

H. W. T. JENNER.

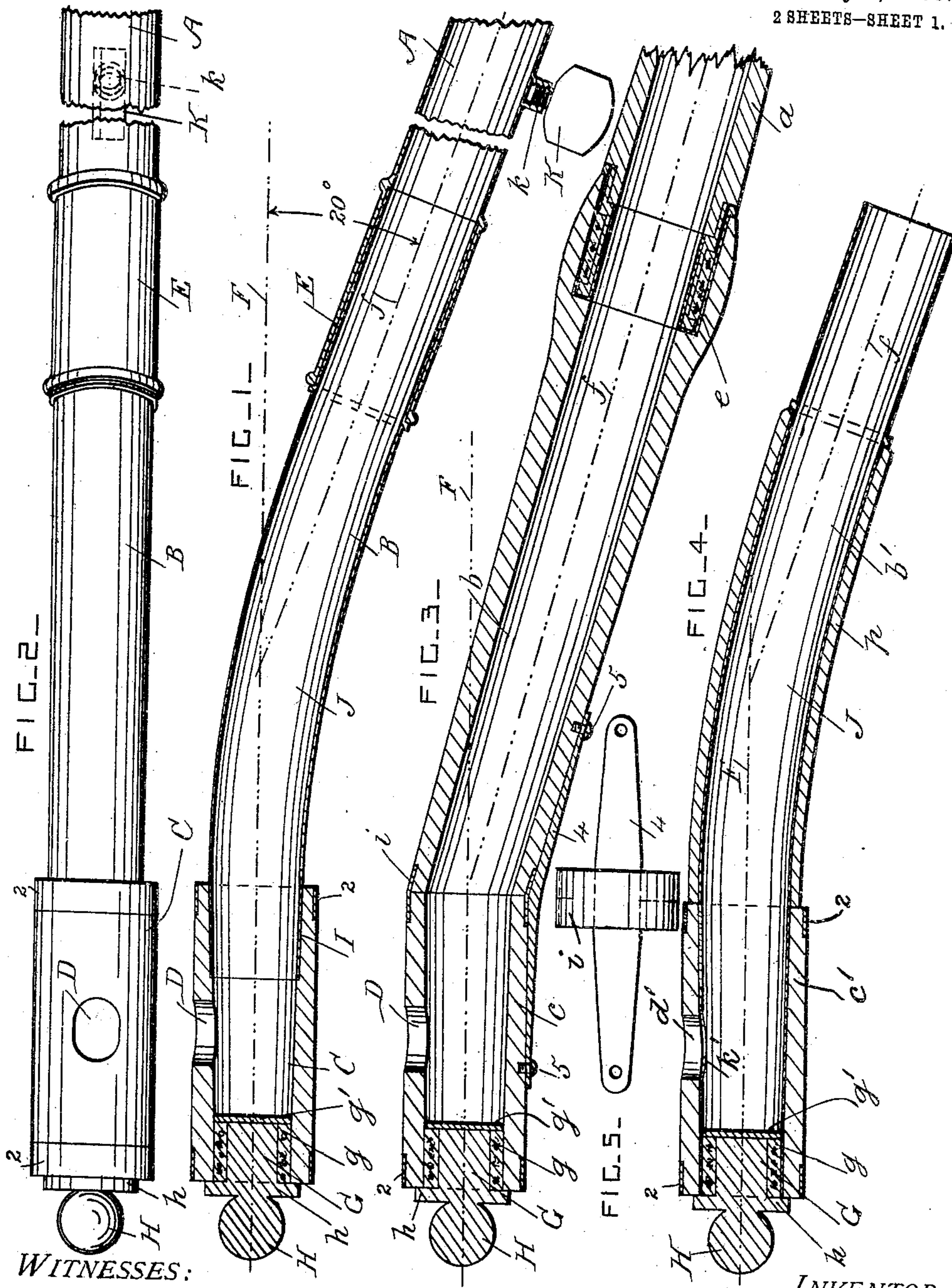
FLUTE.

APPLICATION FILED JAN. 23, 1909.

Patented May 4, 1909.

2 SHEETS—SHEET 1.

920,471.



WITNESSES:

