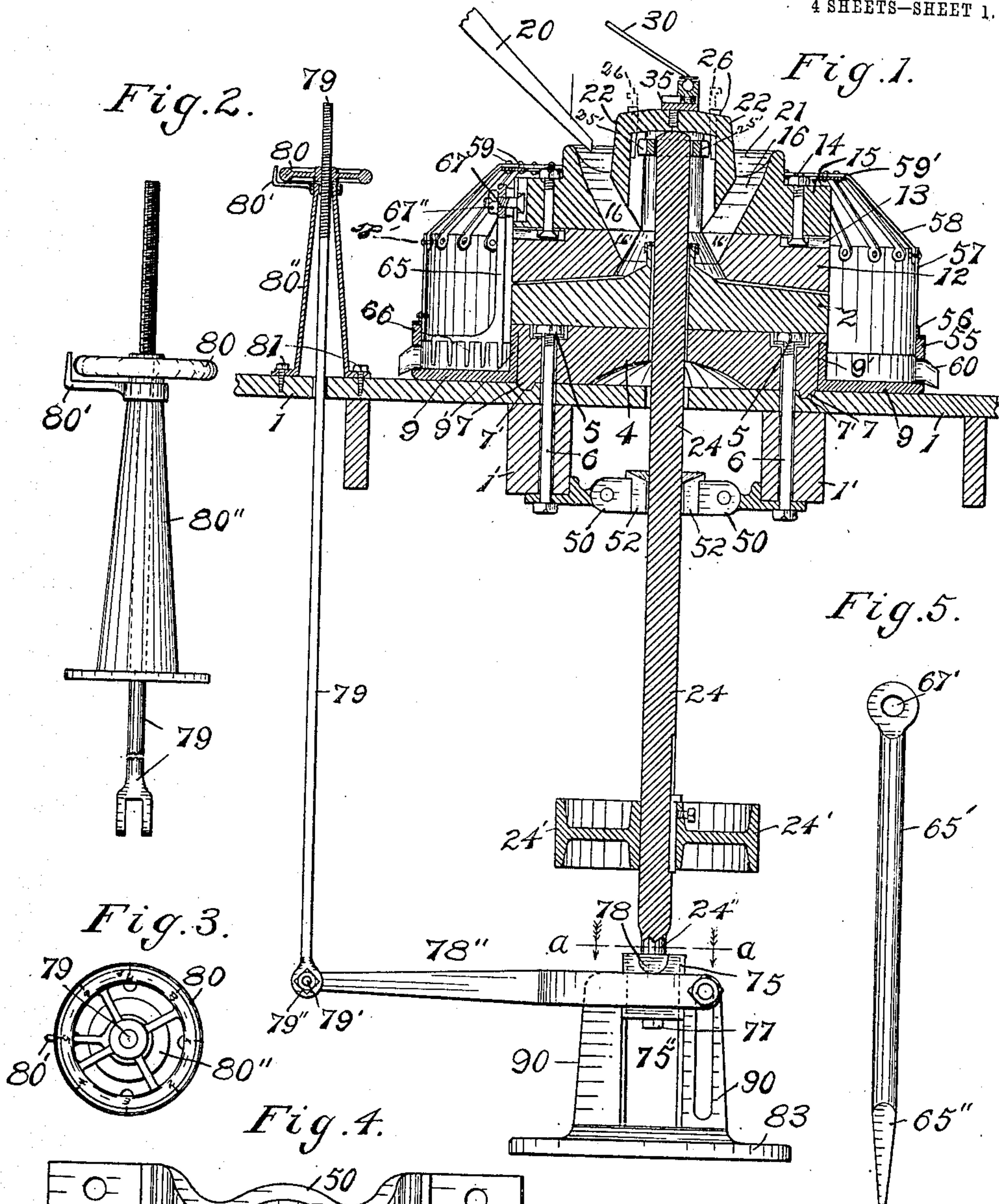


A. TREGONING.
ORE, CEMENT, AND GENERAL PULVERIZING MILL.
APPLICATION FILED OCT. 10, 1906.

913,176.

Patented Feb. 23, 1909.

4 SHEETS—SHEET 1.

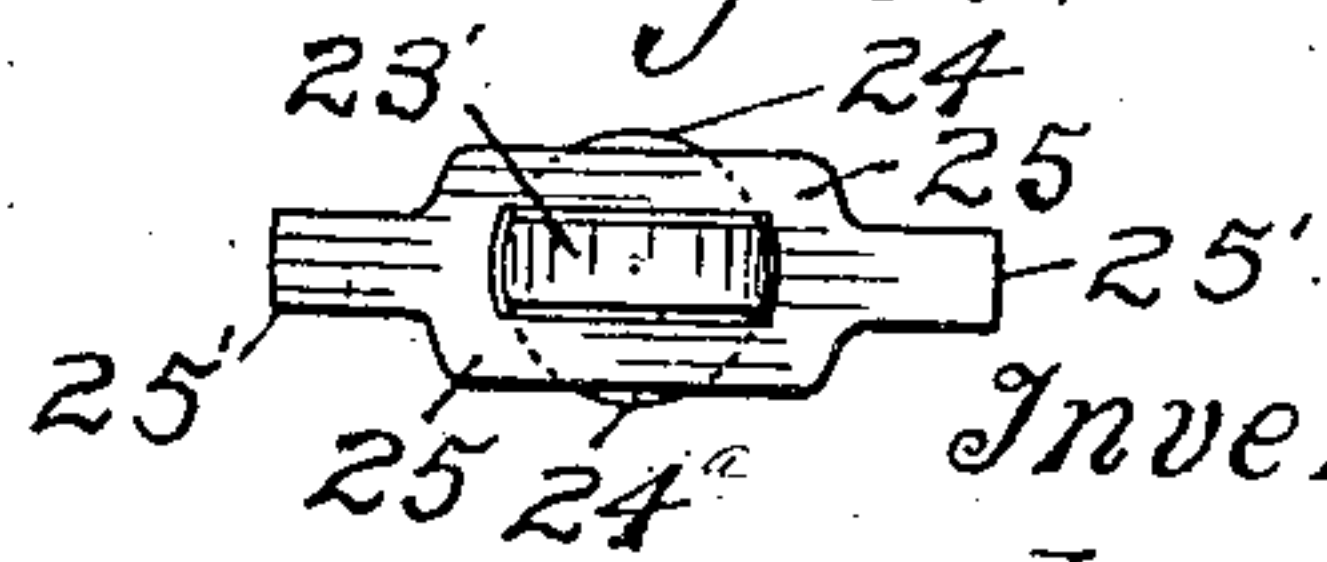


Witnesses: 50" 50' 50"

A. N. Hunt.

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Fig. 6.



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4 SHEETS—SHEET 2.

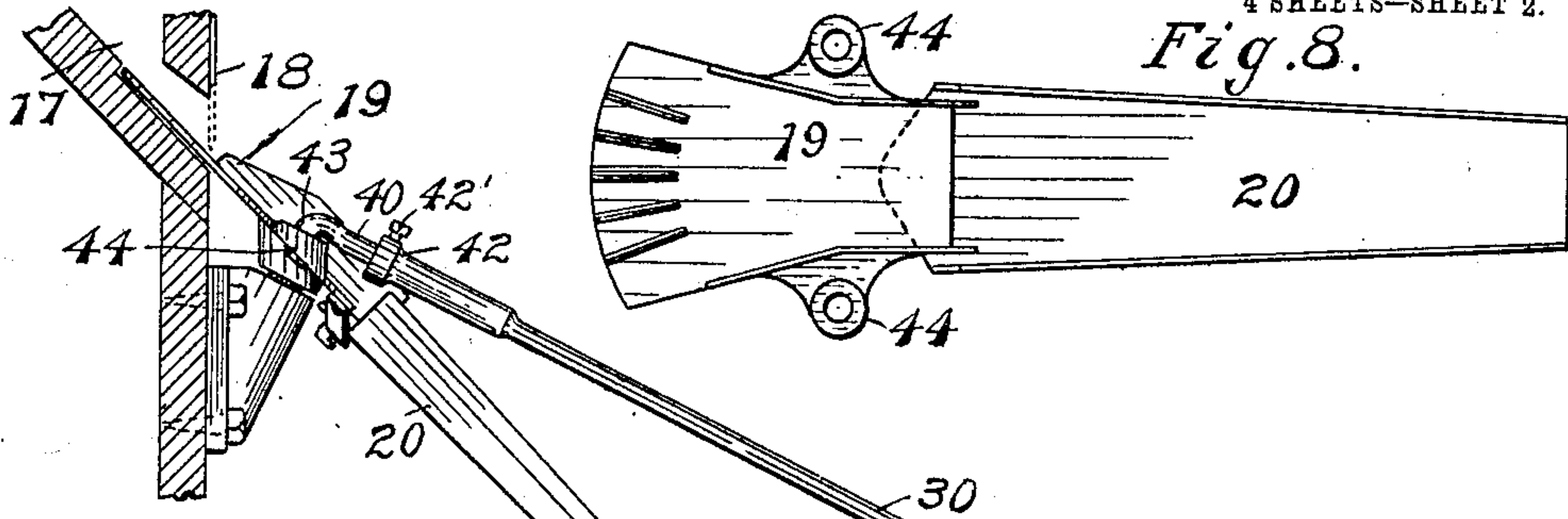


Fig. 8.

