

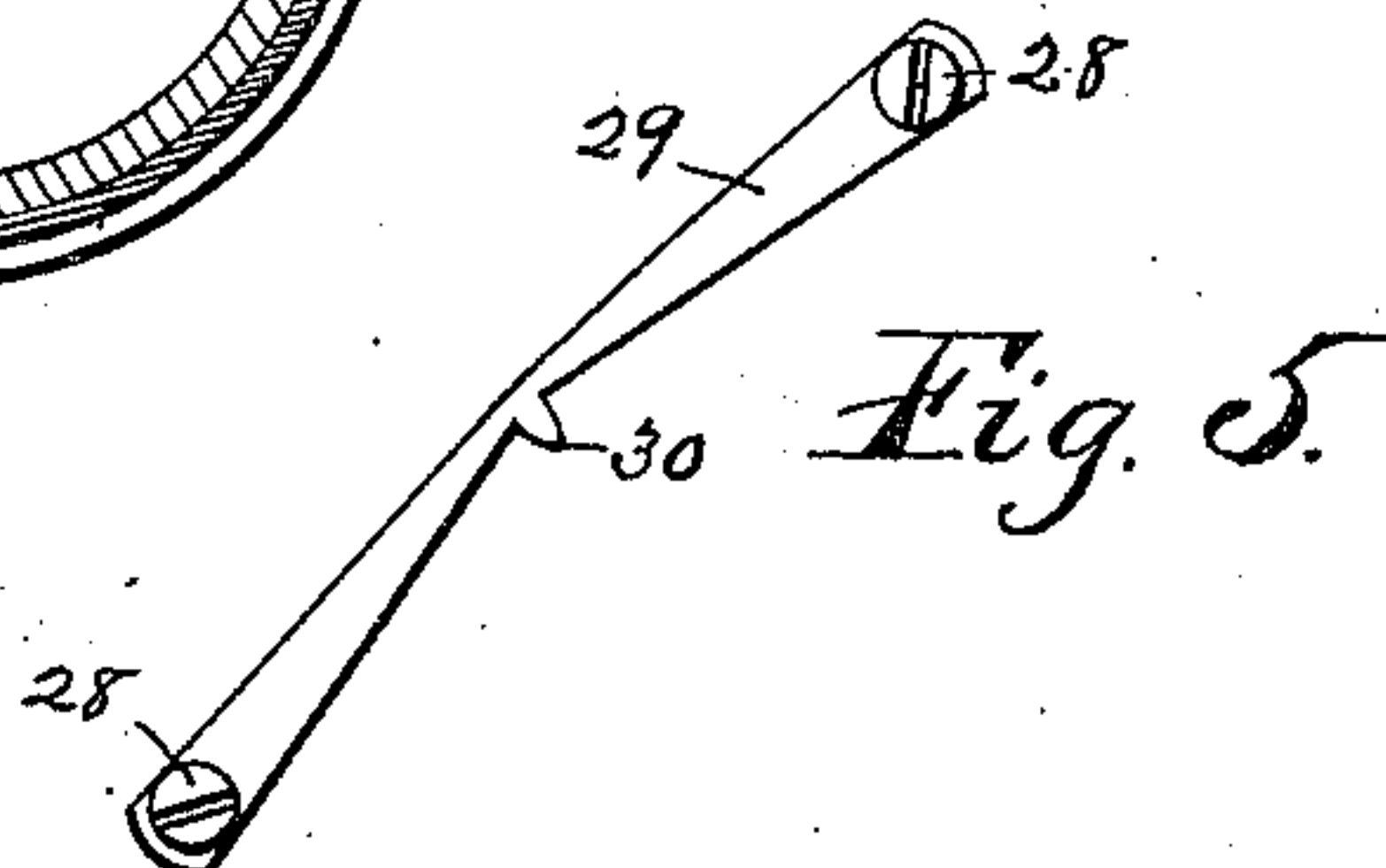
