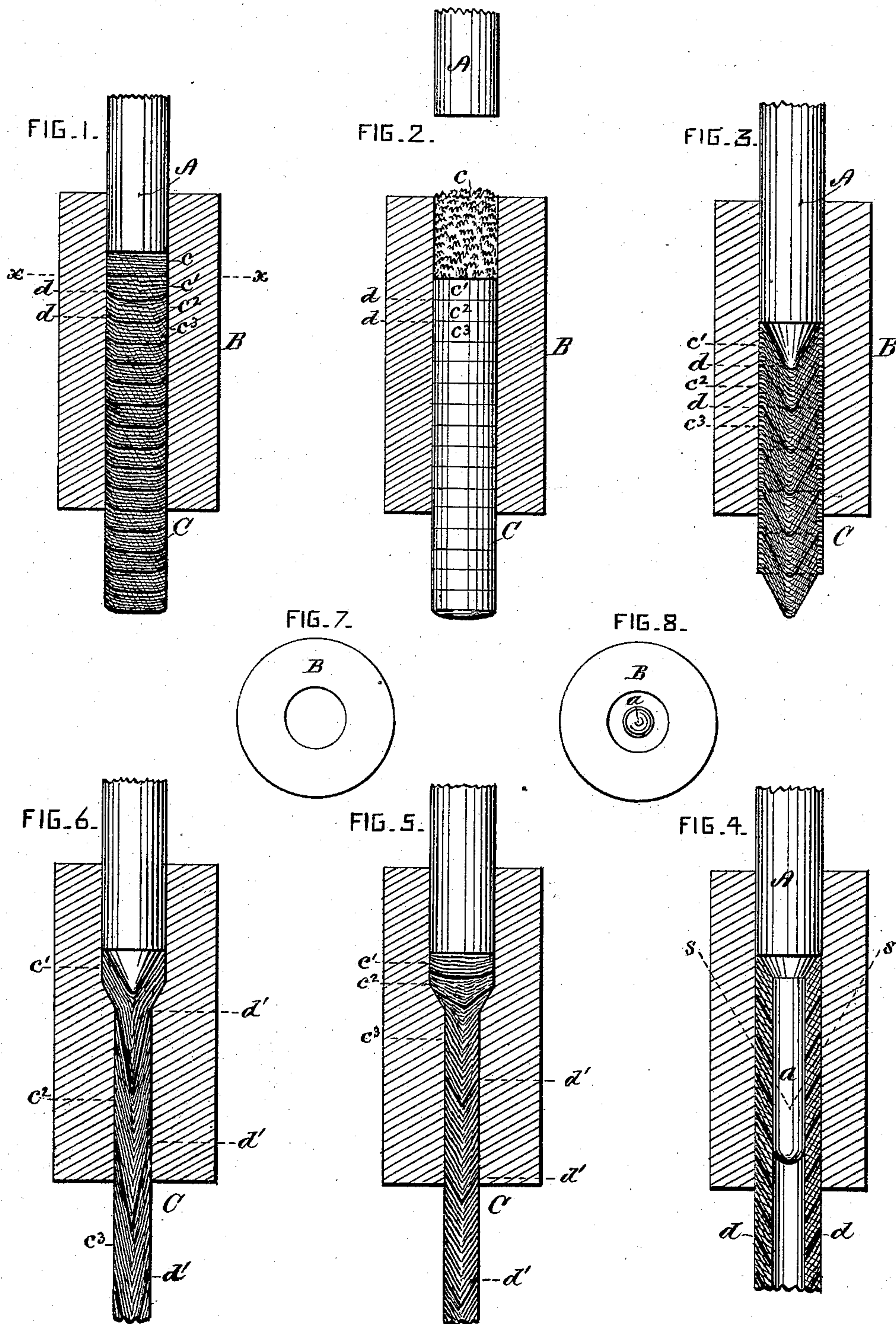
2 Sheets—Sheet 1.

I. LINDSLEY.

Manufacture of Coherent Compressed Tobacco.

No. 235,886.

Patented Dec. 28, 1880.



WITNESSES.

Joseph J. Scholfield.
William H. Joyce.

INVENTOR.

Isaac Lindsley

(Model.)

I. LINDSLEY.

2 Sheets—Sheet 2.

Manufacture of Coherent Compressed Tobacco.

No. 235,886.

Patented Dec. 28, 1880.