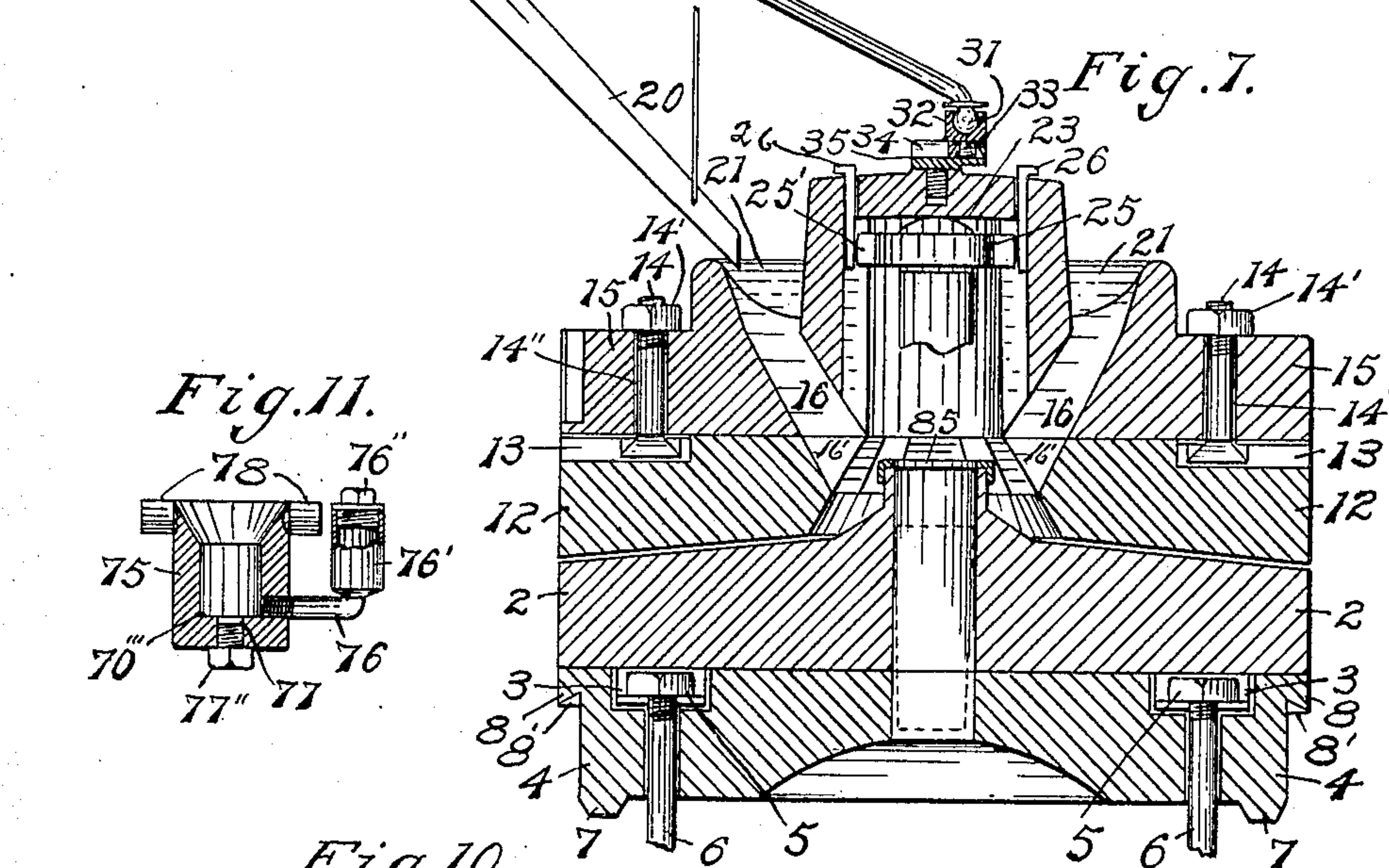


Fig. 7.

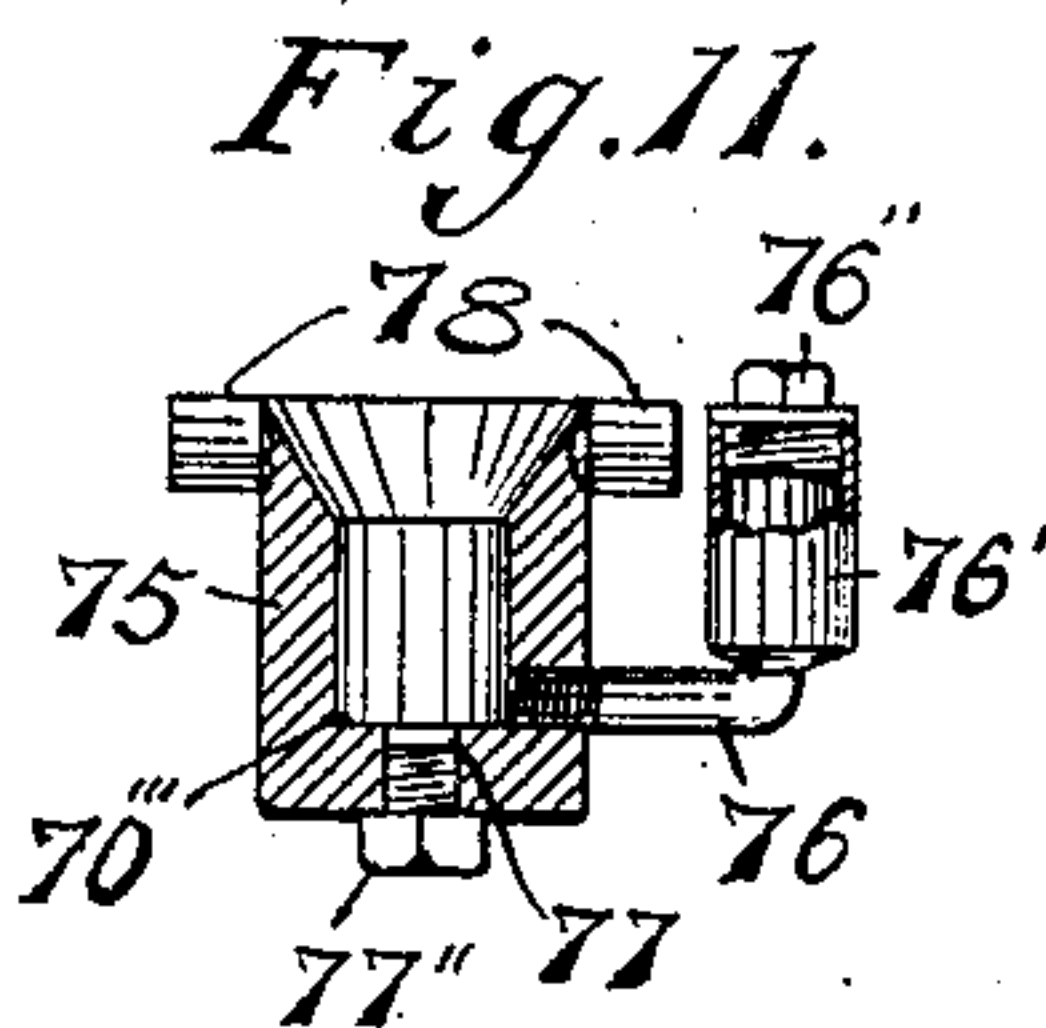


Fig. 11.