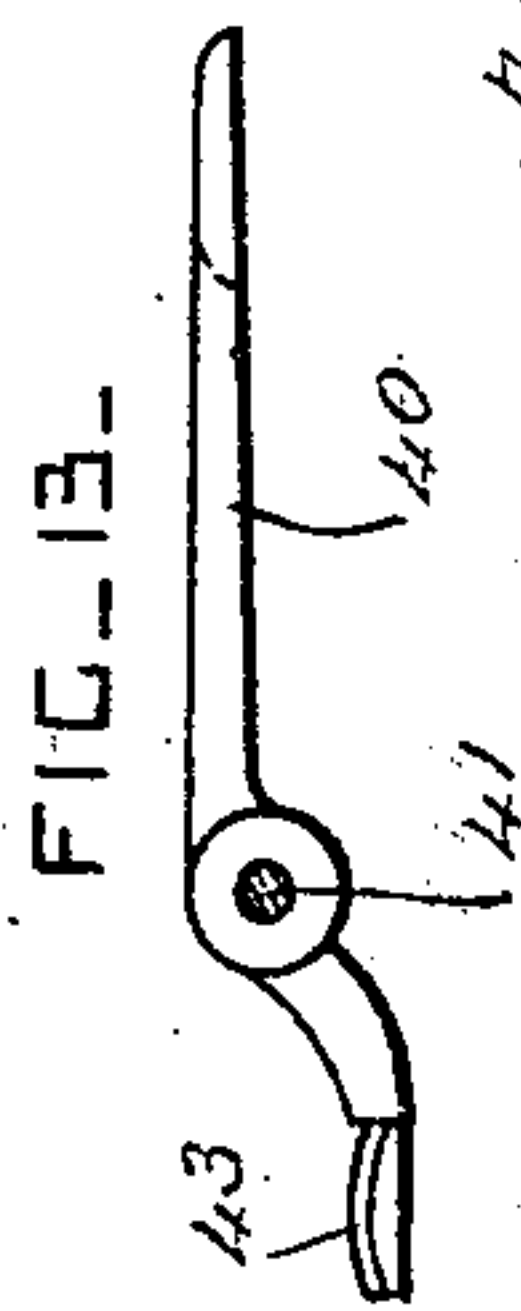
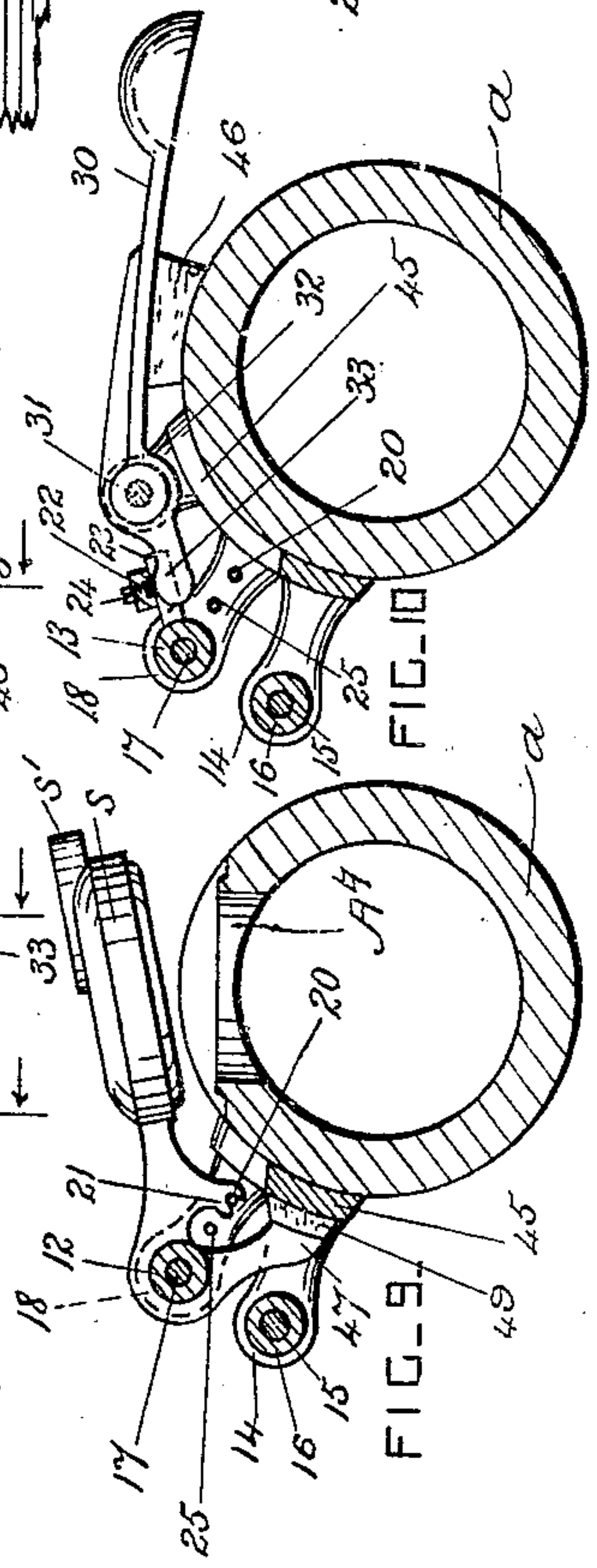
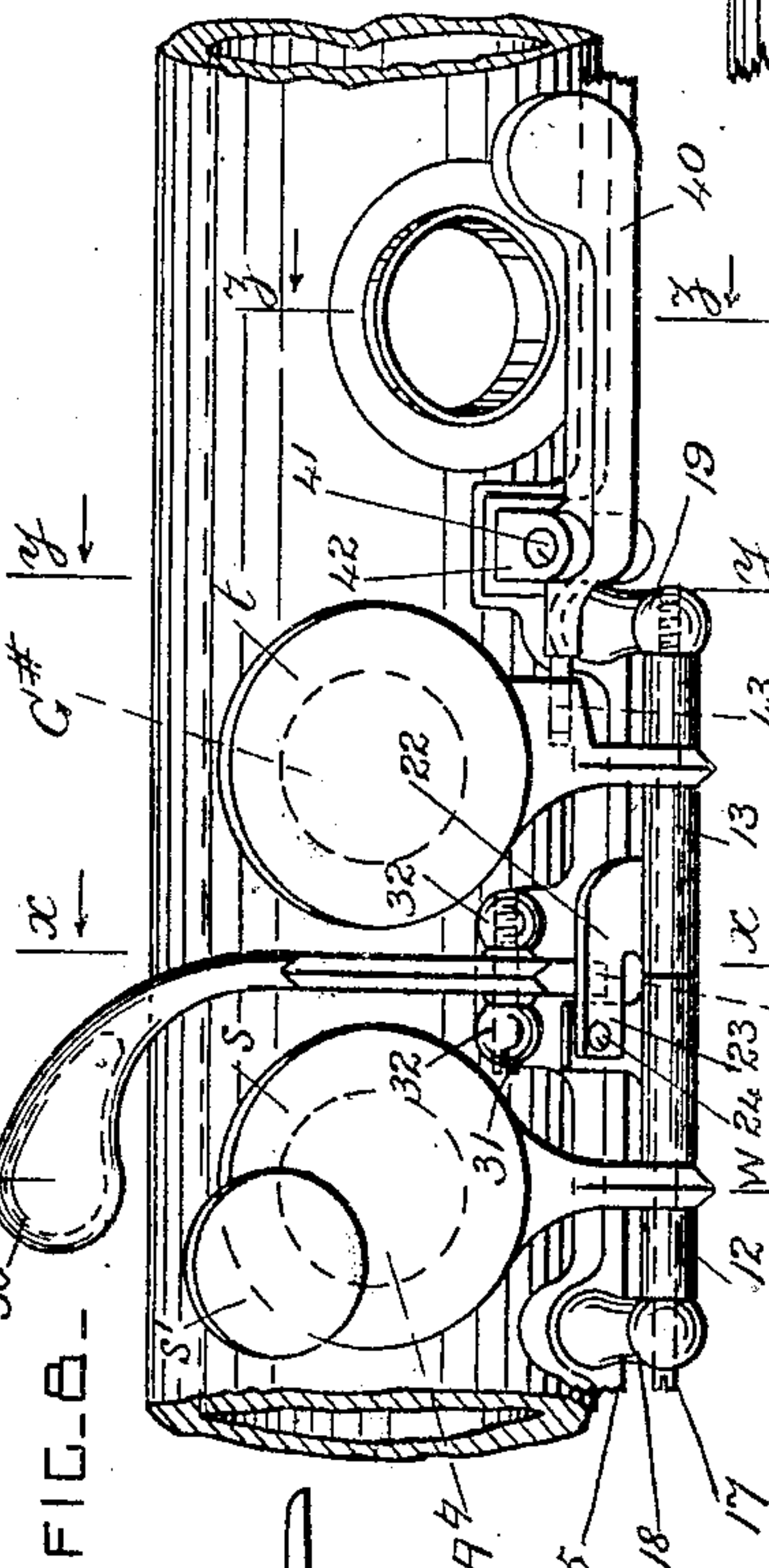