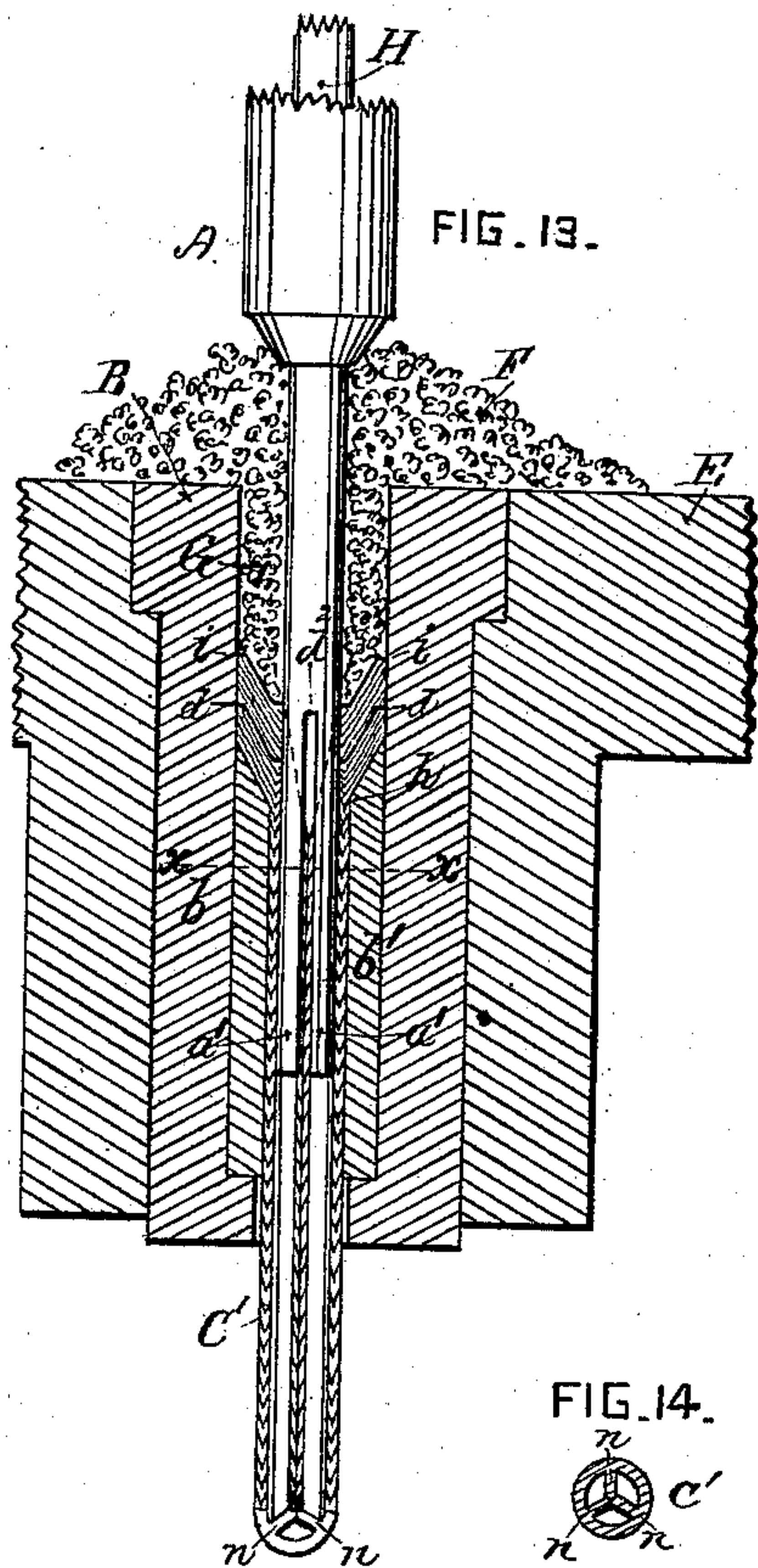


FIG. 13.

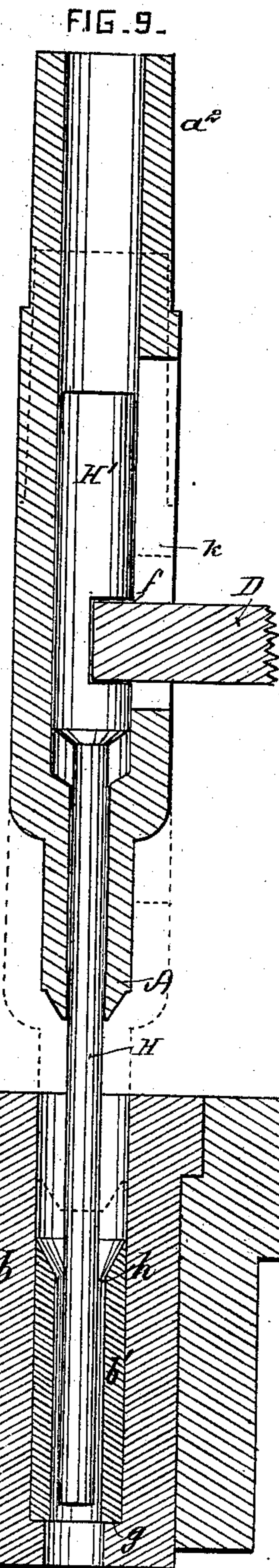


FIG. 9.