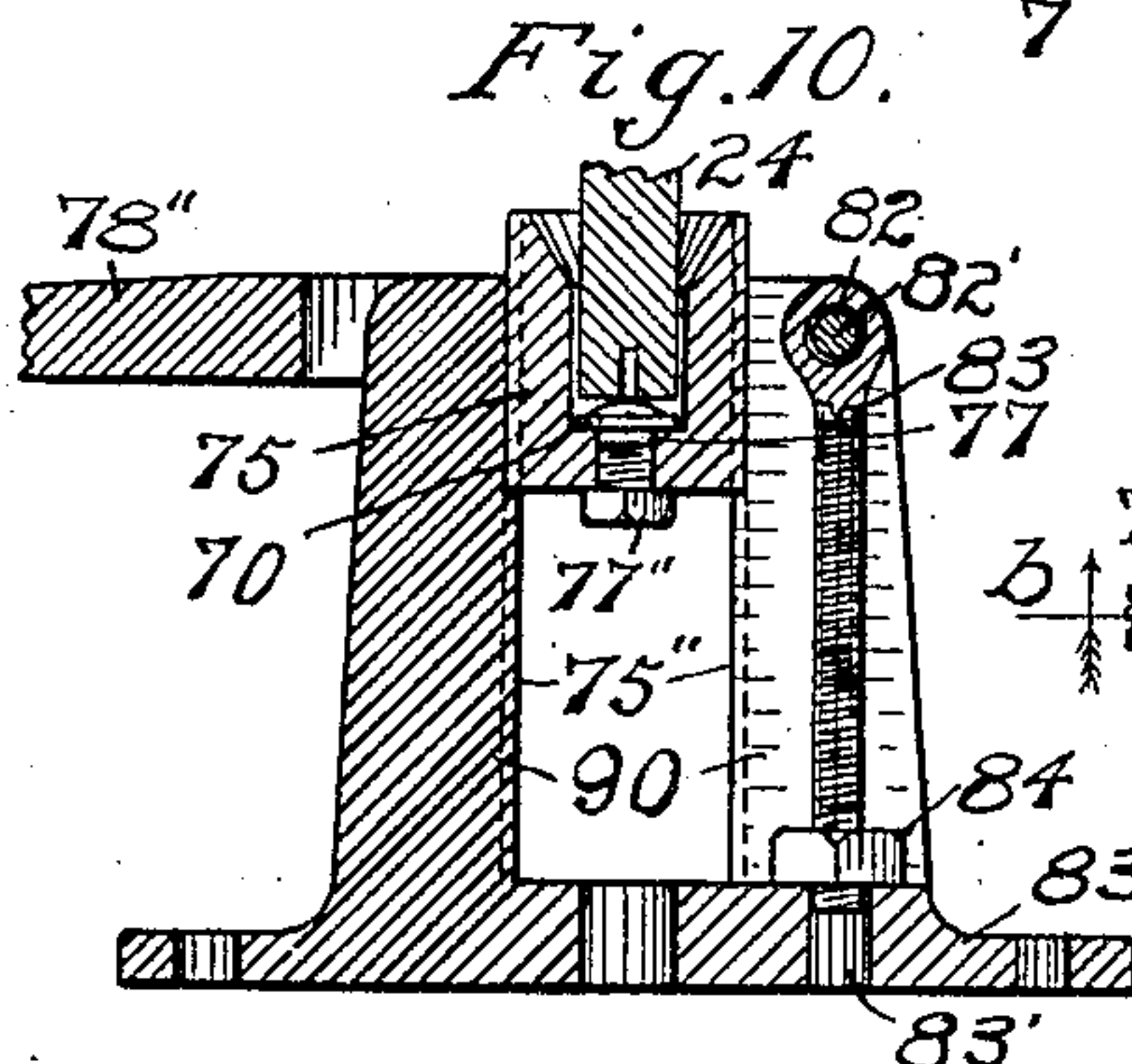


Fig. 10.

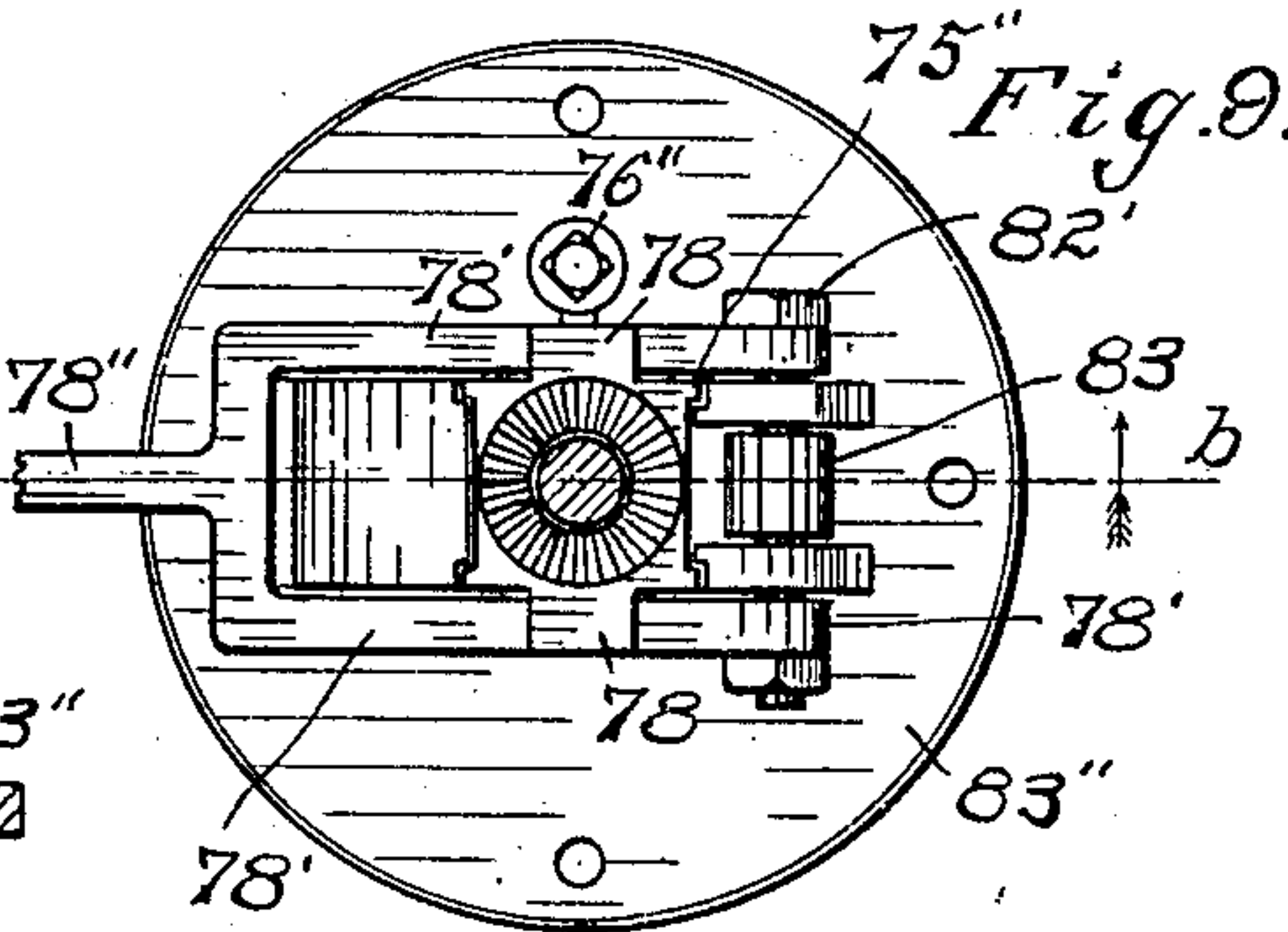


Fig. 9.

Fig. 12.
70"
70
Witnesses:
H. H. Hunt.
E. M. Conner.

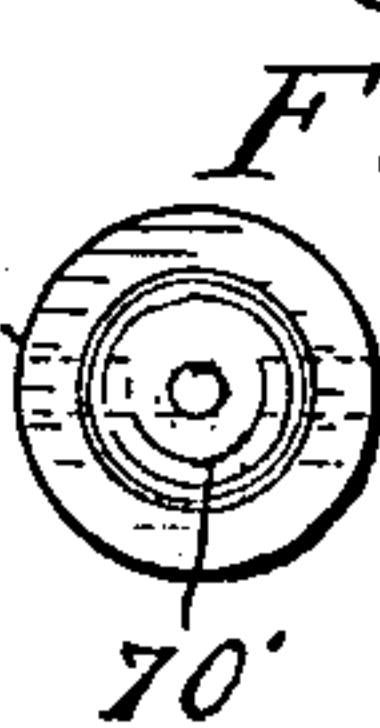


Fig. 13.

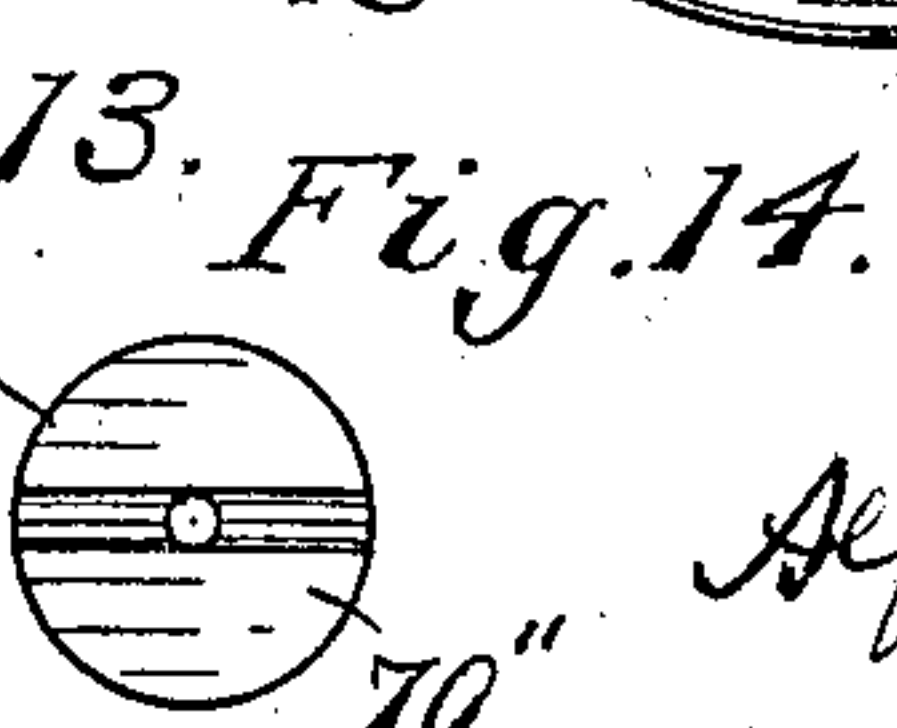


Fig. 14.

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4 SHEETS—SHEET 3,

Fig. 15.