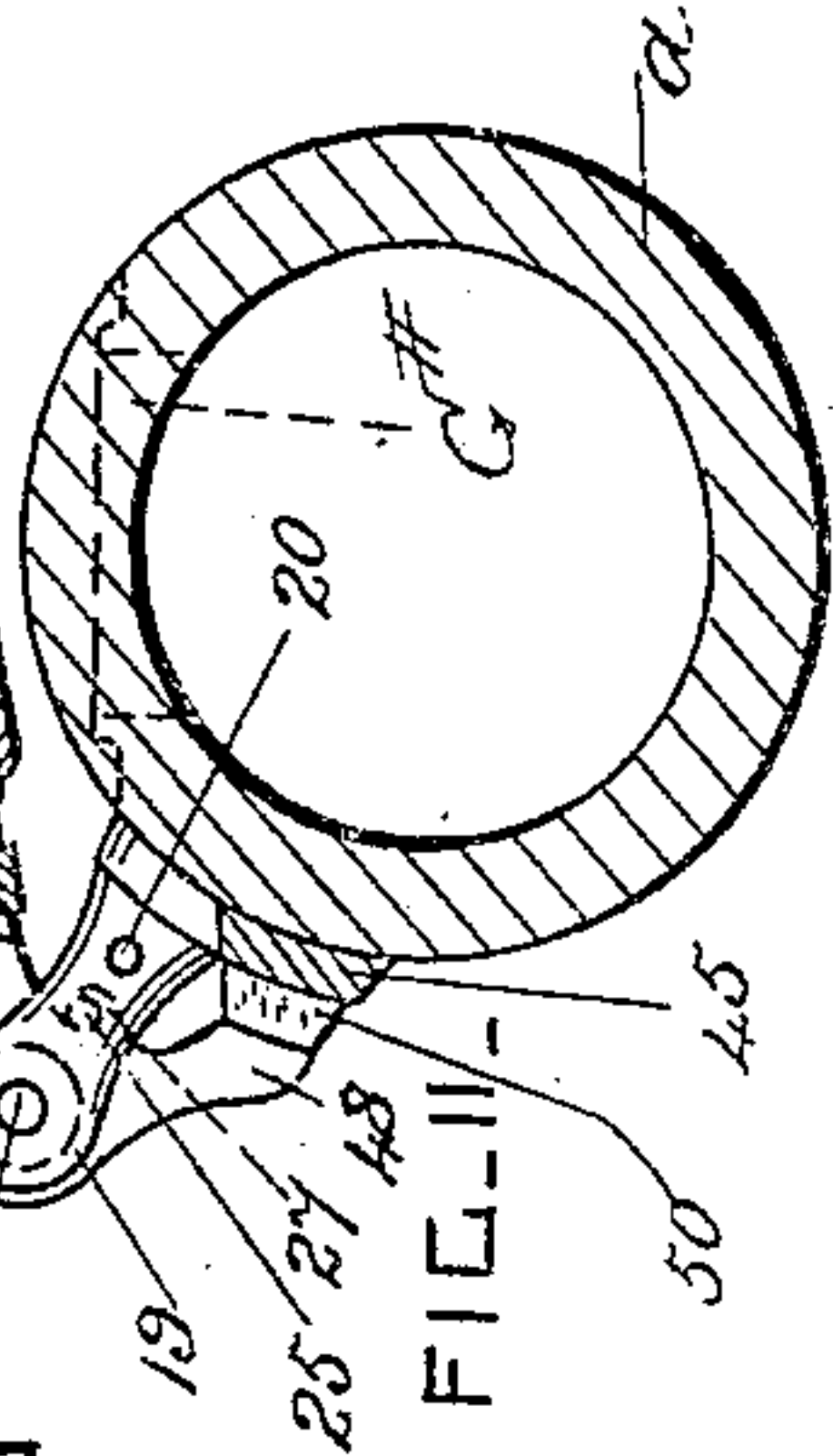
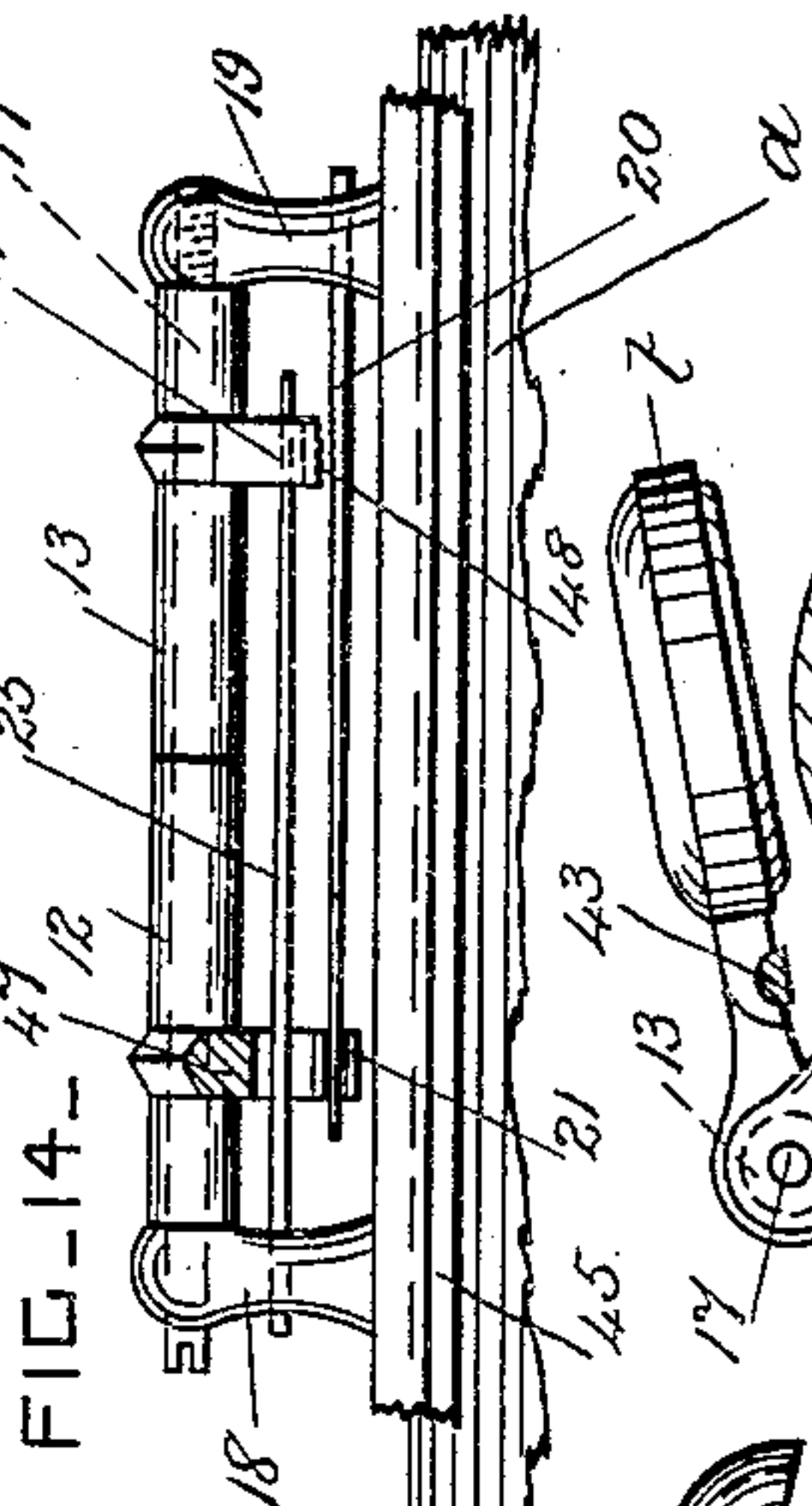