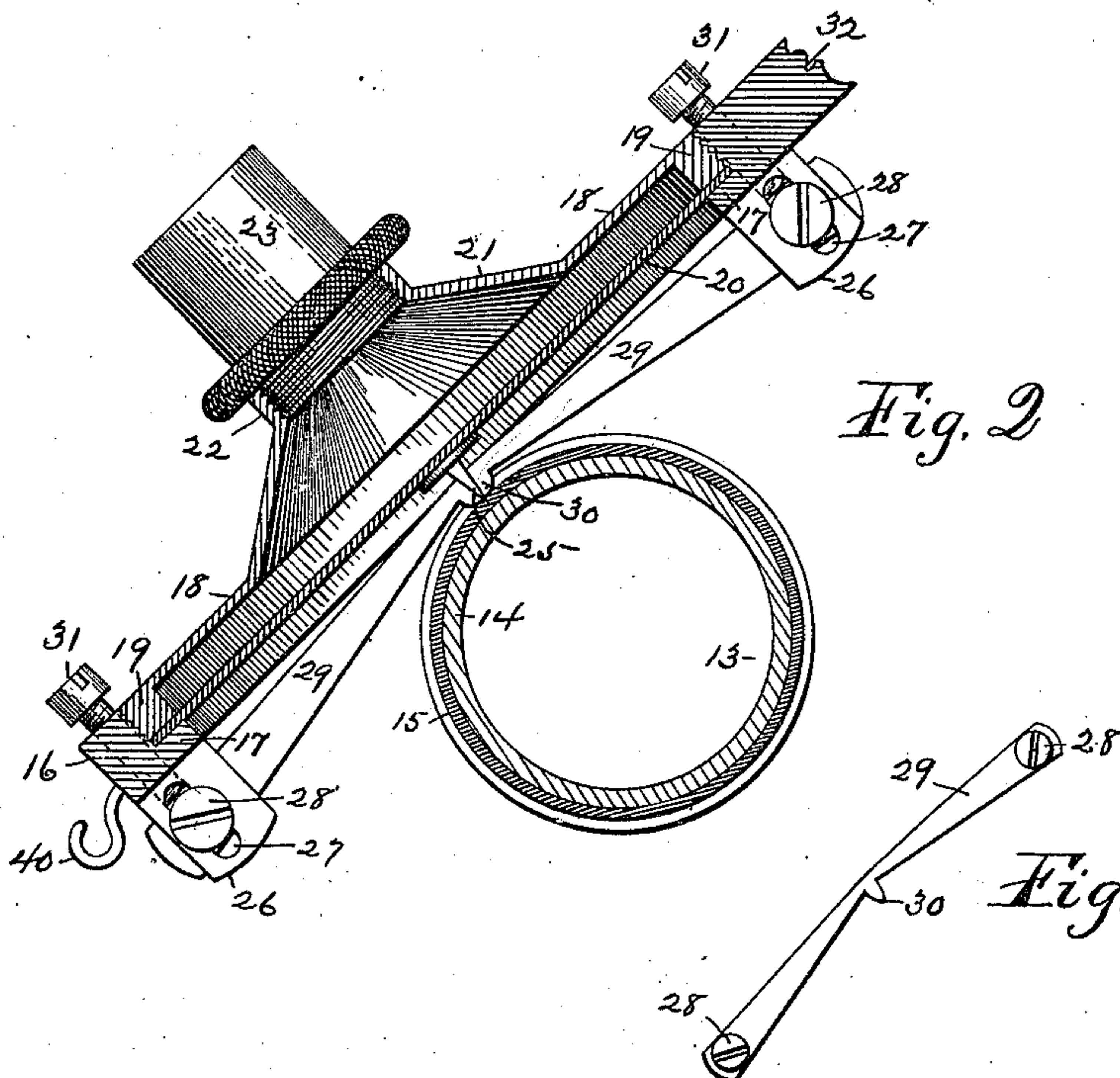