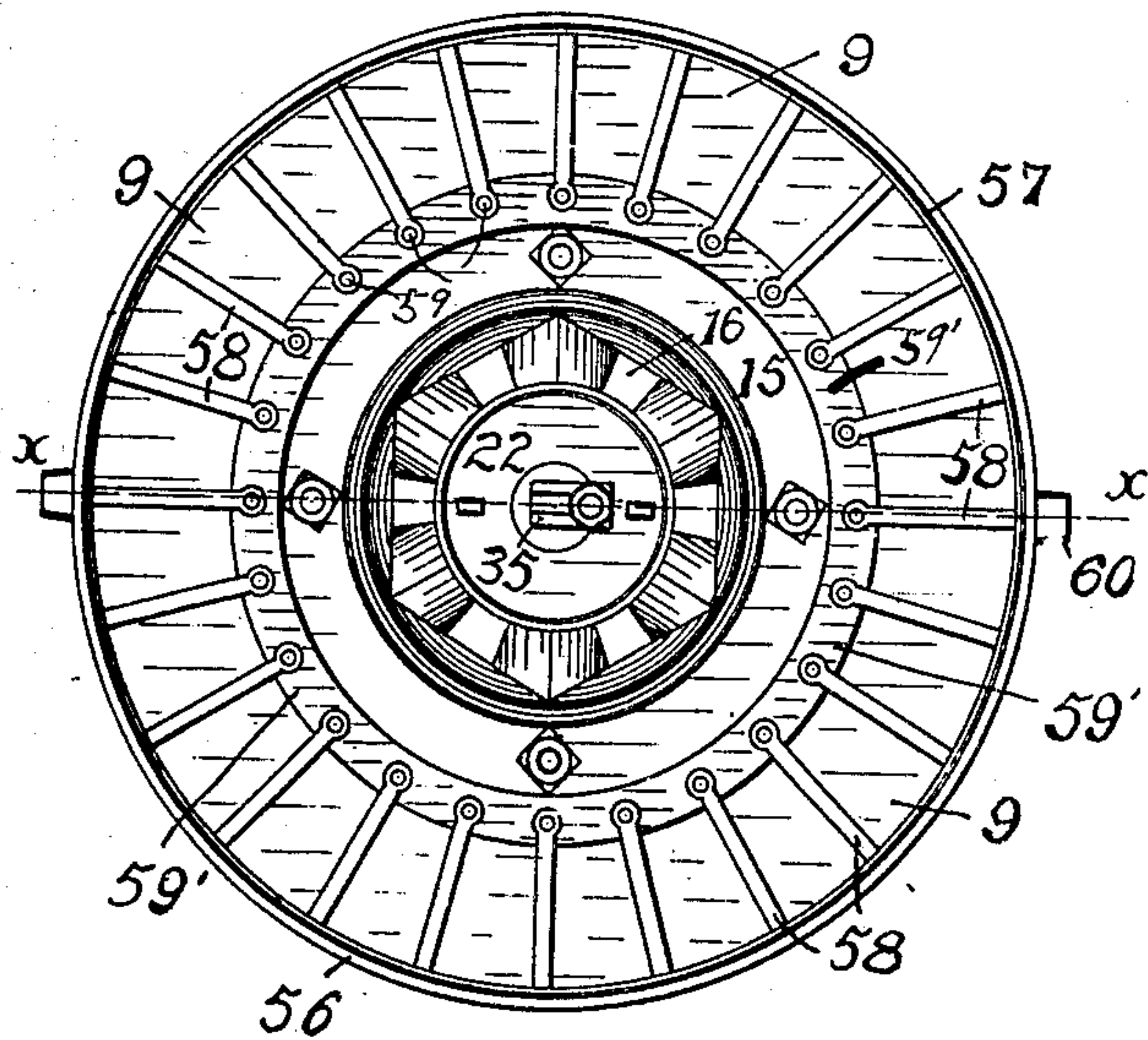


Fig. 16.

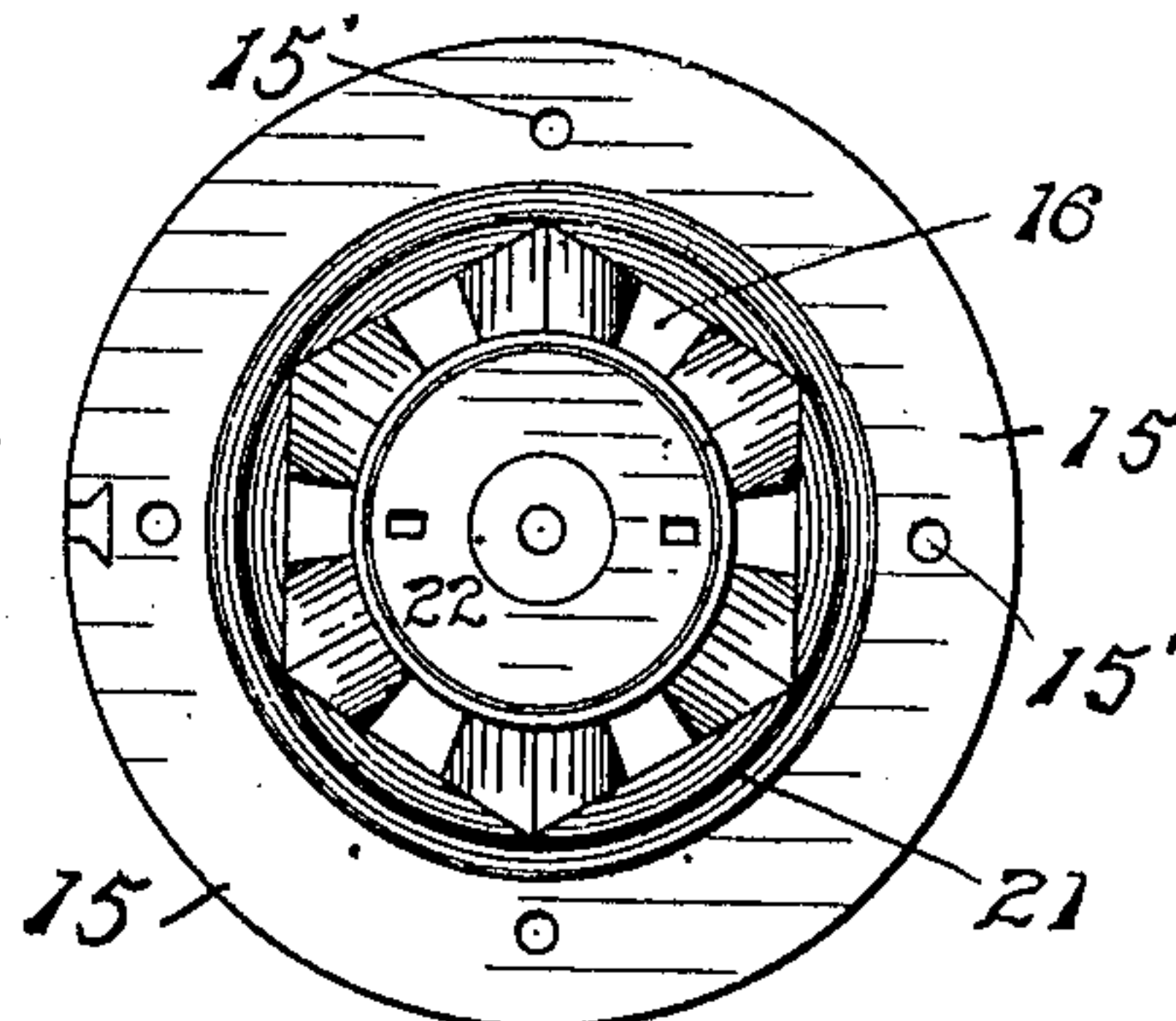


Fig. 18.

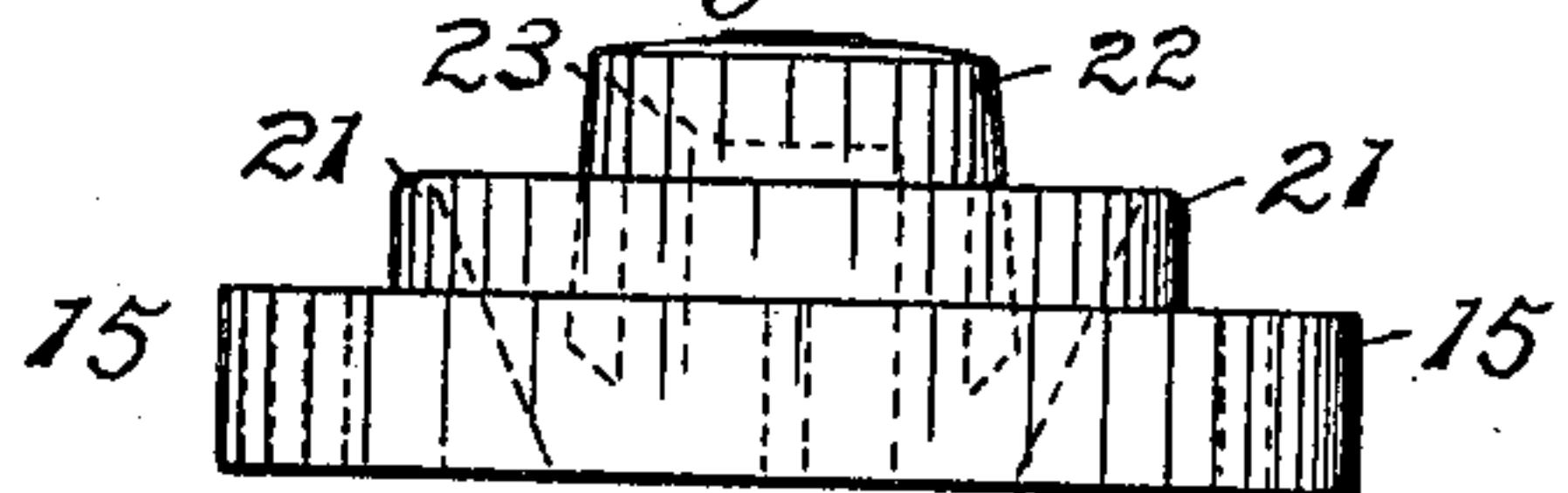


Fig. 17.