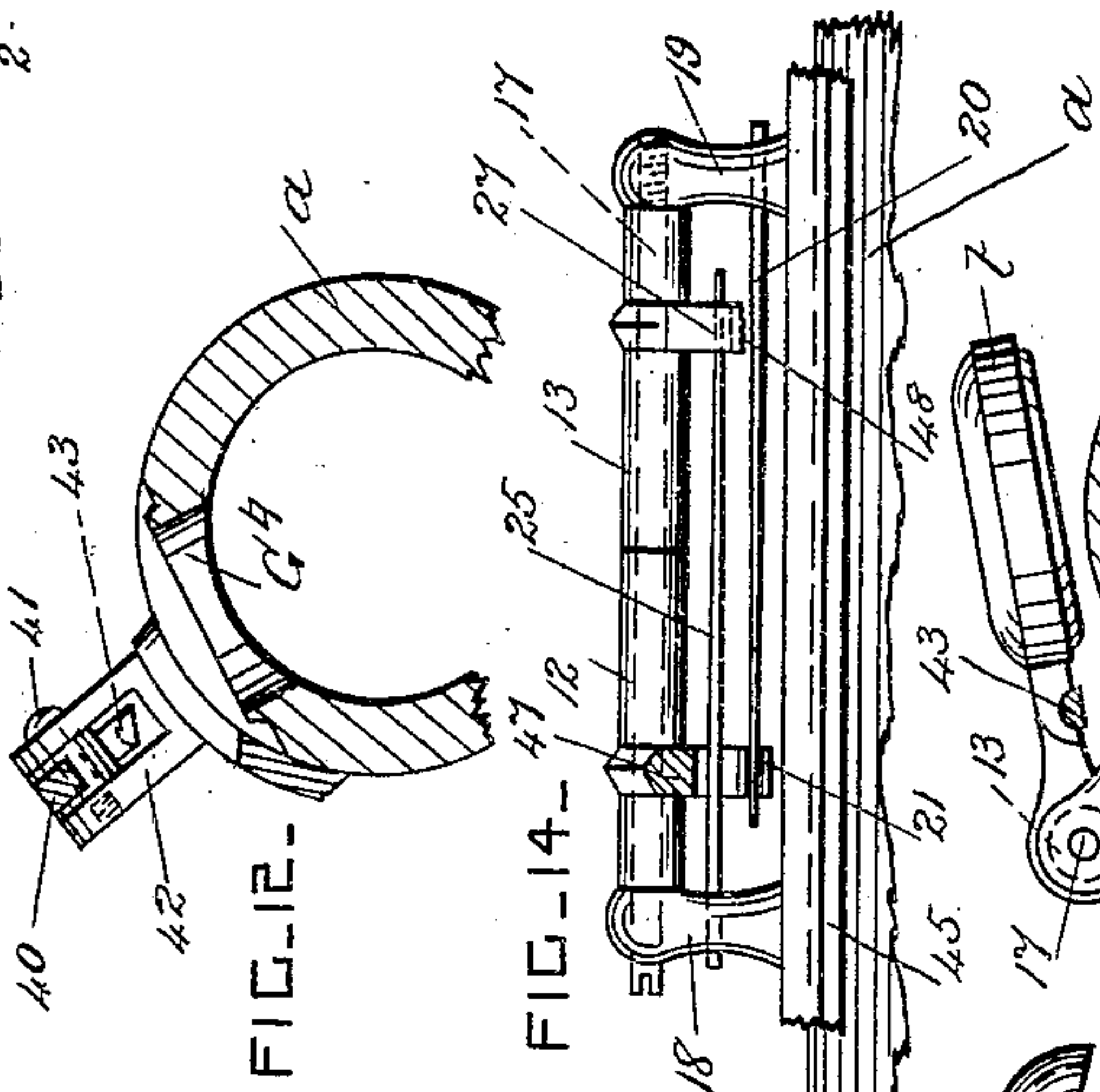
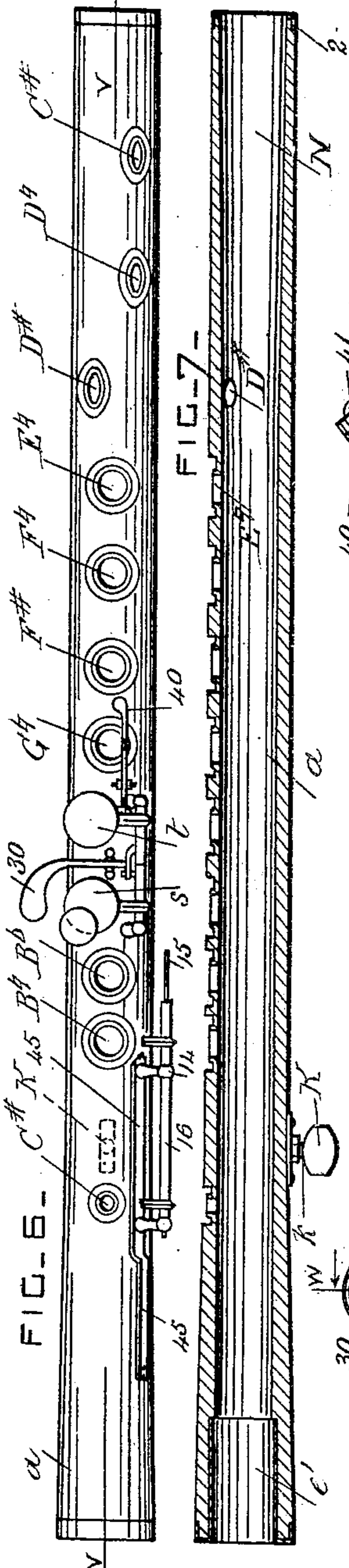
W. E. Oliver
E. Foray Jr.