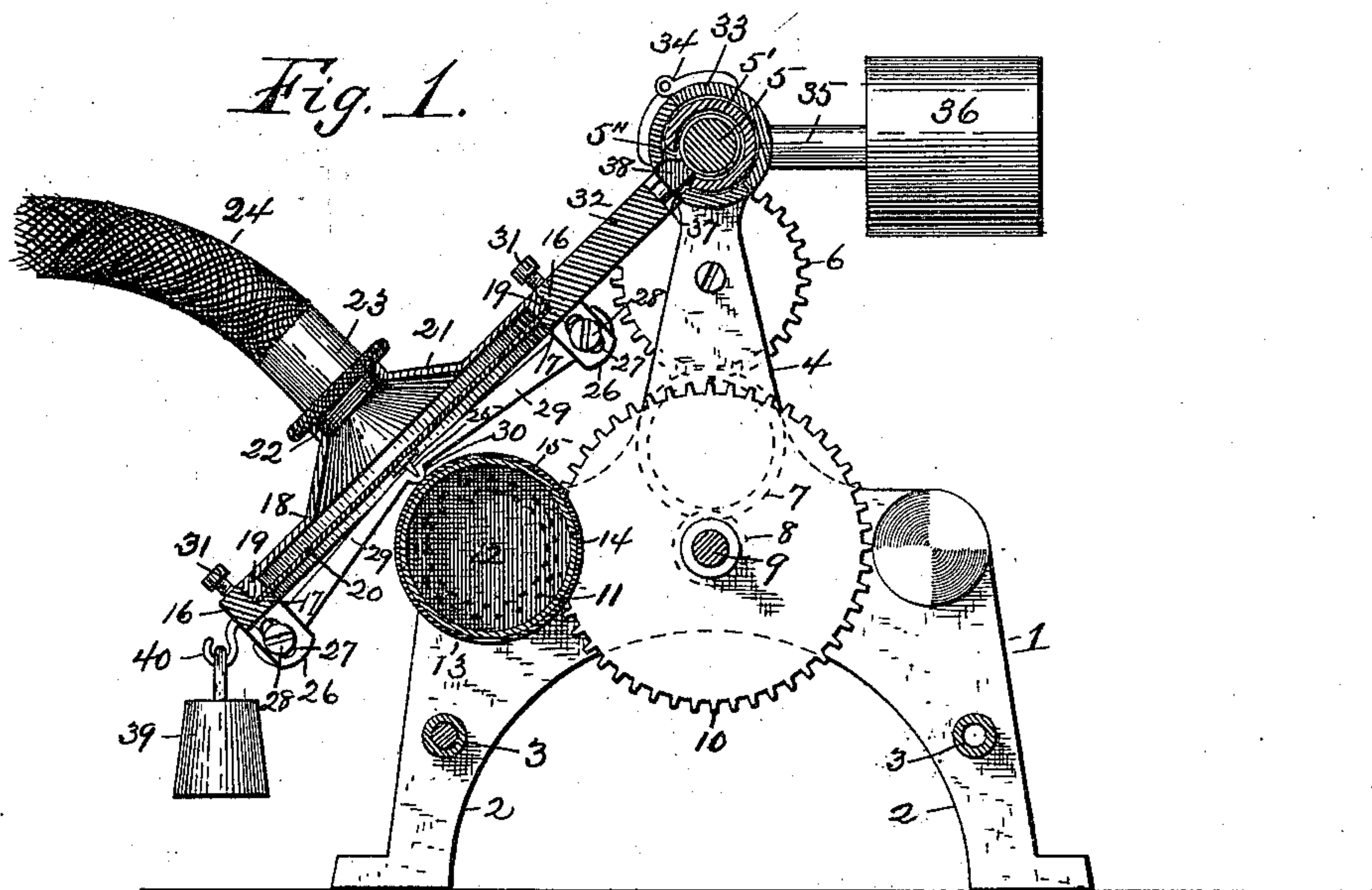
(No Model.)