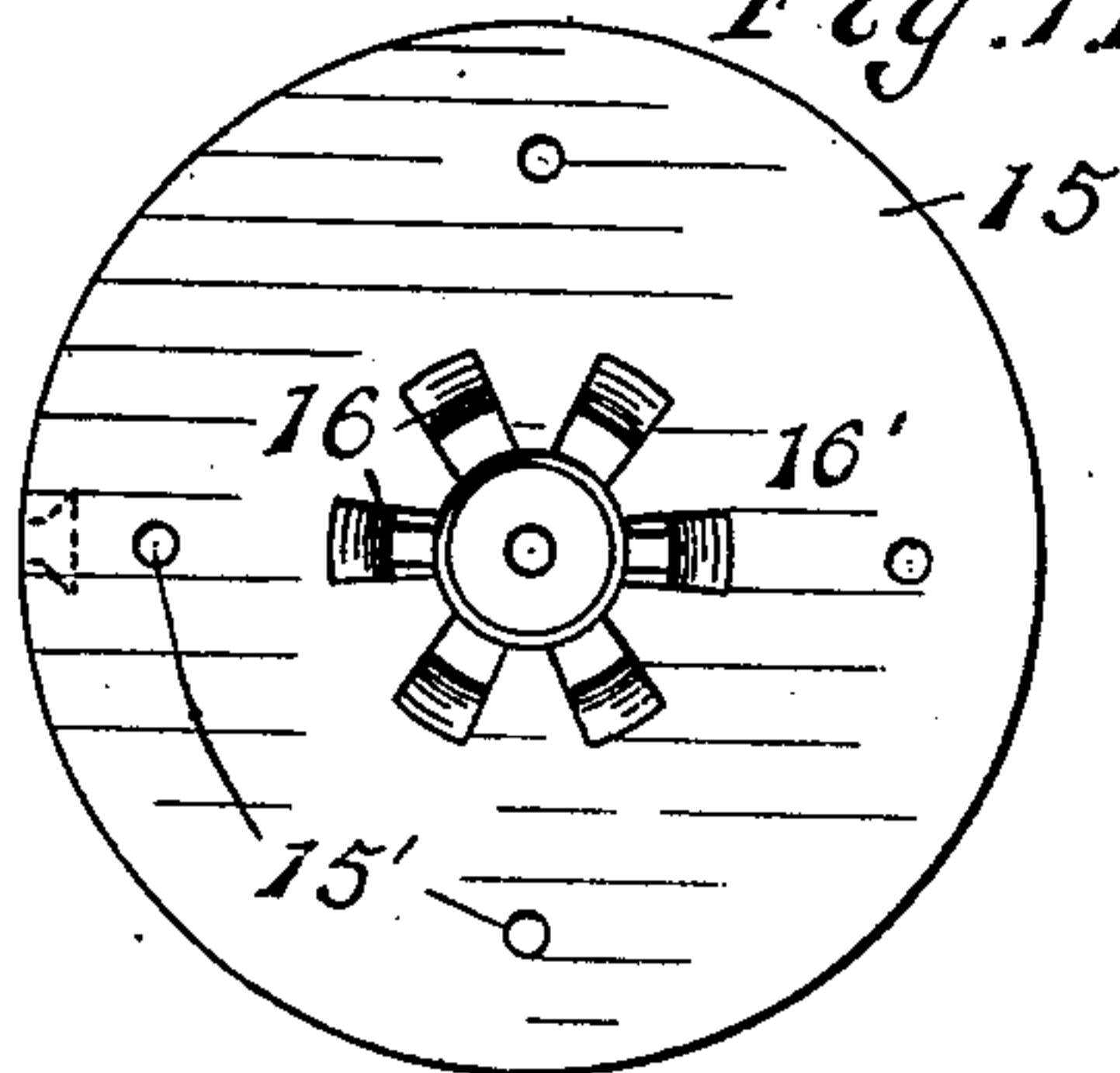


Fig. 19.

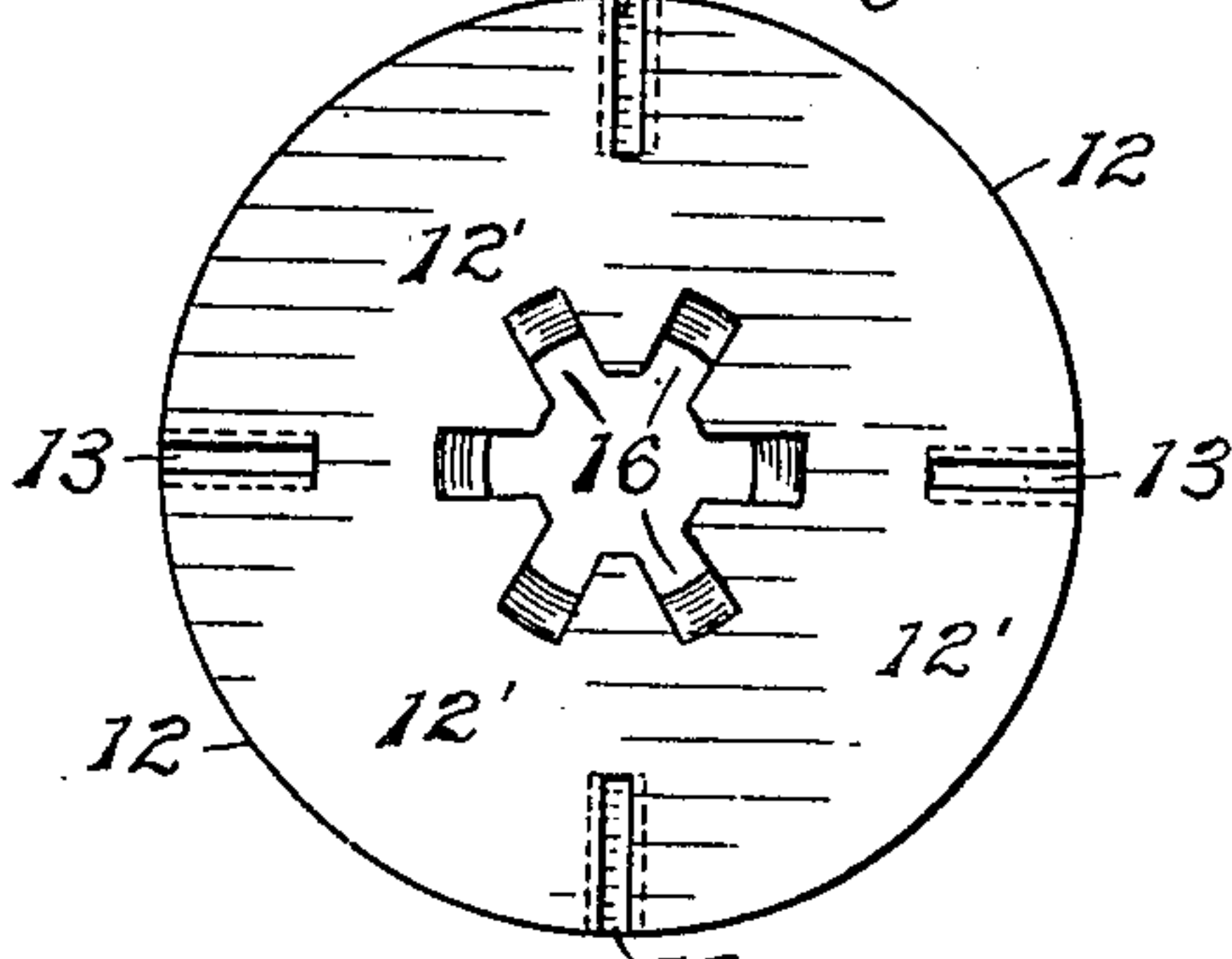


Fig. 20.