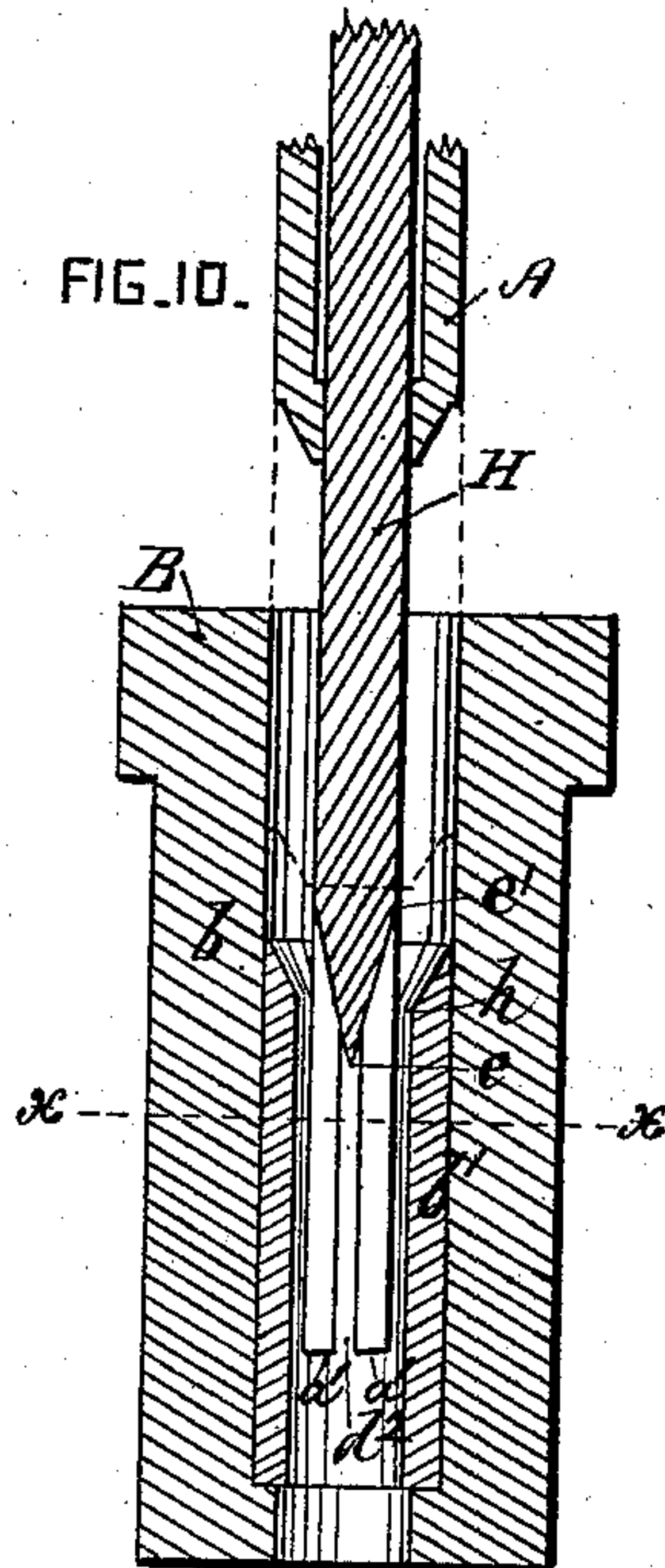


FIG. 10.

