

A. TAYLOR.
SUITABLE APPARATUS FOR CONCENTRATING AND WASHING MINERALS.
APPLICATION FILED JAN. 22, 1907.

899,441.

Patented Sept. 22, 1908.
4 SHEETS—SHEET 1.

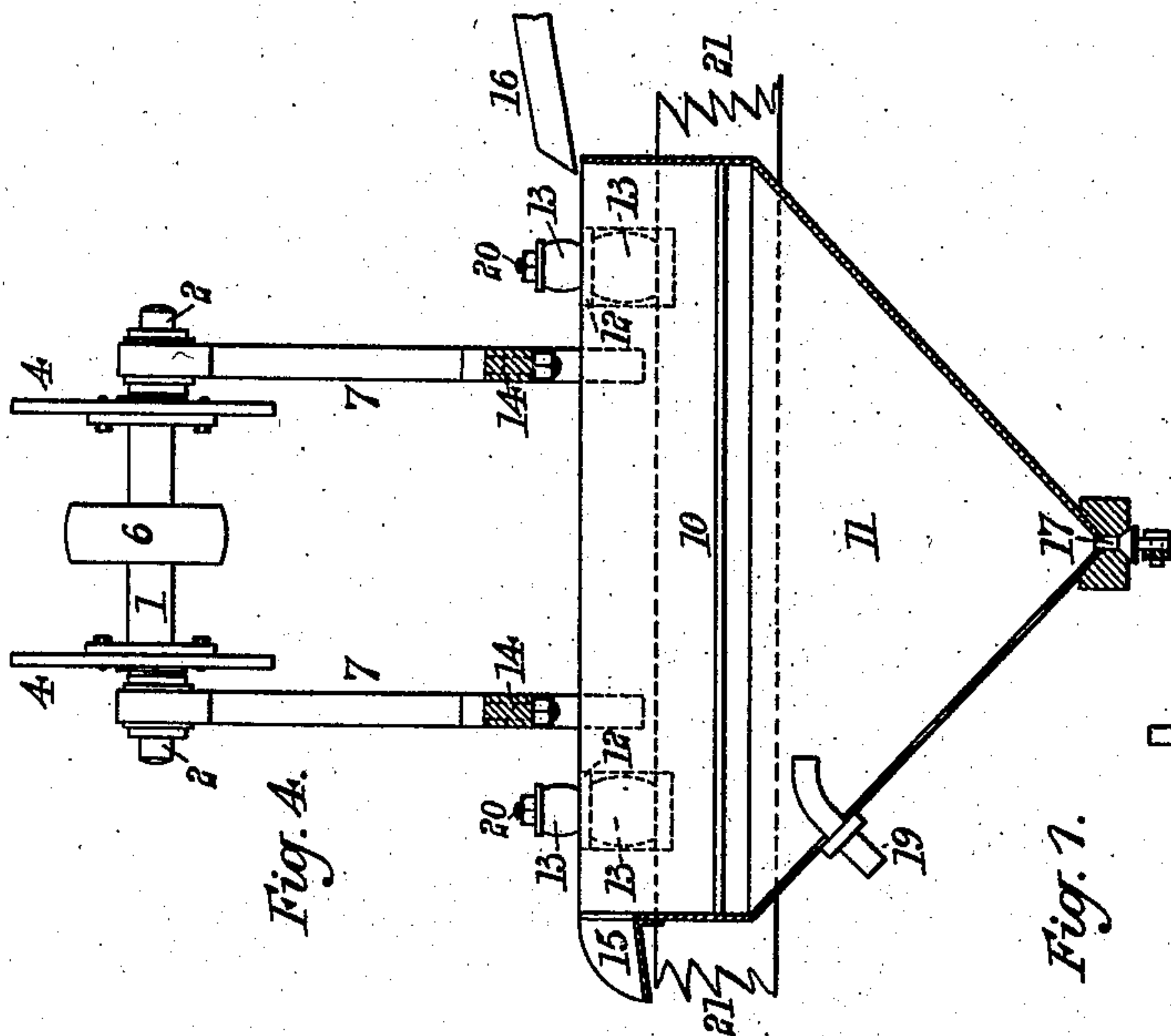


Fig. 1.