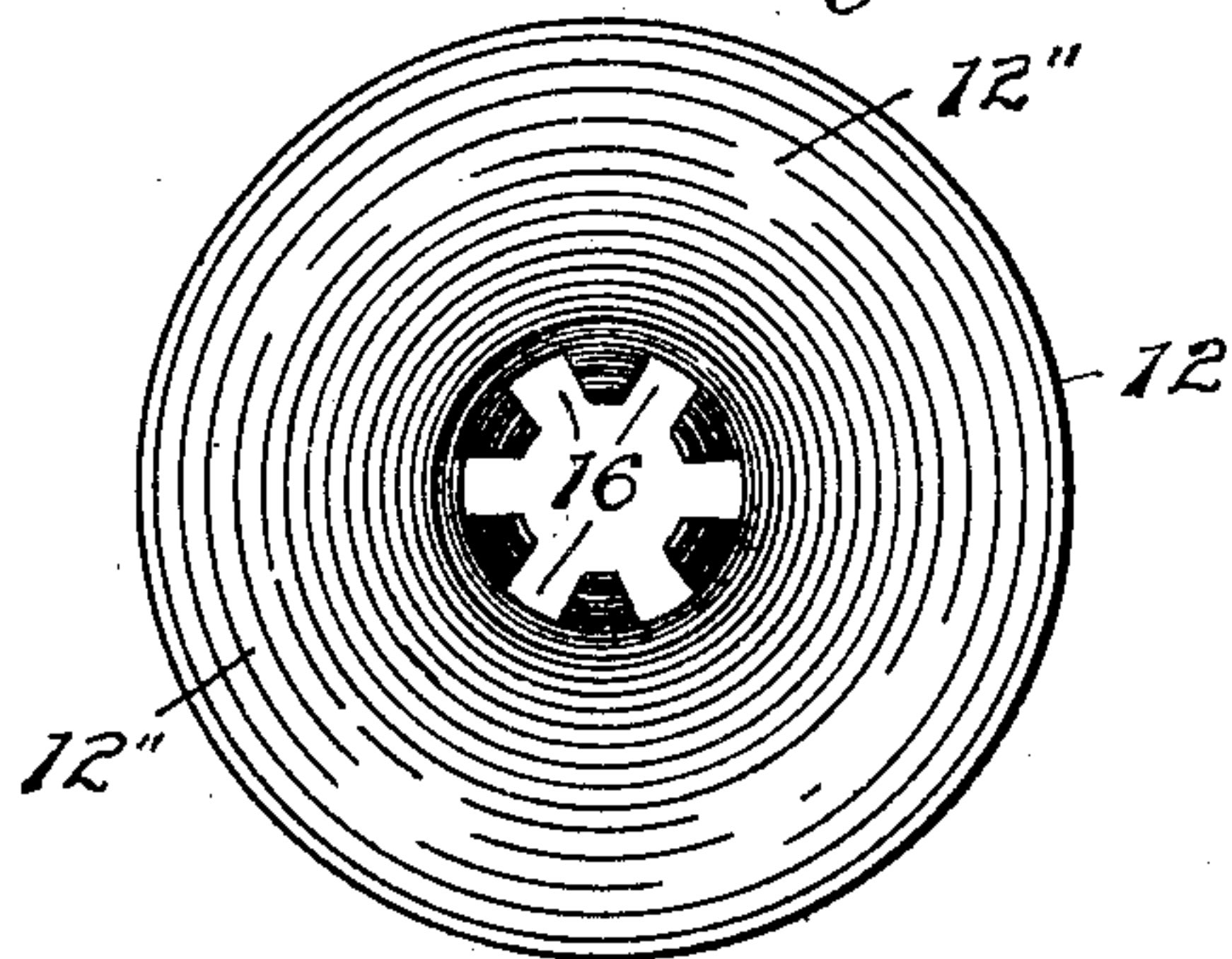
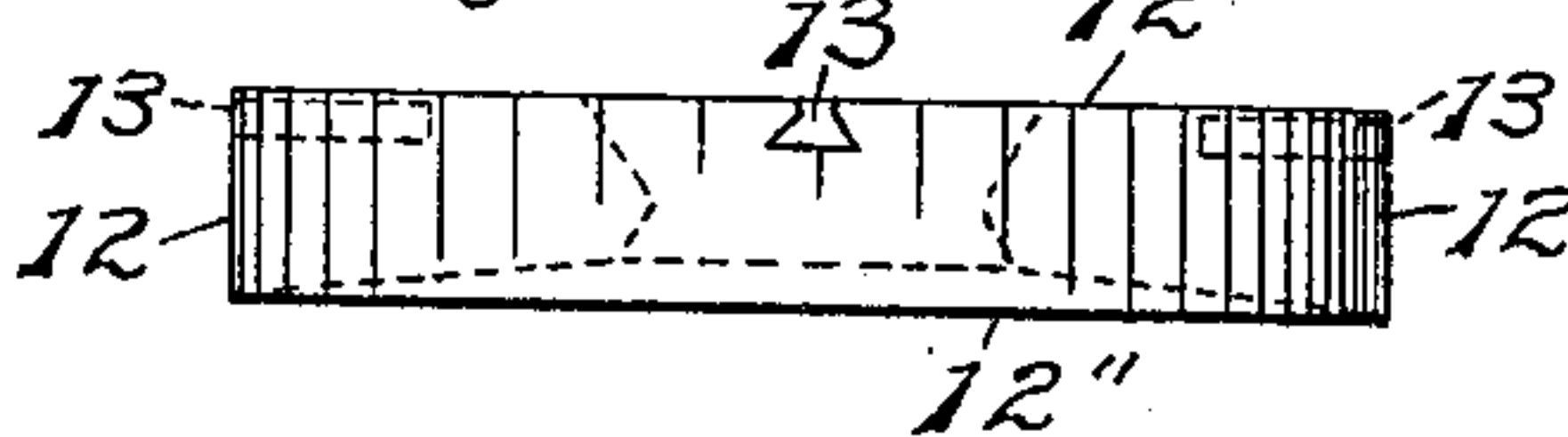


Fig. 21.



Witnesses:

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E. M. Conley.

Inventor:

Alfred Tregoning

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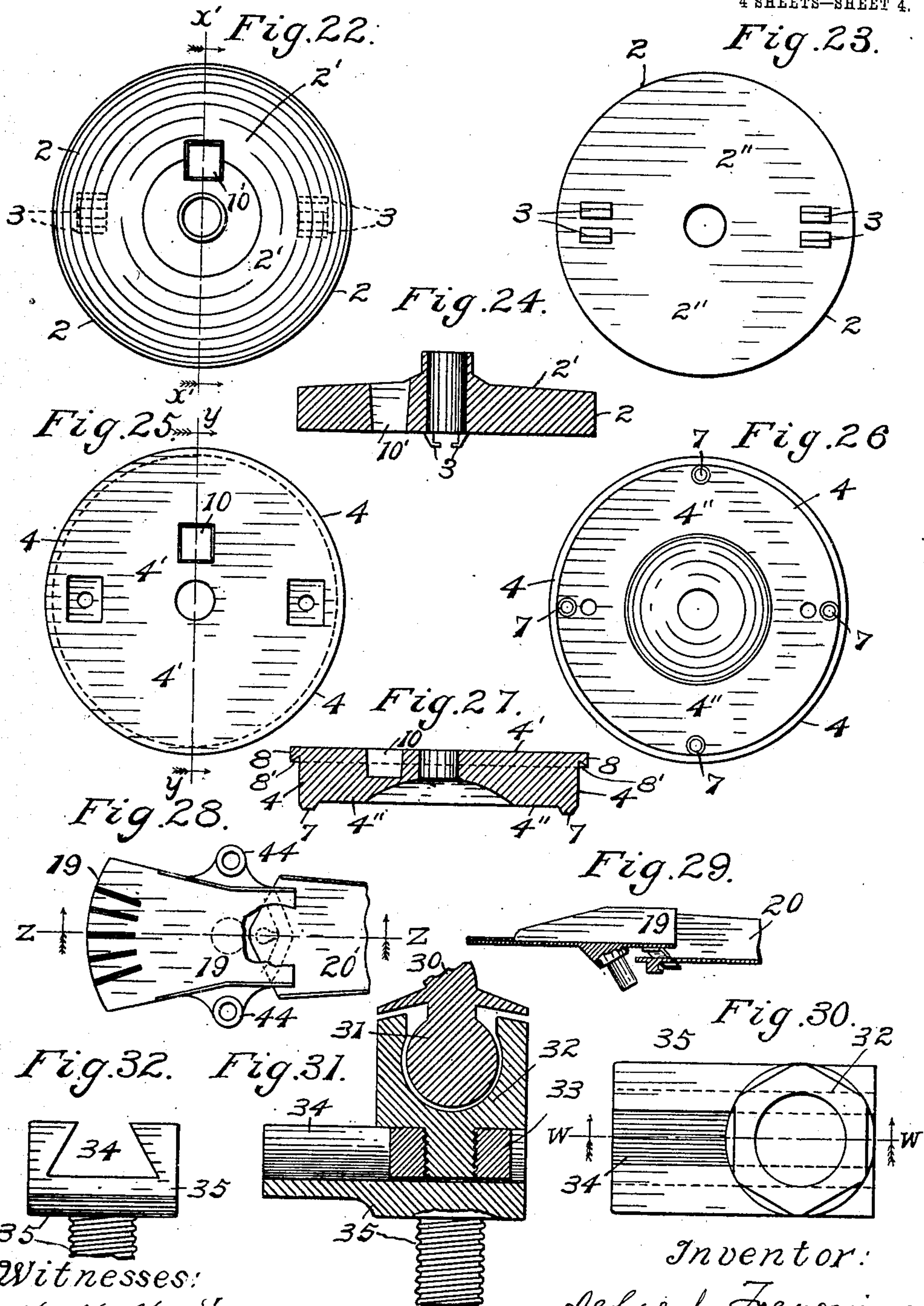
Attorney.

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913,176.

Patented Feb. 23, 1909.

4 SHEETS—SHEET 4.



Witnesses:
H. H. Hunt.
E. M. Conlee.

Inventor:
Alfred Tregoning
By James R. Rogers
Attorney.

UNITED STATES PATENT OFFICE.

ALFRED TREGONING, OF LOS ANGELES, CALIFORNIA.

ORE, CEMENT, AND GENERAL PULVERIZING MILL.

No. 913,176.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed October 10, 1906. Serial No. 338,321

To all whom it may concern:

Be it known that I, ALFRED TREGONING, a citizen of the United States, residing at Los Angeles, county of Los Angeles, State of California, have invented and discovered a new and useful Improvement in Ore, Cement, and General Pulverizing Mills; 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 to improvements in ore, cement, and general pulverizing mills; and the objects of my improvement are, first, to construct mills for reducing ores and other mineral substances to fine states of subdivision; second, to provide mills for pulverizing hard, brittle materials to form fine powder; third, to facilitate the feeding of ores and other friable substances previously crushed to given mesh, to grinding disks; fourth, to afford means for agitating pulverized substances with other materials to extract valuable ingredients therefrom; and fifth, to produce in one machine an apparatus for feeding crushed materials to pulverizing disks, grinding the material, agitating the same and intimately mixing the material with other substances possessing therefor, solvent qualities.

The invention consists essentially in the construction, combination and arrangement of the several parts as will be hereinafter fully described in the specification, shown upon the drawings appended hereto and specifically pointed out in the claims made a part thereof.