INVENTOR

Herbert W. Jenner.

920,471.

Patented May 4, 1909.
2 SHEETS—SHEET 2.



WITNESSES:

W. E. Oliver
C. Longth

INVENTOR

Herbert W. Jenner.

UNITED STATES PATENT OFFICE.

HERBERT W. T. JENNER, OF WASHINGTON, DISTRICT OF COLUMBIA.

FLUTE.

No. 920,471.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed January 23, 1909. Serial No. 473,855.

To all whom it may concern:

Be it known that I, HERBERT W. T. JENNER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Flutes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates more particularly to Boehm flutes provided with conical head-joints and cylindrical body-portions; and it consists in the novel construction of the head-joint, barrel, and mouthpiece, and in certain improvements in the key-mechanism, as hereinafter fully described and claimed.

In the drawings, Figure 1 is a longitudinal section through the upper end portion of a flute constructed according to this invention. Fig. 2 is a plan view of the same. Fig. 3 and Fig. 4 are longitudinal sections through two head-joints showing two modifications. Fig. 5 is a plan view of the brace and socket shown in Fig. 3. Fig. 6 is a plan view of the flute-barrel showing the positions of the new keys. Fig. 7 is a longitudinal section through the flute-barrel taken on the line $v-v$ in Fig. 6. Fig. 8 is a plan view of the new keys drawn to an enlarged scale. Figs. 9, 10, 11, and 12, are cross-sections, taken on the lines $w-w$, $x-x$, $y-y$, and $z-z$, respectively, in Fig. 8. Fig. 13 is a detail view of the trip-lever. Fig. 14 is a rear view of the supports and springs for the new keys.