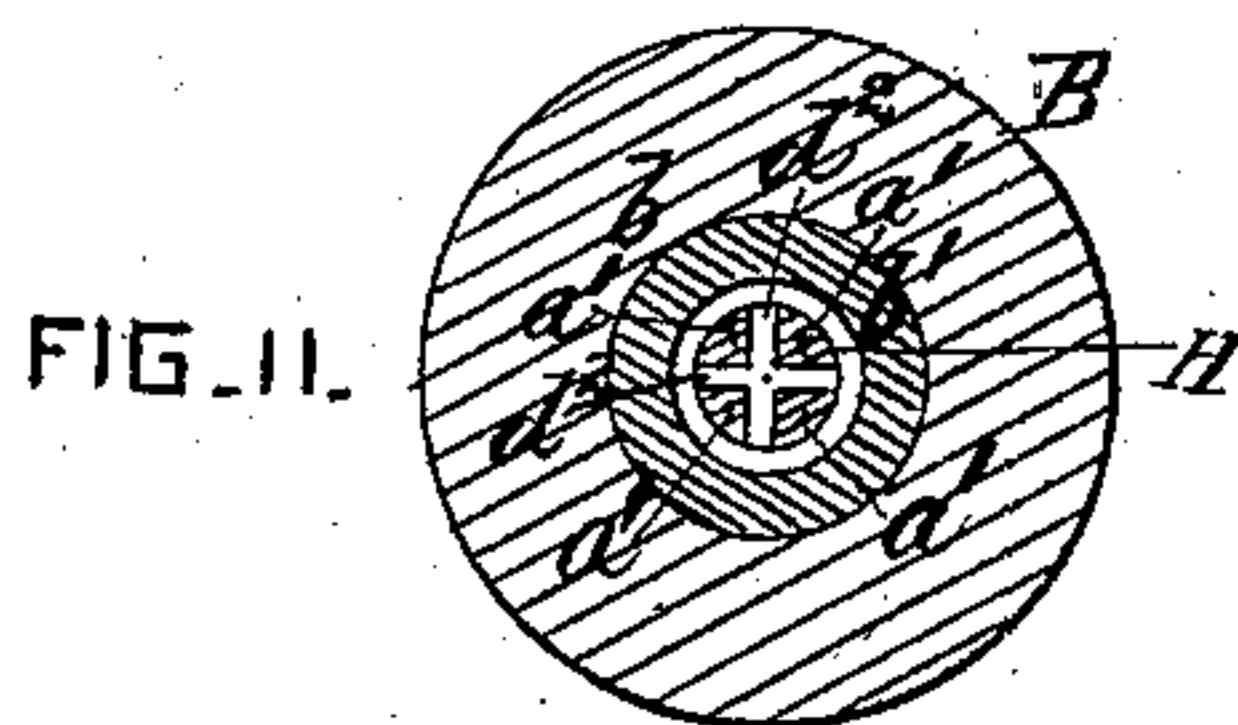


FIG. 11.

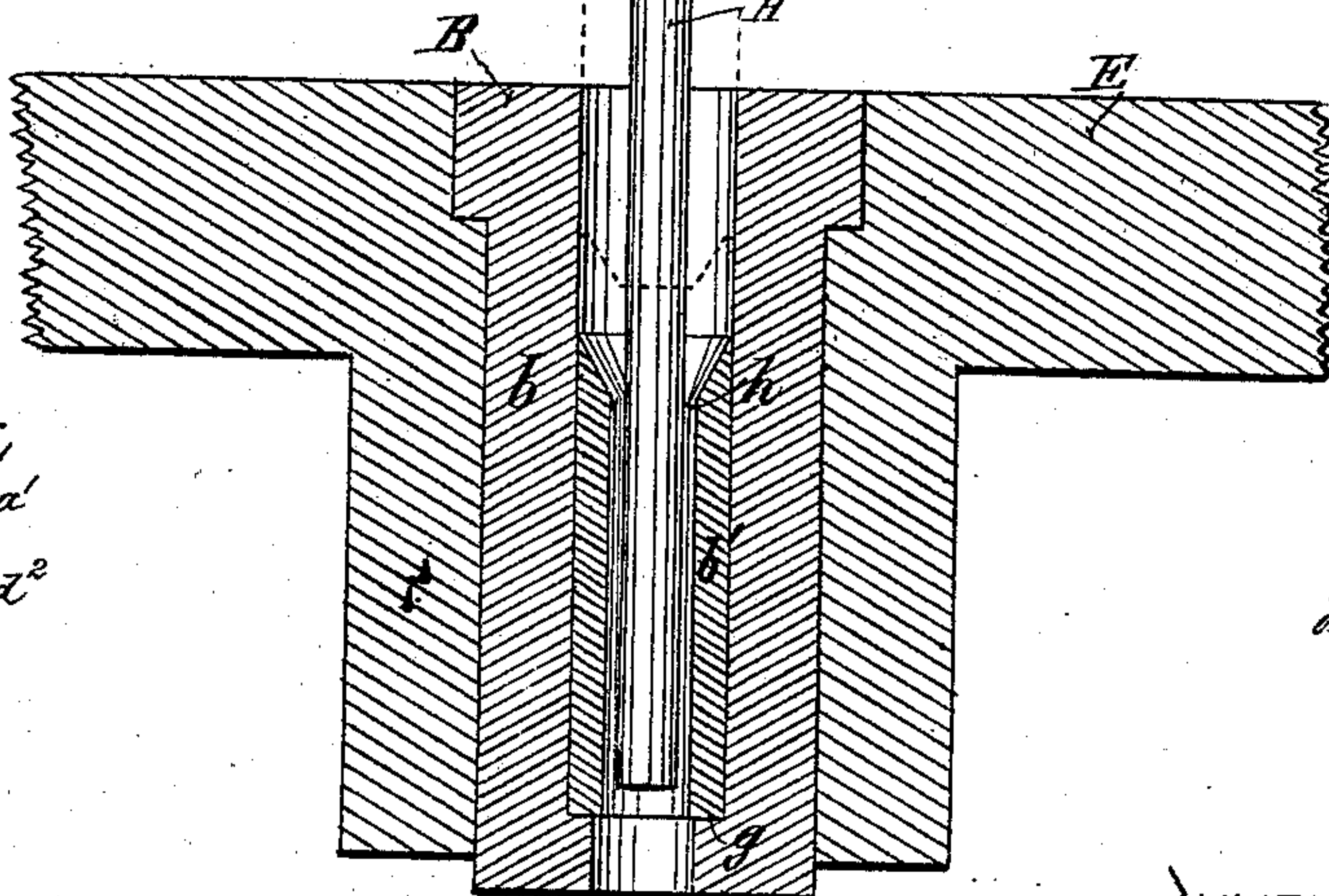


FIG. 12.