I attain these objects by the construction, arrangement and mechanism illustrated in the accompanying drawings, in which—

Figure 1. is a sectional view of my improved pulverizing mill, a part of the floor also in section on which the mill rests and to which the same is secured, parts thereof broken away; and my improved devices for supporting, raising and lowering the upper revolving grinding disks shown partly in elevation and partly in section; Fig. 2. is a view in elevation, shown in full and dotted lines of the screw threaded rod removed from the lever employed for raising and lowering the upper revolving grinding disk, a part thereof broken away; and the stand partly surrounding the rod illustrated in elevation; Fig. 3. is a plan view of the hand-

wheel and rod shown upon Figs. 1 and 2 of the drawings, used for elevating or lowering the lever, spindle or shaft, upper revolving grinding disk and bur illustrated thereon; Fig. 4. is a plan view of the stay-block holding the journal-box through which the spindle or shaft for revolving the upper grinding disk passes, the said stay-block fastened to the beams under the floor supporting the mill; Fig. 5. is an edge projecting end view in elevation of the agitator removed from the bur to which the upper revolving grinding disk is secured; Fig. 6 is a top plan view of the driver and the shaft or spindle projecting through the same; Fig. 7. is a sectional view of the mill showing the upper revolving grinding disk, the bur to which the said grinding disk is secured, the spindle or shaft shown partly in full and dotted lines, the lower stationary disk of the mill and the bed-plate secured thereto also shown in section, the bolts for securing the bed-plate fastened to the floor broken away; the chute, shaker, and bracket for supporting the chute and shaker shown in elevation and a portion of the ore-bin illustrated in section, and parts thereof broken away; Fig. 8. is a plan view of the chute and launder detached from the bin; Fig. 9. is partly a sectional and plan view taken upon the line *a— a* of Fig. 1, a portion of the lever broken away; Fig. 10. is a section taken upon the line *b— b* of Fig. 9, showing the post and plate for supporting the lower end of the shaft or spindle and means for elevating the same; Fig. 11. is a sectional view of the sliding cup for the lower end of the spindle or shaft, and a view partly in elevation and partly in section of the oil-cup connected thereto; Figs. 12, 13 and 14. are views respectively—a side elevation, a plan view of the top face, and a plan view of the under surface of the button, or foot-rest on which the lower end of the spindle or shaft rests and turns; Fig. 15. is a top plan view of the bur and the feed-ways therethrough, shaker and launder removed therefrom, showing the concentrator attached to the bed-plate; Fig. 16. is a top plan view of the bur, showing the feed-ways and slot therein by means of which the agitator is secured to the bur and other parts removed therefrom; Fig. 17. is a plan view of the under side of the bur, shown upon Fig. 16; Fig. 18. is a view in elevation of the bur, illustrated in Figs. 16 and 17; Fig. 19. is a top plan view of the

upper revolving grinding disk, feed-ways therein, and the slots for connecting the same to the under surface of the bur; Fig. 20. is a plan view of the under side of the upper revolving grinding disk showing the feed-ways therein; Fig. 21. is a side elevation of the upper revolving grinding disk, showing in full and dotted lines the slots and feed-ways therein; Fig. 22. is a plan view of the upper face of the lower stationary grinding disk removed from the connecting parts of the mill, showing the pocket therein; Fig. 23. is a plan view of the under or lower face of the stationary grinding disk removed from the other coöperating parts of the mill; Fig. 24. is a sectional view of the lower stationary grinding disk taken upon the line $x'-x'$ of Fig. 22; Fig. 25. is a top plan view of the upper face of the bed-plate to which the lower stationary grinding disk is fastened; Fig. 26. is a plan view of the under face of the bed-plate removed from the floor on which the mill rests, and to which it is secured; Fig. 27. is a sectional view of the bed-plate to which the lower stationary grinding disk is secured, removed from the floor and from other connecting parts of the mill, taken on the line $y-y$ of Fig. 25 of the drawings; Fig. 28. is a plan view of the chute removed from the bin, parts thereof broken away, showing the launder connected thereto partly broken away; Fig. 29. is a view partly in section and partly in elevation of the chute and the launder connected together; taken on the line $z-z$ of Fig. 28 of the drawings; Fig. 30. is a top plan view showing in full and dotted lines the head of the screw-bolt and provided with a way in which the sliding nut travels,—the said nut having a socket in which the ball-end of the shaker turns; Fig. 31. is a sectional view taken on the line $w-w$ of Fig. 30 of the drawings; and Fig. 32. is a view in elevation of the screw-bolt, head, and way therein, showing screw-bolt partly broken away.

Similar reference numerals, letters and characters refer to like parts throughout the several views of the drawings.

The reference numeral 2 denotes the lower stationary grinding disk, 2', the upper face of said disk, and 2'', the lower or under face of the said lower stationary grinding disk 2. The numeral 4, refers to the bed-plate on which the said stationary grinding disk, 2, rests, and to which the said disk, 2, is secured, 4' designates the upper face of the said bed-plate 4, and 4'' the under face of the bed-plate 4, which rests upon the floor 1, of the support or house of my improved mill, as shown upon Fig. 1 of the drawings.

The bed-plate 4, is fastened to the floor 1, by means of headed and screw-threaded bolts 6, which pass upwardly through the beams or joists 1', under the floor 1, and

through the bed-plate 4, into the screw-threaded nut 5, which rests under and between the pairs of flanged cleats 3, shown in full lines upon Figs. 1, 23 and 24 and in dotted lines upon Fig. 22.

The bed-plate 4, is provided upon its under surface with a projection 7, adapted to be received into a recess 7', in the upper surface of the floor 1, and the upper circumference of the said bed-plate 4, is provided with a projection 8, shown upon Figs. 1, and 27 of the drawings, having an undercut 8', adapted to rest upon the inclined inner rim 9' of the concentrator or pan 9, hereinafter to be more fully described.

The bed-plate 4, is provided with a pocket 10, therein, which registers with the passageway 10', extending through the lower stationary grinding disk 2; the said passageway 10', adapted to prevent non-pulverizable material, such as pieces of metal, from being fed between the upper and lower grinding surfaces of said disks. The said pocket 10 when filled with pieces of metal and other non-pulverizable material, is emptied of the same.

The reference numeral 12, refers to the revolving grinding disk; 12' denotes the upper surface thereof, and 12'', the under surface as illustrated upon Figs. 1, 7, 19, 20 and 21 of the drawings.

The upper surface 12', of the upper revolving grinding disk 12, is provided with dove-tailed slots 13, extending from the periphery inwardly, as illustrated in full lines upon Figs. 1, 7, and 19 of the drawings, and in dotted lines upon Figs. 19 and 21 of the drawings. In the said slots 13, the heads of the headed and screw-threaded bolts 14, are shown passed inwardly toward the center of the said revolving grinding disk 12. The numeral 15, designates the bur, the lower surface of which is adapted to rest upon the upper surface 12', of the said revolving grinding disk 12. The heads of the headed screw-threaded bolts 14, being in vertical positions, the bur 15 being provided with perforations 14'', the screw-threaded ends of the said bolts 14 being passed through the perforations 14'', the nuts 14' are then screwed down upon the upper surface of the bur 15, thereby clamping the said bur and the upper revolving grinding disk 12 together as shown upon Figs. 1 and 7 of the drawings. The bur is provided with feed-ways 16, as shown upon Figs. 1, 7, 15, and 16 of the drawings, through which the ore, minerals, or other substances having been crushed to a given size or mesh, screened and fed from the ore-bin 17, through the sliding gate 18 of the bin, downwardly upon and through the chute 19, upon the launder 20, into the saucer-shaped, flaring receptacle 21 of the bur 15, and thence into the said feedways 16 of the bur, into the converging

feedways 16' of the upper revolving grinding disk 12, shown upon Figs. 1, 7, 17, 19, and 20 of the drawings.

Preferably made integral with the bur 15, is the crown portion 22 thereof, shown upon Figs. 1, 7, 15, 16, and 18 of the drawings, the central interior face thereof resting upon the upper convex surface 23, of the spindle 24, which is cut away, forming the tenon 24^a, on the shoulders of which the slotted driver 25 rests; the free ends 25', of the driver 25, shown upon Figs. 1, 6, and 7 of the drawings are adapted to engage the removable keys 26, shown in full and dotted lines upon Fig. 1 of the drawings, and in full lines upon Fig. 7 of the drawings. When the keys 26, are in place, as shown in full lines upon Figs. 1 and 7 of the drawings, the free ends 25' of the slotted driver upon the spindle 24 engage the said keys, revolve the bur 15 and oscillate the shaker 30, eccentrically secured at one end by means of the ball 31, in the socket-screw 32, secured in the sliding nut 33, adapted to slide in the way 34, of the screw-head 35, eccentrically connected to the upper surface of the crown portion 22, of the bur 15, as shown upon Figs. 1, 7, 30, 31, and 32 of the drawings. The opposite end of the shaker 30 is slidably connected by means of the extension hook 40, one end of which is adapted to be received into the enlarged end 42, of the shaker and held therein by set screw 42' of the shaker 30, and the hooked end 43 is adapted to be removably fastened into the socket 44, as shown upon Fig. 7 of the drawings. When the bur 15 is revolved by means of the pulley 24', secured upon the spindle or shaft 24, the shaker being eccentrically connected to the top of the crown portion 22, as hereinbefore described, the crushed ore or mineral in the bin 17, and upon the launder 20, will be agitated and pass downwardly into the saucer-shaped receptacle 21, through the ways 16 and 16', between the upper and lower grinding disks 2 and 12, as hereinbefore mentioned.