2 Sheets—Sheet 1.

D. W. BROWN.
METHOD OF PREPARING GRAPHOPHONE TABLETS.

No. 408,649.

Patented Aug. 6, 1889.



WITNESSES:

Percy C. Bowen.
F. T. Chapman.

INVENTOR,

David Wolfe Brown,

By *Joseph Lyons.*
Attorney

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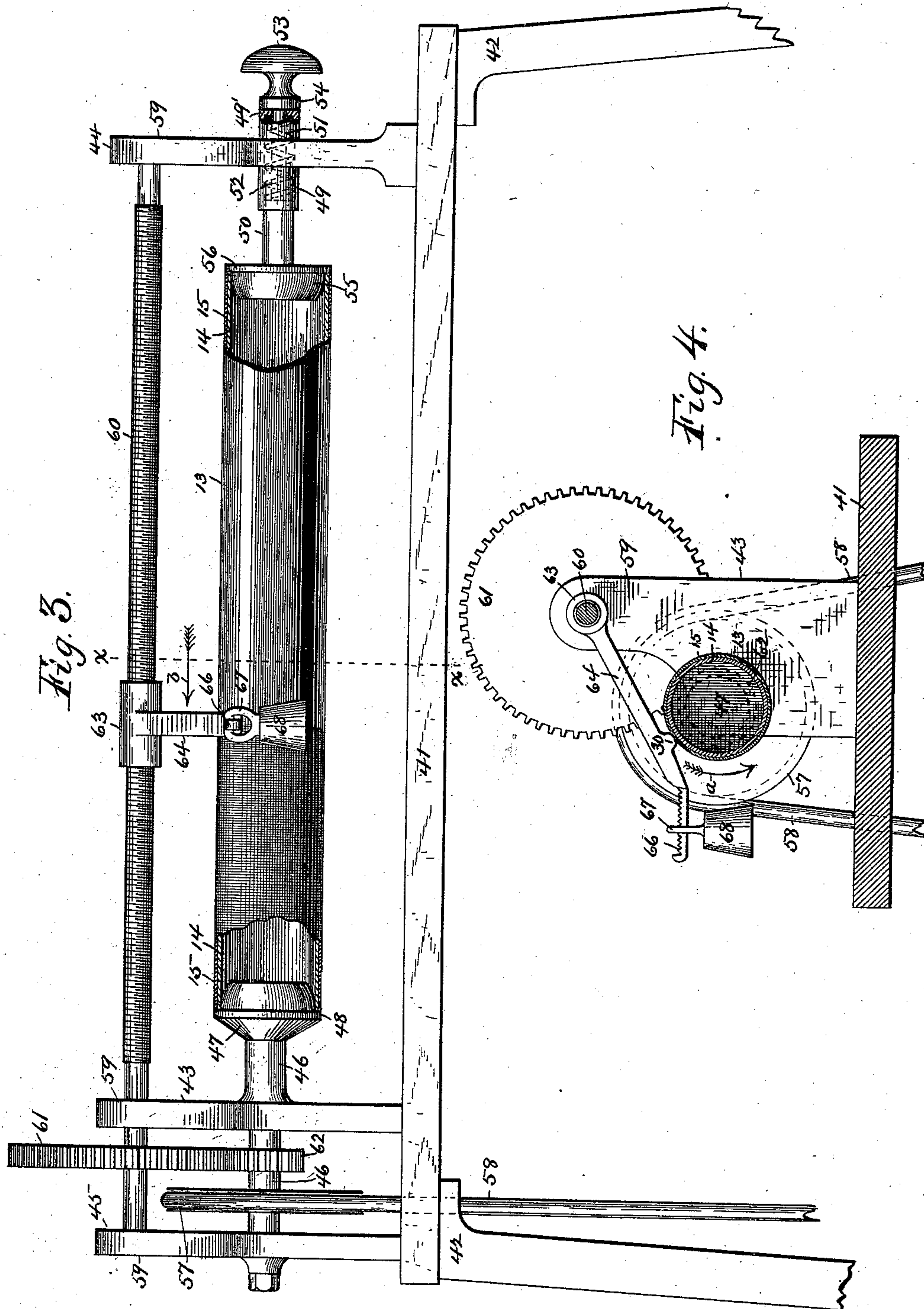
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UNITED STATES PATENT OFFICE.

DAVID WOLFE BROWN, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF REPREPARING GRAPHOPHONE-TABLETS.

SPECIFICATION forming part of Letters Patent No. 408,649, dated August 6, 1889.

Application filed April 27, 1889. Serial No. 308,779. (No model.)

To all whom it may concern:

Be it known that I, DAVID WOLFE BROWN, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Repreparing Graphophone-Tablets, of which the following is a specification.

This invention has reference to the art of obliterating sound-records from record-tablets of phonographs or graphophones or similar sound-recording apparatus in such manner as will permit a new record to be made upon the same tablet with the same distinctness as upon a new tablet not before used. In sound-recording machines it is the usual practice to indent or engrave a sound-record on a moving cylinder or other surface, coated with a waxy substance, by means of a stylus moved by a diaphragm which is vibrated by sound-waves directed against the same, to form a continuous groove in the waxy surface. The groove is of varying depth, in accordance with the vibration of the diaphragm and the stylus carried thereby, and this variation in depth forms the record which, by suitable means, may be made to reproduce the recorded sound. In some instances the record on the tablet is of no further value after being reproduced and written out, as is now customary in the practical use of the machines, and the said cylinders are then worthless, and are usually thrown away unless they are preserved as permanent records. As the capacity of each cylinder is quite limited in machines constructed for practical use, a large number of such cylinders must be used daily in the ordinary course of business, and as only new or fresh cylinders are used the expense is considerable. It has been proposed to reprepare the tablet-surface, after it has received one record and has been used for reproduction, by cutting or shaving off the waxy substance to a depth equal to that of the record-impressions; but the removal of a large portion of the record-receiving material renders it impracticable to repeat this process to again reprepare it for still another record, unless the coating is purposely made of extra thickness, since the repeated cuttings will so reduce the thickness of the coat-