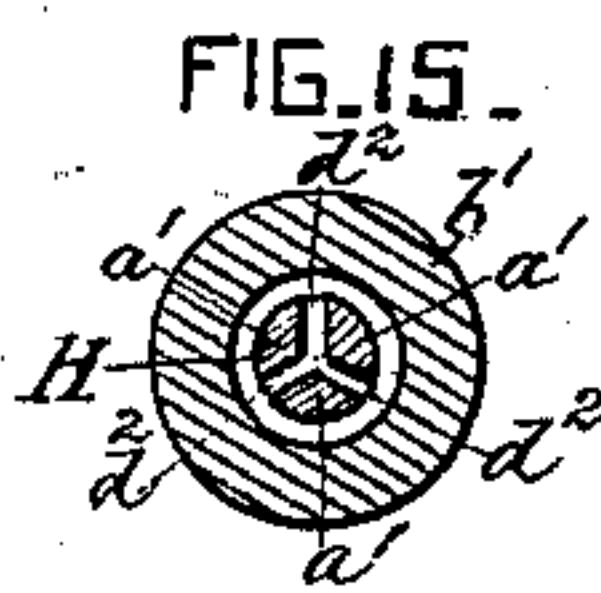


FIG. 15.



FIG. 16.

WITNESSES.

Joseph J. Scholfield.
William H. Joyce.

INVENTOR.

Isaac Lindsley

UNITED STATES PATENT OFFICE.

ISAAC LINDSLEY, OF PAWTUCKET, ASSIGNOR TO HIMSELF AND SOCRATES SCHOLFIELD, OF PROVIDENCE, RHODE ISLAND.

MANUFACTURE OF COHERENT COMPRESSED TOBACCO.

SPECIFICATION forming part of Letters Patent No. 235,886, dated December 28, 1880.

Application filed July 12, 1880. (Model.)

To all whom it may concern:

Be it known that I, ISAAC LINDSLEY, of Pawtucket, in the county of Providence and State of Rhode Island, have invented an Improvement in the Manufacture of Coherent Compressed Tobacco, of which the following is a specification.

Heretofore in the manufacture of coherent compressed tobacco it has been customary to fill a closed mold or die with the proper amount of tobacco required in order to produce the finished product at a single compression. I have, however, discovered that bars of coherent compressed tobacco, either solid or hollow, may be formed by forcing the tobacco in consecutively-fed adjoining charges through a die made open at both the receiving and discharging ends, the impression made by the face of the plunger upon the outer surface of each separate charge as it is fed to the die tending to produce in the resulting product separable joints, whereby the bar may be divided transversely into sections corresponding to the original charges, and, furthermore, the compressed sections so formed may be broken up and the particles or granules of tobacco be rearranged by means of a contraction in the bore of the die, so that the resulting bar of tobacco may have the several sections of which it is formed so thoroughly connected by the attenuation and incavation produced by constriction as not to be capable of separation at the joints, as before; and my invention consists in the improved process for manufacturing such bars of compressed tobacco; also, in certain special devices for carrying out that process, and in the resulting improved article of manufacture, all as hereinafter set forth.

Figure 1 represents a longitudinal section of an open hollow die and an elevation of the lower end of a cylindrical plunger, and also a bar of compressed tobacco formed in sections and longitudinally divided at its axis, showing the joints between the several sections and the distinctive hollowed grain of the tobacco. Fig. 2 represents the sectionally-constructed bar of compressed tobacco in elevation, and also a freshly-inserted charge of loose tobacco. Fig. 3 represents the conical or hollowed joints and the grain of the tobacco in the several