A is a portion of the barrel or body of the flute. This barrel is preferably cylindrical for the greater portion of its length, and it is provided with any approved system of holes and key-mechanism.

B is the head-joint of the flute, and C is the mouthpiece which is provided with a lateral embouchure or blow-hole D. The upper end portion of the bore of the head-joint is formed conical upon approved lines. The lower end portion of the head-joint is cylindrical, and it is connected to the barrel by a slip-joint E of any approved construction, so that the head-joint may be drawn out or pushed in to vary the pitch of the instrument in the usual manner.

The mouthpiece C is short, and it is connected to the upper end of the head-joint by a slip-joint I. The embouchure D is ar-

ranged at the middle part of the mouthpiece. The axis F of the mouthpiece, and also its exterior surface around the embouchure, is arranged at an acute angle to the axis f of the barrel and the lower part of the head-joint. The head-joint is straight at the slip-joints I and E, and the intervening portion J is preferably formed upon a curve of large radius. The angle of the axis F with the axis f is preferably 20° , but the exact angle is not material. By constructing the head-joint and its mouthpiece in this manner, the embouchure D can be held in a horizontal position, and parallel with the parting line and opening between the lips of the player, when the head of the player is held erect. The barrel of the flute with the key-mechanism is then in a conveniently inclined position, and the arms of the player are not raised to an inconvenient extent. When the axis F is in line with the axis f , as in flutes constructed in the usual manner, the embouchure is usually held somewhat out of parallel with the opening between the lips of the player. The tone is not so good, nor so easily produced, when the embouchure is held in this position, and the player tries to improve the tone by leaning his head to one side and by raising the barrel to a nearly horizontal position, and in so doing he is obliged to assume positions which are tiring to maintain.

The short separate mouthpiece is a great advantage, as it can be renewed at a small cost if it splits, and a set of interchangeable mouthpieces can be provided having embouchures of different form to suit different requirements.

The mouthpiece C is adjustable circumferentially of the head-joint by means of the slip-joint I. This slip-joint also permits the parts to be adjusted longitudinally to a limited extent, if desired. A greater range of longitudinal adjustment can be had by making the adjacent surfaces of the slip-joint cylindrical instead of making them tapered. The circumferential adjustment of the mouthpiece on the head-joint is of importance as it enables the position of the embouchure to be adjusted with reference to the holes and key-mechanism of the barrel, without turning the head-joint in the barrel. When a curved head-joint is turned circumferentially in the barrel, it throws the upper part of the head-joint and the mouthpiece

out of line with the barrel, when viewed as shown in Fig. 2. If desired, however, the mouthpiece can be set out of line with the barrel by turning the head-joint in the barrel, and the mouthpiece can then be adjusted on the end of the head-joint to any desired position. When the exact position of the mouthpiece has been adjusted circumferentially to suit the individual player, the mouthpiece can be secured on the head-joint with shellac-cement, or in any other approved manner, if desired.

K is a knuckle-plate on the underside of the barrel. This knuckle-plate bears against the lower part of the knuckle-joint of the fore-finger, and it prevents the curved head-joint from twisting the barrel circumferentially in the hands when the mouthpiece is pressed against the lip. This knuckle-plate is preferably removable, being provided with a peg or screw *k* which engages with a socket on the barrel. The position of the knuckle-plate is shown in Figs. 5 and 7. One side of the knuckle-plate is curved to fit against the knuckle-joint, and as the knuckle-plate only projects downward for a short distance it does not press on the ligaments between the finger and thumb like a thumb-crutch.

The mouthpiece C is provided with a tuning-plug or cork G. This plug has a cork facing *g* secured around the end portion of it which engages with the mouthpiece. The middle part of the plug has a stop or shoulder *h* which bears against the end of the mouthpiece and which is immovable with respect to the said end portion. The other end portion forms a finger-piece or knob H for inserting and removing the plug. The usual screw for adjusting the cork is dispensed with, and the flute has the advantage of being lighter at its upper end than when an adjusting-screw is provided. The exact position of the plug G with respect to the embouchure is first determined by means of an experimental cork, and the plug G is then made of the right length. The plug G can be removed as often as desired, to wipe out the mouthpiece, and the positioning shoulder *h* enables it to be replaced in its exact original position.

A facing or cake *g'* of hard wax, such as dental impression wax, is secured on one end of the tuning-plug G. The wax is heated and is dropped on the plug so that it adheres tightly to it. This wax facing prevents the moisture from the breath being absorbed by the cork, and ultimately causing the mouthpiece to split. It also affords a means of fine adjustment, as if the tuning-plug is a little too long it can be shortened by rubbing the wax on a sheet of sand-paper; or an additional thickness of wax can be applied in a similar manner, to increase the length of the plug, and the facing subsequently reduced to make the plug the exact length required.

In the modification shown in Fig. 3, the head-joint *b* is formed wholly of wood, and its tubular upper part or mouthpiece *c* is secured at an angle to its lower part. The mouthpiece *c* can be adjusted circumferentially of the head-joint, and it is secured to it by a socket or slip-joint of any approved construction. It is preferably secured by a socket *i* which encircles the adjacent portions of the mouthpiece and head-joint. A brace or brace-bar 4 is secured to the socket at the lower side of the head-joint and mouthpiece to stiffen their junction. The other forms of head-joint can also be provided with stiffening braces, if desired. The stiffening brace 4 can be secured to the mouthpiece and head-joint by screws 5, or in any other approved manner, after the mouthpiece has been adjusted. The wooden head-joint *b* may be connected to a wooden barrel *a* by a cork slip-joint *e* of approved construction, as shown in Fig. 3. The other head-joints may be connected to a wooden barrel *a* by sliding their lower cylindrical end portions into a socket tube *e'* as shown in Fig. 7.