ing that the recording-stylus will cut into the body of the cylinder and form an imperfect record. In addition thereto, such process requires special machinery and a nice adjustment of the cutting apparatus to prevent waste.

It is the object of my invention to obliterate the record and reprepare the cylinder-surface for a fresh record without reducing the mass of the coating forming such surface, so that a single cylinder may be used many times before it becomes useless.

According to my process I apply in any suitable manner, and with or without specially-constructed machinery, sufficient pressure on the surface containing the record to flatten the ridges between the grooves and to fill the latter with the waxy material of such ridges until the entire surface is perfectly smooth and in condition to receive a new record.

In practicing my process I may employ a great variety of instrumentalities, and while I have shown in the accompanying drawings, forming part of this specification, two forms of apparatus for illustrating the process, it is to be distinctly understood that I am in no wise limited to such devices in the practice thereof.

In the drawings, Figure 1 is a vertical cross-section through a portion of a sound-recording instrument, showing means applied thereto for practicing my process. Fig. 2 is a vertical cross-section of a record-cylinder and recorder, with the parts in position for simultaneously obliterating an old and producing a new record. Fig. 3 is a front elevation of a machine for practicing my process, showing a cylinder in position, with the ends in section and with the record thereon partially obliterated. Fig. 4 is a vertical cross-section on the line $x x$ of the machine shown in Fig. 3, and Fig. 5 is a detail view of the bridge as usually constructed for limiting the depth to which the stylus enters the cylinder-coating.

Like numerals of reference indicate like parts throughout the drawings.

Referring now more particularly to Figs. 1 and 2 of the drawings, there is shown in Fig. 1 one end standard 1 of the frame of a sound-recording apparatus of the type known as "graphophones." This standard has formed

on it two legs 2 2, to which are secured tie-bars 3 3, extending to the other standard of the frame, which is not here shown.

The standard 1 is provided with a central upward extension 4, in the top of which are formed bearings for a horizontal screw-threaded shaft 5, and this shaft is surrounded by a sleeve 5', open or slotted along one side, as shown at 5''. The shaft 5 is driven at a reduced speed by a train of gear on the outer side of the standard, and designated by the numerals 6 7 8, the latter gear being a pinion (indicated by dotted lines) on the main drive-shaft 9, which is journaled centrally in the standard 1, as indicated. On the inner side of the standard the shaft 9 carries a gear-wheel 10, which meshes with a pinion 11 (indicated in dotted lines) on a shaft, (not shown,) terminating in a head 12, which fits into one end and forms one of the supports of a record-cylinder 13. The gearing between the drive-shaft 9, the shaft 5, and the cylinder-shaft is so proportioned that the shaft 5 will carry a recorder forward a distance equal to the space between the screw-threads on said shaft at each revolution of the record-cylinder.

The cylinder 13 is constructed of a paper body 14 and a coating 15 of a waxy substance; but for the purposes of my invention the composition of such coating is immaterial.

The recorder shown in Figs. 1 and 2 consists, essentially, of an annular frame or ring 16, recessed on one side to form an inwardly-projecting annular flange 17. The recess above the flange is screw-threaded to receive the screw-thread edge of a shell 18, as shown. The edge of this shell is thickened on one side, as shown at 19, and on its outer surface or periphery are cut the screw-threads before mentioned. The edge 19 is of such thickness that it will clamp the edge of a diaphragm 20 to the flange 17 when the upper surface of the shell 18 is flush with the surface of the frame 16. The central portion of the shell is formed into a cone 21, and the outer portions are flat, as shown. The cone 21 terminates in a short neck 22, provided with an internal screw-thread, and into this neck is screwed the shank 23 of a flexible tube 24, provided with a flaring mouth (not shown) for collecting the sound-waves to be recorded. The diaphragm 20 carries on its under side at the center a pointed stylus 25, constructed in the usual manner, to enter and either cut or indent a groove in the coating 15 of the cylinder 13, and to move with the diaphragm when the latter is subjected to the action of sound-waves. At opposite points on the under side of the frame 16 are two downwardly-projecting posts 26 26, each provided with a longitudinal slot 27, through which passes a screw 28. The screws 28 enter suitable nuts in the ends of a bridge 29, the latter extending between the posts 26, below the diaphragm 20, and diminishing in width from the ends toward the center, where it is pro-