sections as produced by means of a plunger provided with a conical face. Fig. 4 represents the formation of a hollow bar of compressed tobacco in jointed sections, the mandrel being attached to the face of the plunger. Figs. 5 and 6 represent the longitudinal section of a die provided with a large and a small chamber, serving to constrict and incavate the original plunger-impressed sections. Fig. 7 represents a view of the lower end of the die shown in Fig. 1. Fig. 8 represents a view of the lower end of the die and mandrel shown in Fig. 4. Fig. 9 represents a longitudinal section of the die, plunger, and the stationary mandrel arranged for making the improved perforated bars of compressed tobacco. Fig. 10 represents the longitudinal section of the die, and also of a stationary mandrel provided at its lower end with rib-forming grooves. Fig. 11 represents a transverse section of the die and the grooved mandrel, taken in the line x of Fig. 10. Fig. 12 represents the transverse section of the perforated bar of compressed tobacco, formed by means of the die and mandrel shown in Figs. 10 and 11. Fig. 13 represents a longitudinal section of the die with the mandrel and plunger in elevation, and illustrates the process of forming an improved perforated bar of compressed tobacco provided with three longitudinal ribs made to extend from the outer portion to the axis of the bar. Fig. 14 represents a transverse section of the perforated bar formed by means of the die and mandrel shown in Fig. 13. Fig. 15 represents a transverse section of the lower end of the mandrel and the inner portion of the die as taken in the line x in Fig. 13. Fig. 16 represents a transverse section of the lower end of a mandrel provided with three rib-forming grooves which do not extend to the axis.

In the accompanying drawings, Fig. 1, A represents the lower end of a plunger made to reciprocate in the upper end of the die B, which is provided with a bore of uniform, or nearly uniform, diameter, and made of sufficient length to contain several of the consecutively-compressed sections c' c^2 c^3 of the bar C, connected to each other by the separable joints d d , produced by the direct action of the face

of the plunger A upon the outer surface of each charge of loose tobacco, thus forming a smooth hard face, against which the succeeding charge of tobacco will be compressed, so that the surface fibers or granules of the adjoining sections will not become strongly interlocked, but may adhere sufficiently to admit of light handling without danger of separation.

In Fig. 2, *c* represents a freshly-inserted charge of loose granulated tobacco, which may be fed to the die from a hopper, or otherwise, upon the proper elevation of the plunger A. The friction of the several inclosed sections *c'* *c*² *c*³ against the sides of the die will be such that the loose charge *c* will be first compressed, as shown in Fig. 1, before the bar C will start downward through the die, and the continued movement of the plunger toward its lower position, which is indicated by the dotted line *x x*, will force the bar C through the die B for a distance equal to the thickness of the compressed charge *c*, the friction of the tobacco against the sides of the die causing the adjoining section, *c'*, to become slightly hollowed toward the face of the plunger, as indicated by the curving of the lines *d d*, which serve to represent the joints between the sections, and this effect is liable to be increased by the adherence and gradual accumulation of tobacco upon the flat face of the plunger, thus impressing a hollowed form directly upon the charges of tobacco, which incavation will become thereafter increased by the frictional action of the sides of the die.

It is well known that when a mass of loose tobacco or similar material is placed under heavy pressure in a die the resulting compact cake or bar will have its component particles arranged in a certain grain, of comparatively easy division, running in a line or plane at about right angles to the direction of the applied pressure. Thus the grain of the compressed charge of tobacco *c* in Fig. 1 will run about parallel with the face of the plunger A, as indicated by the shade-lines running transversely of the bar; but as the plunger continues downward to its lower position (shown by the line *x x*) the grain of the previous charge of tobacco, or the section *c'*, will become hollowed, to correspond with the incavation of the joints *d d* between the sections, by the frictional resistance of the sides of the die.

In first filling the die with tobacco, in order to start the press, the lower end of the die may be temporarily closed and a suitable quantity of tobacco placed within the die and pressed sufficiently to hold its position, when, upon starting the press, the tobacco will be brought to the required degree of condensation by the action of the plunger upon the subsequently-fed charges.

When a plunger having a conical or protuberant face, as shown in Fig. 3, is employed, the sections *c'* *c*² *c*³ will be primarily compressed into a mutually-interlocking form, by which means the sectionally-constructed bar may be

made to resist a greater transverse strain than where a plain plunger is employed, as in Fig. 1, and the face of the plunger, when made in the above conical or protuberant form, tends to remain free from adhering tobacco, which, at ordinary temperatures, is inclined to form a gradually-accumulating mass upon a flat surface at the face of a plunger.

By fixedly attaching a mandrel, *a*, to the end of a plunger, A, as shown in Fig. 4, so as to move therewith, sectionally-formed hollow bars of compressed tobacco may be made from consecutively-fed charges of loose tobacco, the face of the plunger at the base of the mandrel being made conical, in order to produce an axially-oblique grain, as indicated by the shading-lines which run in the direction of the dotted lines *s s'*, and in the foregoing illustrations the desired degree of compression in the tobacco may be secured by increasing or diminishing the length of the die B.

When a die, B, having a large and a small chamber, as shown in Figs. 5 and 6, is employed, a more thorough union of the several sections *c'* *c*² *c*³ may be secured by reason of the consequent breaking up and rearrangement of the original plunger-impressed joints, and this rearrangement may be carried to such an extent as to destroy the original separability of the sections.