The concentrator or pan 9, hereinbefore mentioned, rests upon the floor 1, and the upper inclined inner rim 9' is overlapped by the under-cut 8' of the projection 8, of the bed-plate 4, as shown upon Figs. 1 and 27 of the drawings. Upon the outer surface near the upper edge of the said concentrator or pan 9, the lower, inner edge of the cleat 55 rests, and to the upper and outer edge of the said cleat 55 is secured the bracket 56, by means of screws or equivalent devices, and the upper edge of the said bracket 56 is fastened to the shield 57, as shown upon Figs. 1 and 15 of the drawings. The upper inner edge of the shield 57, is secured to the lower ends of braces 58, by means of the screws 58', or equivalent devices, and the upper ends of said braces 58,

are secured to the ring 59', on the top of the bur 15 by means of the screws 59, as illustrated upon Figs. 1 and 15 of the drawings; the shield 57, and the braces 58, afford protection to operators and animals, preventing them from falling into the concentrator, thereby avoiding injury. Arranged at intervals leading from the outer periphery of the concentrator 9, are the spouts 60, through which the pulverized ores when intimately mixed with a solvent or an amalgam can be quickly and readily removed from the concentrator or pan 9.

The numeral 65 denotes the agitator, consisting of a vertical portion 65', and a horizontal portion 65'', the said horizontal portion having teeth 66, adapted to stir and intimately mix any solvent material with the pulverized ore or mineral substances ground when the mill is in operation. The agitator 65, is secured at the upper end thereof by means of a headed bolt 67, which passes through the opening 67' in the upper end thereof, and the outer end of the said screw-bolt is screw-threaded to receive the nut 67'', whereby the agitator 65 is held in a vertical position and stirs and intimately mixes the pulverized mineral substances with any solution desirable to be mixed therewith.

The portion 50 of the stay-block, shown upon Figs. 1 and 4 of the drawings, is secured to the under face of the joists or beams 1', by means of the headed screw-bolts hereinbefore mentioned; the said stay-block 50 is preferably made in two parts, 50 and 50', as illustrated upon Fig. 4 of the drawings, the part 50' attached to the stay-block 50 by means of the headed screw-bolts 50''. The oil-cup 52, for the spindle 24, is held in place and is removable from the stay-block 50 by removing the screw-threaded bolts 50'', hereinbefore referred to, and the shaft or spindle 24 can be cleansed of any gum or sticky substance adhering to the shaft.

The lower end 24^b of the spindle or shaft 24, bears and turns upon the upper convex portion 70' of the bearing button 70, which rests loosely with its flat face 70'', upon the bottom 70''', of the sliding cup 75, adapted to slide in ways 75'', shown in full lines upon Fig. 1, and in dotted lines upon Fig. 10 of the drawings. The said sliding cup 75, near the bottom thereof is provided with a laterally extending pipe 76, communicating with the oil-cup 76', provided with a pneumatic screw-threaded plug 76'', and through the said pipe 76, the oil passes into the bottom of the said sliding cup 75, upon the convex portion 70' of the bearing button 70 and lubricates the said convex portion upon which the lower end 24' of the shaft turns. Through the bottom of the sliding cup 75, I make a screw-threaded opening 77, in which

the screw-plug 77'' is secured, in order that the said cup 75 may be quickly and readily cleansed of any gummy substance adhering thereto contained in the lubricating oil.

5 Preferably made integral with the said sliding cup 75, are projecting, outwardly extending lugs 78, which rest upon parallel side pieces 78', desirably made integral with the lever 78'', the outer end of which is mov-

10 ably connected with the rod 79, by means of the bolt 79', and nut 79'', secured upon the end thereof as shown upon Fig. 1 of the drawings. The upper end of the said rod 79, is screw-threaded and adapted to engage

15 the screw-threaded measuring-wheel 80, which upon being turned in one direction elevates the said rod 79, and the end of the said lever 78'', and on being turned in the opposite direction, lowers the said rod 79

20 and the lever 78'', to which said rod is secured at the lower end thereof. Upon the top of the standard 80'', the indicator 80' rests, in order to fix the number of revolutions made by the said measuring-wheel 80.

25 The lower end of the standard 80'' is secured to the upper surface of the floor 1 by means of the screws or bolts 81, shown upon Fig. 1 of the drawings. The free ends of the said parallel portions 78' of the lever

30 78'' are provided with openings 82, through which the bolt 82' passes; the said bolt 82' also passes through the upper enlarged end of the screw-threaded bolt 83, extending vertically downward through the opening 83'

35 of the plate 83'', which is adapted to be secured in any well-known manner at the required distance below the floor 1' on which the mill rests.

The collar 85 having a downwardly projecting rim, rests upon the top or neck portion 2' of the lower stationary grinding disk 2, within the said collar 85 and the upwardly extending neck portion 2' of the disk 2, the spindle or shaft 24 revolves. The said collar

40 with the downwardly projecting rim prevents any dust of the pulverized ore, cement, or other substance from passing downward upon the shaft in the openings in the said disk 2, and bed-plate 4, in which the said

45 spindle or shaft revolves. When the two grinding surfaces of the said two disks have been worn, the said surfaces are properly adjusted and brought together again by revolving the said screw-threaded measuring-

50 wheel 80, permitting the screw-threaded rod 79 to pass downwardly through the said wheel 80, lowering the outer end of the lever 78'', screwing upward the nut 84 upon the screw-threaded bolt 83 (with a wrench or

55 other tool), the said screw-threaded bolt 83 passing downward through the opening 83', in the plate 83'', as shown upon Figs. 9 and 10 of the drawings, allowing the forked portions 78' of the lever 78'' to descend around

60 the stand 90, the sliding cup 75, with the

lower end 24' of the spindle 24 therein, also to descend, until the bur 15 and the upper revolving grinding disk 2 have been lowered in order that the two ground-away surfaces of the said grinding disks have been again

70 properly adjusted. Whenever, by inadvertence or accident, uncrushable and unyielding substances, as pieces of iron or steel, mixed with the ore or cement, are fed between the grinding surfaces of the said two

75 disks, and the surfaces of the disks are corrugated or furrowed concentrically, one of the said tapering keys 26, is then raised higher than the other or corresponding key on the opposite side of the crown 22, as illus-

80 trated in dotted lines upon Fig. 1 the axes of revolution of the bur 15 and the grinding disk 12, connected thereto are thereby changed, and the two said grinding disks

85 no longer revolve concentrically as they did before the unequal elevation of the said keys 26, but being now eccentrically adjusted, the said disks revolve eccentrically relative to

90 each other, and the services of the said disks previously concentrically corrugated and furrowed, have the corrugations and furrows removed from their surfaces. The said

95 two grinding disks will now revolve eccentrically and concentric corrugations and concentric furrows previously made, as hereinbefore mentioned, will in a short time be

obliterated and again made smooth, lying in the same plane throughout their entire extent, and when the said concentric furrows

100 have been worn away and the grinding surfaces again made smooth, lying in the same plane, and said keys 26 can be again "driven home" as shown in full lines upon Fig. 1 of the drawings.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the construction, mode of operation, and advantages of the invention will be readily apparent without requiring an extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention and I therefore reserve to myself the right to make such changes as fairly fall within the scope thereof.

It is obvious that many variations and changes in the details of construction and arrangement of my invention would readily suggest themselves to persons skilled in the art, and still be within the spirit and scope of my improvement.

I claim:

1. A mill comprising an upper disk, means for rotating it, a lower stationary grinding disk, a bed plate supporting the same having a projection upon its under face, a support having a recess receiving said projec-

tion, a concentrator mounted upon said support and having an upwardly extending inner rim, the bed plate having a projection with an undercut receiving said rim, and
5 means securing said parts rigidly together.

2. A mill comprising a lower stationary grinding disk, a bed plate supporting the same having a projection upon its under face, a support having a recess receiving
10 said projection, a concentrator mounted upon said support and having an upwardly extending inner rim, the bed plate having a projection with an undercut receiving said rim, means securing said parts rigidly to-
15 gether, a revoluble grinding disk above the stationary disk, a spindle passed through said support and disk, means for securing the disk to the spindle and means for revolving the same.

20 3. In a mill, a bed plate, a lower stationary grinding disk, an upper revolving grinding disk, a bur above the same, means for revolving the latter disk relative to the stationary grinding disk, means for raising and
25 lowering the revolving grinding disk, and means embodying removable tapering keys for changing the axes of revolution of the bur and revolving grinding disk.

4. In a mill, a stationary grinding disk, a
30 revoluble grinding disk above the same, a bur above the revoluble disk and having a crown portion, a spindle having a convex surface upon which the central interior face of said crown portion rests, a slotted driver

secured upon said spindle, and removable 35 keys engaging the free ends of the slotted driver and slots in the crown portion of the bur.

5. In a mill, the combination with the stationary grinding disk, the revoluble grind- 40 ing disk and the bur disposed above the latter and having a crown portion, of a revoluble spindle upon which the crown portion of the bur rests, a shaker, a ball at one end thereof, a socket screw, means for connecting 45 the same eccentrically with the upper surface of said crown portion, and means for adjustment of said connection.

6. A mill comprising a bed-plate provided with a pocket therein for retaining 50 unpulverizable material fed to the mill, a grinding disk having a passageway there-through communicating with the pocket, a revolving bur and grinding disk connected therewith, means for revolving the bur and 55 the disk connected thereto, means for conveying the material to be fed to the mill and for regulating the movement of the material fed to the mill by the number of revolutions made by the bur and said revolving 60 grinding disk.

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

ALFRED TREGONING.

Witnesses:

JAMES R. ROGERS,
E. M. CONLEE.