In the modification shown in Fig. 4, the head-joint *b'* is curved the same as the head-joint shown in Fig. 1, but it is made longer so that it forms a liner for the mouthpiece *c'*. In this form of the device the mouthpiece *c'* is preferably secured so that its embouchure comes in the most desirable position for the generality of players, and the mouthpiece may be formed integral with the head-joint if desired. The mouthpiece *c'* can be adjusted to a limited extent, by making the hole *k'* in the head-joint larger than the embouchure *d'*, so that the embouchure will not be obstructed when the mouthpiece is moved circumferentially to set it to its exact position.

The improvements hereinbefore described are chiefly shown applied to metal flutes, but they can be applied to flutes of any material. The flute-barrels can all be of wood, or of ebonite. The curved head-joints and their mouthpieces can be made of ebonite or other suitable molded material, or they can be made of thin metal covered with ebonite *p* or other approved casing material. Rings 2 are secured to the wooden parts wherever desired, to prevent splitting.

The barrel is provided with the usual holes for producing the notes, as indicated in Figs. 6 and 7, and in order to improve the tone of the lowest notes the lower end portion of the barrel is provided with a conical or tapering portion N. This conical portion preferably joins onto the cylindrical part of the barrel at a point between the D-sharp and E-natural holes, and it is largest at the extreme lower end of the flute-barrel. The barrel is made a little longer than when

cylindrical for its full length, as the conical portion N sharpens the lowest note materially. The tone of the lowest note, C-natural, is fuller and more resonant when the barrel is formed in this manner because of the increased volume of air which is thrown into vibration, and the quality of the tone is improved because the first upper partial, the middle C-natural, is more nearly in tune with the fundamental tone when sounding with it. A good effect is produced when the diameter at the extreme end of the barrel is ten per cent. larger than the diameter of its cylindrical portion, but an increase of fifteen per cent. is found to be detrimental to the tone. The sides of the tapered portion N are substantially straight, but the tapered portion should curve into the cylindrical portion as smoothly and gently as possible.

The barrel of the flute is provided with keys *s* and *t* for closing the A-natural and G-sharp holes. In Figs. 6, 9 and 10, 14 is one of the pillars which support the spindle 15 and the tubular shaft 16 pertaining to the keys of the C-sharp, B-natural, and B-flat holes. The keys *s* and *t* are preferably supported by a separate spindle 17 carried by pillars 18 and 19, the holes covered by those keys being preferably arranged out of line with the other holes. All the keys are provided with pads of approved construction. The upper key *s* which is depressed by the third finger of the left hand is provided with a bearing-tube 12, and it is normally held open by a spring 20 projecting from the lower pillar 19 and engaging with a hook 21 on the shank of the key *s*. The key *t* is provided with a bearing-tube 13, and this bearing-tube is provided with a lug 22 which overlaps a lug 23 which projects from the bearing-tube 12, so that the key *t* is also normally raised by the spring 20. An adjusting-screw 24 is provided in the lug 22 which bears on the lug 23. A spring 25 is secured to the upper pillar 18 and projects across the sleeve 12 and engages with a hook 27 on the shank of the key *t*. When the key *s* is depressed, the spring 25 presses down the key *t* and closes the G-sharp hole. The spring 25 is normally under tension, but it does not depress the key *t* until the key *s* is depressed because the spring 20 is stronger or more effective than the spring 25 and holds both keys raised. The two springs 20 and 25 are arranged one above the other at different levels, and are made as long as possible. They are preferably secured to the pillars under the bearing-sleeves so that they are protected from exposure and injury. The G-sharp key *t* is raised forcibly, independent of the key *s*, and while the key *s* is depressed, by means of a key-lever 30 operated by the little finger of the left hand. This key-lever 30 is pivoted on a pin 31 car-

ried by pillars 32 which are secured to the barrel and arranged between the keys *s* and *t*. The short end portion 33 of the key-lever 30 projects under the lug 22 on the bearing-tube 13 of the key *t*, so that the said key is raised against the pressure of the spring 25 when the long end of the key-lever 30 is depressed. The key *s* is provided with an extension-plate *s'* to give the third finger additional leverage to operate the key against the pressure of the strong spring 20 which normally raises it, but this extension-plate may be dispensed with if desired.

In Boehm flutes as heretofore constructed, an additional G-sharp key had to be provided, under the closed G-sharp system; and under the open G-sharp system the key-lever was secured to the G-sharp key, so that the G-sharp key was held closed by the little finger. With the arrangement hereinbefore described all the advantages of the closed G-sharp system are obtained, and one key and one hole into the flute are dispensed with.

In order to facilitate the formation of the G-sharp notes, in certain passages of music and more particularly to facilitate the formation of the high G-sharp when passing between it and the high F-sharp and G-natural notes, an additional trip-lever 40 is provided, and is operated by the first finger of the right hand. This trip-lever 40 is pivoted on a pin 41 carried by pillars or a double-eye 42 secured to the barrel between the G-sharp hole and the G-natural hole. This trip-lever 40 is arranged longitudinally of the barrel and it is provided with a projection 43 on its shorter end which works in a recess in the underside of the shank of the G-sharp key *t*, or is otherwise operatively connected with the said key. The longer end portion of the trip-lever 40 is arranged sufficiently above the G-natural hole so as not to interfere with its key, and so that it can be worked by the tip of the first finger when raised off the key over the F-sharp hole. The key of the G-natural hole is normally held down by the pressure of the first finger on the key over the F-sharp hole, so that the tip of the first finger is moved a little toward the head-joint of the flute before being applied to depress the trip-lever 40.