The effect produced by a plunger having a flat face and made to reciprocate in the large chamber of the die is shown in Fig. 5, the resulting hollowed form of the sections and the joints being indicated by the lines *d' d' d'*, and the grain of the tobacco in the sections by the axially-oblique shading-lines between the lines *d' d' d'*, and the like effect, produced by means of a plunger having a conical or protuberant face operating in the larger chamber of the die, is illustrated in Fig. 6, which shows the increased incavation of the sections and the corresponding oblique or hollowed arrangement of the grain.

The joints *d' d' d'*, formed by means of the conical plunger, (shown in Fig. 6,) are stronger than those formed by the plunger with a flat face, (shown in Fig. 5,) for the reason that in the latter case the tobacco in a forward charge, being constricted in advance of the adjoining charge in the rear, tends to move or slip away from the rear charge at the outer portion of the contact-surface of the joint in contraction from the large to the smaller chamber, thus producing imperfect juncture between the two charges at the outer portion of the joint near the surface of the tobacco bar, whereas in Fig. 6 this tendency is overcome by the proper conical form of the charges, which does not admit of the above-mentioned movement when under the constricting action of the die.

In the drawings, Fig. 9, a stationary cylindrical mandrel, H, extends into the die B through the hollow plunger A, which is bored out at its upper end to receive the enlarged head H' of the mandrel. The plunger A is

provided on one side with a slot, *k*, and the head *H'* of the mandrel is provided with a notch, *f*.

The stud *D*, which is to be fixedly attached to a convenient portion of the frame of the operating press, extends through the slot *k* in the plunger, and enters the notch *f* in the side of the head *H'*, thus holding the mandrel stationary, while the plunger is free to move up and down with the sliding head of the press, being secured thereto by means of the shank *a*².

The bore of the plunger *A* is made to loosely fit the cylindrical mandrel *H*, and the face of the plunger is made conical to within a slight distance from its extreme edge, and truncated at its point, and in Figs. 9 and 10 the plunger is represented at its extreme elevation, its lowest position being represented by the dotted lines within the chamber of the die.

The die *B* is, for the sake of convenience of manufacture and renewal, made in two parts, the outer portion, *b*, being made cylindrical, with a short contracted bore at its lower end, forming an interior shoulder, *g*, the upper portion of the bore being made large enough to receive the lower end of the plunger *A*. The inner portion, *b'*, of the die is made to loosely fit the bore of the outer portion, *b*, and rests for support upon the shoulder *g*, the upper end of the portion *b'* being conically hollowed, thus forming the throat *h* of the die. The bore of the inner portion, *b'*, may be made to slightly expand at its lower end, in order to give clearance to the tobacco, and the lower end of the mandrel may be very slightly tapered for the same purpose. The die *B* is to be fitted to a proper die-holder, *E*, and so adjusted in a very powerful press, such as is commonly employed for punching metals, that the lower end of the stationary mandrel *H* may extend for some distance below the throat *h*.

The mandrel *H* (shown in Fig. 9) is adapted to the manufacture of plain cylindrical hollow bars; but in Figs. 10 and 11 the mandrel is represented as divided at its lower end into four prongs, *a' a' a' a'*, separated from each other by cross slits or grooves *d² d²*, which at their upper ends gradually diminish in depth from the axis *e* of the mandrel to the point *e'* at the cylindrical surface, which point should be slightly below the extreme lower position of the reciprocating movement of the plunger. (Shown by the dotted line.)

The plunger and mandrel (represented in Figs. 10 and 11) are adapted to the manufacture of a perforated bar of compressed tobacco provided interiorly with four longitudinal ribs extending from the outer portion of the bar to the axis, thus forming four distinct apertures, as shown in the transverse section, Fig. 12.

The manufacture of a perforated bar of compressed tobacco provided with three interior ribs, forming three distinct apertures, as shown by a transverse section in Fig. 14, is illustrated in Fig. 13, in which the plunger *A* is represented at its extreme highest position, allow-

ing the tobacco *F*, in a granulated condition and very slightly moistened, to be fed, by suitable mechanism, under the plunger and into the receiving-chamber *G* of the die. The downward movement of the plunger will then compress the tobacco in the chamber *G*, and force the previously-compacted tobacco through the throat *h* of the die and into the grooves *d²* of the mandrel, and at the lower position of the plunger the loose tobacco will have become compressed against the outer surface of the previous charge, so as to occupy the space between the lines *i* and *d*, and will have, as the result of compression, an oblique axial grain, corresponding to the conical or protuberant face of the plunger, as indicated by the oblique lines drawn on both sides of the mandrel, between the lines *i* and *d*, and at the succeeding stroke of the plunger, fresh charges of loose tobacco being constantly inserted into the chamber *G*, the tobacco included between the lines *i* and *d* will be forced downward to the throat *h* of the die, and the previously-impressed grain of this section will then, at the succeeding stroke of the plunger, be broken up and rearranged by constriction, somewhat as represented by the lines drawn obliquely from the adjacent surfaces of the mandrel and die below the throat *h*, thus forming a hollow bar, *c'*, provided with three interior ribs, *n n n*, and having a transverse grain V-shaped in its axial section or hollowed in a uniform longitudinal direction.