vided, adjacent to the stylus 25, with an enlargement or lug 30. Passing through nuts in the frame 16 are screws 31, with their lower ends in contact with the upper surface of the bridge 29 at one side of the posts 26, and serving as a convenient means for regulating or adjusting the distance of the bridge 29 from the diaphragm 20.

At one side of the frame 16 is an arm 32, on the outer end of which is formed a cylindrical carriage 33, so constructed that it will support the recorder in an inclined position, as shown. This carriage is split longitudinally, and the two parts are hinged together at one side, as shown at 34, so that the carriage-cylinder may be opened and placed on the sleeve 5', surrounding the shaft 5 at any point desired, and when closed the said carriage will embrace such sleeve, but loosely enough to be moved longitudinally thereon. The hinged section of the carriage is provided with an arm 35, on the end of which is a weight 36, which acts as a counter-weight for the recorder-frame, and also serves to maintain the two parts of the carriage-cylinder in a closed position around the sleeve 5'.

Secured to the arm 32 and projecting into the interior of the carriage-cylinder 33, through a slot 37 therein, is a block 38, with its inner face provided with screw-threads of the same pitch as those on the shaft 5, and when the carriage is closed on the sleeve 5' the block 38 projects through the slot or opening 5'' therein, and the screw-threads on its face engage with those on the shaft 5.

The operation of the sound-recording mechanism is so well known as to require but brief mention here. When the drive-shaft 9 is rotated, it imparts motion to the screw-shaft 5 and to the record-cylinder, as before explained, and the rotation of the shaft 5, it will be understood, causes the carriage and recorder supported thereby to travel longitudinally over the revolving record-cylinder.

In the ordinary operation the bridge 29 is so adjusted that the point of the stylus 25 is below the lug 30 thereon, as shown in Fig. 2, so that the stylus will enter the cylinder-coating 15 a limited distance, and as the cylinder revolves and the recorder moves longitudinally thereon a spiral groove is cut in the coating by the said stylus. Sound-waves entering the tube 24 act on the diaphragm to vibrate it to and from the cylinder, and the stylus, moving with the diaphragm, cuts the groove deep or shallow, according to the amplitude of the vibrations of the diaphragm, and thereby forms a record in the bottom of the groove, from which the sound-waves can be reproduced in a manner and by means well understood.

In recording sounds by means of the apparatus described the lug 30 on the bridge-piece 29 only serves the purpose of defining the medium depth of the record-groove produced by the stylus. It bears very lightly upon the record-surface, and the counterbalancing-

weight 36 is intended and specially constructed to reduce the pressure of the said lug upon the cylinder to a minimum.

It is customary in using the sound recording and reproducing apparatus, particularly in the transaction of business, to speak into the mouth-piece of the recorder as the cylinder is rotated, and thus produce the record on the cylinder. The words are then reproduced by the usual mechanism to an assistant and written out. The cylinder-records have then no further value, except for the preservation of a permanent record, and the cylinders are ordinarily destroyed or thrown away, and, since in the usual course of business many cylinders are used daily, it will be seen that the cost of the necessary supply of cylinders is considerable.

It is the object of my invention, as before stated, to reprepare the surface of the cylinder by obliterating the record without removing any of the material of the coating, so that the cylinders may be used many times, and the expense of a supply of new cylinders whenever it is desirable to use the phonograph or graphophone be saved.

I will now proceed to describe the manner in which I may practice my process with the apparatus described with reference to Figs. 1 and 2 of the drawings, and therefore without the aid of specially-constructed machinery.