The various supporting pillars hereinbefore described are secured to the metallic frame 45, which is secured to the barrel of the flute in any approved manner, and this frame is provided with suitable lugs or extensions for the additional pillars. The key-lever 30 is provided with a cork stop-block 46 on its lower side which rests on the barrel until the key *s* is depressed. The cork stop-block 46 is secured to the key-lever 30, and is raised with it by the action of the spring 25 and the lug 22, when the key *s* is depressed

to permit the spring 25 to press the lug 22 downwardly on the short end portion 33 of the key-lever. The keys *s* and *t* are provided with stop-arms 47 and 48 respectively, which have cork stop-blocks 49 and 50 secured to them and bearing against the frame 45.

What I claim is:

1. In a flute, the combination, with a barrel, of a head-joint, and a mouthpiece adjustable circumferentially on the upper end portion of the said head-joint, said mouthpiece having a lateral embouchure and having its axis arranged at an acute angle to the axis of the said barrel.

2. A head-joint for a flute provided with straight upper and lower end portions arranged at an angle to each other, the said upper end portion constituting a mouthpiece and having an embouchure in the same side as that on which the said head-joint projects outward, said head-joint being adapted to be played when held transversely of the player with its said upper end portion horizontal and with its lower end portion inclined downward at an acute angle to the horizontal.

3. A head-joint for a flute having straight upper and lower end portions and a curved middle portion which projects laterally, the said upper end portion constituting a mouthpiece and having an embouchure in the same side as that on which the said middle portion projects, and the said head-joint being adapted to be played when held transversely of the player with its said upper end portion horizontal and with its lower end portion inclined downward at an acute angle to the horizontal.

4. A head-joint for a flute provided with straight upper and lower end portions arranged at an angle to each other, the said upper end portion constituting a mouthpiece and having an embouchure in the same side as that on which the said head-joint projects outward, said head-joint having also a relatively short plug which closes its upper end and which extends therefrom to within a short distance of the embouchure.

5. In a flute, the combination, with a barrel, of a head-joint provided with straight upper and lower end portions arranged at an angle to each other, the said upper end portion constituting a mouthpiece and having an embouchure in the same side as that on which the said head-joint projects outward, and a stop or rest on the said barrel which projects in the opposite direction from the said projecting side and which prevents the barrel from slipping circumferentially when the flute is being played.

6. In a flute, the combination, with a head-joint provided with straight upper and lower end portions arranged at an angle to each

other, the said upper end portion constituting a mouthpiece and having an embouchure in the same side as that on which the said head-joint projects outward, of a stiffening brace or bar secured on the lower side of the said head-joint and mouthpiece.

7. In a flute, the combination, with a mouthpiece provided with a lateral embouchure, of a tuning-plug provided with a positioning shoulder which bears against the end of the mouthpiece, a plate for adjusting the length of the plug, said plate being formed of soft but inelastic material and secured over one end of the plug, and an intermediate portion of elastic material arranged between the said plate and shoulder and holding the plug in the mouthpiece.

8. In a flute, the combination, with a head-joint provided with a lateral embouchure and having the upper end portion of its bore tapered and smallest at its upper end, of a barrel having a cylindrical upper portion and a tapered lower end portion, the said tapered lower end portion having substantially straight sides and having its largest diameter at the bottom end of the barrel.

9. In a flute, the combination, with a head-joint provided with a lateral embouchure and having the upper end portion of its bore tapered and smallest at its upper end, of a barrel cylindrical in bore from its upper end to a point between its E-natural and D-sharp holes and having its lower end portion tapered and largest at its lower end.

10. In a wind instrument, the combination, with a pivot-pin, two normally-raised keys carried by the said pivot-pin and arranged side by side, and a spring which depresses one of the said keys when the other key is depressed; of a second pivot-pin supported in the space between the said keys, and a lever which raises the said spring-pressed key without raising the other key, said lever being carried by the last said pivot-pin and arranged on the same side of the first said pivot-pin as the said keys.

11. In a wind instrument, the combination, with a pivoted G-sharp key provided with a spring for depressing it, of a support secured between the G-sharp and G-natural holes, and a trip-lever arranged at a right-angle to the said key and having its middle portion pivoted to the said support, said trip-lever having an upper end portion which engages with the said key and a free lower end portion adapted to be depressed by the first finger of the right hand to raise the said key.

12. In a wind instrument, the combination, with two stationary pillars, of two keys pivoted between the said pillars and provided with overlapping portions, a spring secured to the lower pillar and engaging with the upper key and normally holding both keys raised, a spring secured to the upper pillar

and engaging with the lower key and depressing it when the upper key is depressed, and means for raising the lower key against the pressure of the last said spring without raising the upper key.

13. In a wind instrument, the combination, with two stationary pillars, of two keys pivoted side by side between the said pillars and provided with overlapping lugs, a spring secured to the lower pillar and engaging with the upper key and normally holding both keys raised, a spring secured to the upper pillar and engaging with the lower key and closing it when the upper key is depressed, and a lever pivoted independent of the said keys and affording a means for raising the lower key without raising the upper key.

14. In a wind instrument, the combination, with two stationary pillars, of two keys

pivoted between the said pillars and provided with overlapping portions, a spring secured to the lower pillar and engaging with the upper key and normally holding both keys raised, a spring secured to the upper pillar and engaging with the lower key and depressing it when the upper key is depressed, said springs being arranged underneath and at different distances from the axis of the said keys, and means for raising the lower key against the pressure of the last said spring without raising the upper key.

In testimony whereof I have affixed my signature in the presence of two witnesses.

HERBERT W. T. JENNER.

Witnesses:

JOHN L. FLETCHER,

M. R. MULLEN.