The operation of forming the above-described improved perforated bars is to be continuous, the tobacco being fed under the plunger by suitably-arranged means, while the proper merchantable lengths are at the same time cut off from the finished bar below the die.

The special construction of the mandrel shown in Fig. 13 is illustrated by the transverse section, Fig. 15, taken in the line *x x*; but the grooves *d²* of the mandrel may be made as shown in Fig. 16, so as not to connect laterally with each other, thus serving to form a perforated bar in which the several ribs are not connected at the axis.

The plunger and mandrel should be made of steel and properly hardened or tempered, in order to successfully resist the great pressure required for the purpose of forming the bars.

When the tobacco is fed to the die in a dry condition, or but slightly moistened, a hardened surface and a desirable polish will be imparted to the finished product by the resulting frictional contact with the sides of the die, and this improved surface adds greatly to the value of the manufacture. Heating the die causes the tobacco to pass with greater ease through the throat *h*, and an excess of moisture produces a rough and broken surface, owing to the adhesion of moist tobacco to the surface of the die.

The receiving-chamber of the die may be made of sufficient size to contain the tobacco necessary to form several entire merchantable bars, and in this case they will be formed with-

out the joints above described, but still having the distinctively - hollowed grain, which may be shown by transverse fracture or cleavage at all portions of the bar.

5 The tobacco fed to the chamber of the die may be in a granulated or other suitable condition, according to the special quality of the desired product or the comparative size of the receiving-chamber, and the tobacco so fed to the die
10 does not require the addition of any foreign material whatever; but I do not, in carrying out my invention, confine myself to pure leaf-tobacco.

The moisture developed in smoking the
15 above-described perforated bars tends to gradually close the perforations at their rear ends, and therefore the proper sectional area of the perforations and the surrounding tobacco should be preserved at a certain maximum
20 length of the bar, in order to prevent injurious closure and stoppage of the draft. Perforated bars formed with three apertures, as shown in Figs. 13 and 14, have been found to smoke properly when made about four inches in length,
25 with an outside diameter of about nine thirty-seconds of an inch, the shell being made three sixty-fourths of an inch in thickness and the ribs one thirty-second of an inch, the shell being thus made slightly thicker than the ribs,
30 which practice has shown to be the most favorable condition for perfect manufacture, diminishing the tendency to curvature after leaving the die and avoiding imperfections upon the outer surface of the bar.

35 When the bars are made for chewing purposes it is desirable to feed the die with pieces of tobacco of considerable size, in order that a chew of tobacco taken from the bar may have the proper consistency after becoming
40 swelled in the mouth; but for smoking purposes very finely divided tobacco may be employed to advantage. The hollowed grain increases the strength of the bar, promotes combustion, and causes the ashes to retain their
45 form and to cling firmly to the unconsumed tobacco.

The tobacco bars may be divided into any suitable lengths, and for smoking purposes may be used with a holder or mouth-piece.

I claim as my invention—

1. The described process of manufacturing tobacco, which consists in compressing one charge of tobacco upon a previously-compressed charge in an open-ended die by means of a plunger, and forcing the same through the
55 said die, substantially as described.

2. The described process of manufacturing tobacco, which consists in compressing one charge of tobacco upon a previously-compressed charge in the larger chamber of a die
60 by means of a plunger, and forcing the said charges of tobacco, as they advance, into and through a smaller chamber, whereby the said charges are more effectually joined to each other, substantially as described.

3. In a machine for manufacturing bars of compressed tobacco by forcing the tobacco through a hollow die by means of a plunger, the combination of the die having a large and a smaller chamber with a plunger fitted to
70 work in the large chamber and provided with a conical or protuberant face, whereby the successively-compressed sections of the bar are more thoroughly joined to each other in passing from the large to the smaller chamber, substantially as described.

4. In a machine for manufacturing bars of compressed tobacco by forcing the tobacco through a hollow die by means of a plunger, the combination of the die and plunger with
80 the grooved mandrel, whereby the bar of tobacco is formed with interior ribs, as set forth.

5. A bar of compressed tobacco having a transverse grain, made V-shaped or hollowed in its axial section, and continued uniformly
85 in one direction throughout the bar, substantially as described.

6. A bar of compressed tobacco having a uniform transverse grain, V-shaped or hollowed in its axial section, and a friction hardened or polished longitudinal surface, substantially as described.

ISAAC LINDSLEY.

Witnesses:

WILBER MASON,
JOSEPH J. SCHOLFIELD.