I first adjust the bridge 29 by loosening the screws 28 and turning the screws 31 until the lug 30 projects below the point of the stylus, as shown in Fig. 1, and I then fasten the bridge 29 in such adjusted position by tightening said screws 28, so that the stylus is held out of contact with the cylinder-coating. I then place the recorder with the lug 30 at the beginning of an old record on a cylinder and apply pressure to the recorder either by the direct application of the hand or by a weight 39 hung from a hook 40 on the frame 16 opposite the arm 32. I then rotate the screw-shaft 5 and the cylinder in the manner before described to carry the lug 30 over the surface of the coating containing the record. This coating, it has been explained, has formed in it by the stylus a spiral groove of varying depth and the coating between the spirals of the groove forms an intervening ridge, and as the lug 30 rides over such surface the additional weight on the recorder will cause said lug to force the material forming the ridge into the groove and thus render the surface smooth, solid, and even, and in good condition for the reception of a fresh record. As the amount cut away by the stylus in forming a record is but a very small proportion of the mass of the coating, it will be evident that the obliteration of the record by pressure applied to said coating may be repeated many times before the coating becomes too thin for further practical use. When the bridge 29 is in the position shown in Fig. 2—that is, with the point of the stylus projecting beyond the lug

30—then the recorder is adjusted to engrave the record on the cylinder in the manner before stated. With the parts in this position I may obliterate the record and reprepare the surface of the cylinder-coating immediately in advance of and simultaneously with the production of a fresh record by attaching a weight to the recorder or applying pressure thereto by the direct application of the hand.

When practicing my process, in the manner hereinbefore set forth, to obliterate a record without removing the cylinder from the recording apparatus, I preferably form the lug 30 on the bar 29 with a larger and more rounded bearing-face than that of the lug usually employed, for the sole purpose of restricting the depth to which the stylus shall enter the cylinder-coating. In Fig. 5 the lug 30 is shown with the comparatively narrow bearing-face employed when it is used only as a limiting-stop for the stylus, and in Figs. 1 and 2 the lug is shown with a larger and more rounded bearing-face, so that it may be used to reduce the cylinder-coating containing a record to a smooth, solid, and uniform surface without cutting or grooving such surface when weight or pressure is applied to the recorder, as would be the case with the narrow lug shown in Fig. 5, while at the same time it in no wise interferes with the normal operation of the recorder and acts equally well as a limiting-stop for the stylus.

Referring now more particularly to Figs. 3 and 4, there is shown a specially-organized machine for the purpose of obliterating the record and reparing the surface of the record-cylinders. In this machine there is a table or bench 41, supported at each end on legs 42. On the top of the table and near each end thereof are standards 43 44, and adjacent to the standard 43 is another and similar standard 45. Journaled in bearings in the standards 43 and 45 is a drive-shaft 46, extending through and beyond the standard 43 and terminating in a head 47, provided with a peripheral flange 48, beyond which it is frusto-conoidal in shape, as shown. In the standard 44, and in line with the shaft 46, is a horizontal sleeve 49, with an interior flange 49' at one end, as indicated, and through this sleeve extends a spindle 50, reduced in size for a portion of its length within the sleeve, as indicated by dotted lines at 51, and there surrounded by a spring 52, also indicated by dotted lines. The outer end of the reduced portion 51 terminates in a knob 53, having a shoulder 54, which normally abuts against the end of the sleeve 49. It will now be seen that by grasping the knob 53 the spindle 50 may be moved longitudinally in the sleeve 49, and such movement will compress the spring 52, which is confined between the flange 49' and the shoulder formed by the reduced portion 51 of the spindle, and that when the knob is released the reaction of the spring will return the spindle to its normal position. The spindle 50 has at the end opposite the knob a head

55, on which is formed an annular flange 56, beyond which the head projects, and is frusto-conoidal in shape, as shown. The heads 47 and 55 beyond the flanges are of such diameter that they will readily enter the ends of the record-cylinder 13 until the edges of the latter abut against the flanges 48 and 56 on said heads. It will now be evident that if the spindle 50 be moved against the action of the spring 52 a tablet-cylinder may be placed with one end over the head 47 against the flange 48, and brought with the other end in line with the said spindle, after which the latter may be released and the spring will move the head 55 into the cylinder end until it abuts against the flange 56. The shaft 46 is provided with a pulley 57, around which passes a belt 58, coming from any suitable source of power. If now the shaft be rotated, the cylinder 13 and spindle 50 will rotate with it, as the spring 52 holds the ends of the cylinder and the flanges on the heads in good frictional contact. Each of the standards 43, 44, and 45 has an upward projection 59, in which is formed a bearing for a shaft 60. This shaft is screw-threaded between the standards 43 and 44 and extends through the latter to the standard 45, where it has secured to it a gear-wheel 61, which meshes with and receives motion from a pinion 62 on the shaft 46. On the screw-threaded portion of the shaft 60 is a cylindrical sleeve 63, internally threaded for the passage therethrough of said shaft and provided on one side with a projecting arm 64, on the under side of which latter is a rounded lug 30, similar in all respects to the lug on the bridge 29, used in the apparatus described with reference to Figs. 1 and 2, and this lug is at such distance from the sleeve that it will normally rest on the surface of the record-cylinder 13, as shown in Fig. 4. The arm 64 terminates in an extension 66 at an angle to the main portion, so as to be substantially horizontal when the arm is in operative relation to the record-cylinder, and this extension is notched on the upper surface, as shown, to receive the eye 67 of a weight 68 and hold the latter at any desired point within the length of said extension. It will now be understood that if a cylinder on which a record has been formed be placed between the heads 47 and 55 in the manner before explained, with the lug 30 bearing on the cylinder-coating at the beginning of the record, then on rotating the shaft 46 in the direction of the arrow *a*, Fig. 4, the screw-shaft 60 will be rotated by the pinion 62 and gear-wheel 61 and move the sleeve 63 in the direction of the arrow *b*, Fig. 3. The weight 68 having been adjusted on the extension 66 of the arm 64 to cause the lug to bear with the desired force on the cylinder-surface, it will be seen that the lug, traveling in a horizontal direction over the revolving cylinder, will flatten the ridges and fill up the grooves in the cylinder-coating and render it smooth, solid, and even, and in readiness for the formation of a new record, in the same manner as

has been described with reference to Figs. 1 and 2.

In Fig. 3 the tablet-cylinder surface is shown on the right-hand side of the arm 64 smooth and solid—*i. e.*, with the old record obliterated—while on the left-hand side of the arm 64 the cylinder-surface is represented with the old record still on the same, and it will now be understood that Fig. 3 represents the apparatus in the condition when the arm 64 has traveled from one end of the machine to the point where it is shown.

In the practice of my invention I am not confined to the use of either of the two forms of apparatus shown, but may use any instrumentality by which sufficient pressure can be brought to bear upon the record to obliterate the same. With either of the devices herein described the complete obliteration of a graphophone record can be effected in a few minutes, and this can be done by persons who need not be skilled or specially trained for the work.

As has been stated above, the old record on a tablet may be obliterated by my process while a new record is being made, in which case no time whatever is specially consumed in the reparation of the old tablet.

The cylindrical nut-sleeve 63 (shown in Figs. 3 and 4) may be constructed in two halves, joined in the manner described with reference to the carriage 33, or in any other suitable manner.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. The herein-described method of obliterating an engraved or indented sound-record from a waxy or other plastic surface, which consists in forcing the ridges of material between the record-grooves into the said grooves, substantially as described.

2. The herein-described method of obliterating an engraved or indented sound-record from a waxy or other plastic surface, which consists in forcing the ridges of material between the record-grooves into the said grooves by external mechanical pressure and solidifying and smoothing the surface by such pressure, substantially as described.

3. The herein-described method of reparing a graphophone or phonograph tablet having a sound-record in plastic material for the reception of a new record, which consists in obliterating the old record by forcing the material of the ridges which separate the record-grooves into such grooves by the forcible application thereto of a tool, substantially as described.

4. The herein-described method of reparing a cylindrical graphophone or phonograph tablet having a grooved sound-record upon a surface of plastic material for the reception of a new sound-record, which consists in rotating the tablet and feeding a pressure-tool bearing upon a portion of the surface of the tablet along the same, substantially as described.

5 5. The method of recording sounds upon a plastic surface having a grooved sound-record already formed thereon, which consists in successively obliterating the successive portions of the old record by forcing the ridges of material between the record-grooves into the said grooves, and simultaneously therewith producing a new record upon the repaired portion of the surface, substantially as
10 described.

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

DAVID WOLFE BROWN.

Witnesses:

JOSEPH LYONS,
F. T. CHAPMAN.