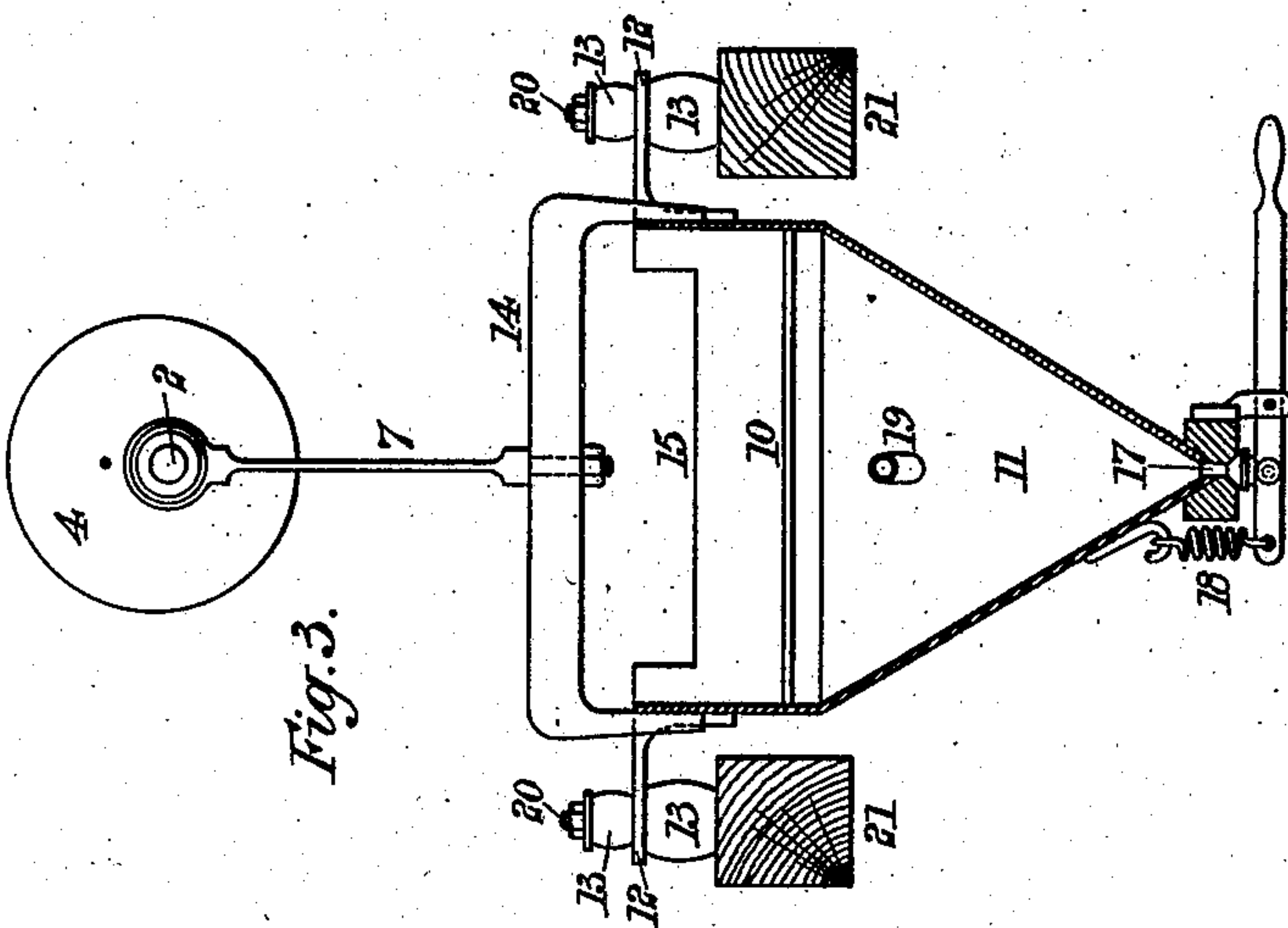
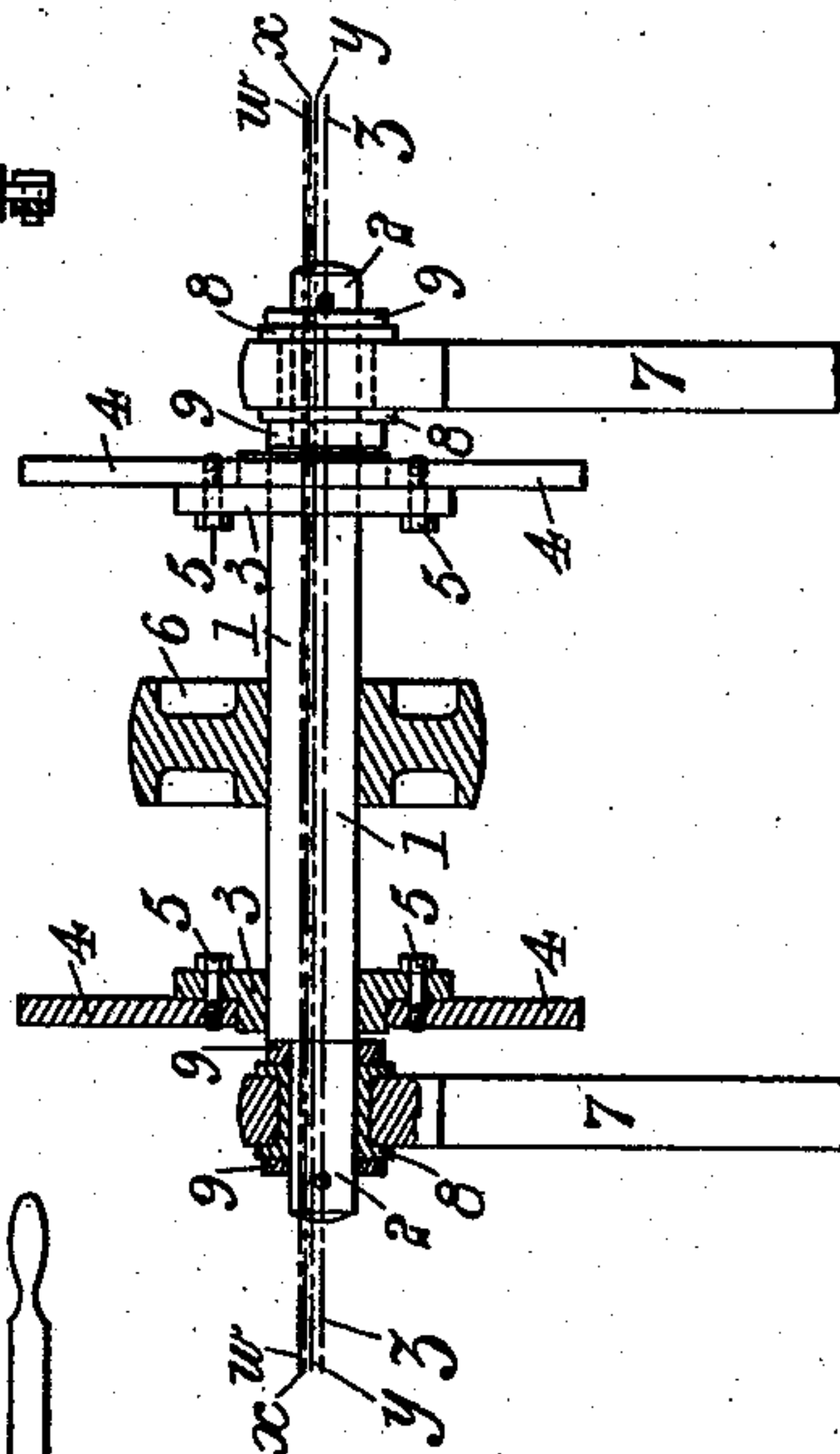


Fig. 3.

WITNESSES
L. H. Grote
M. E. Keir

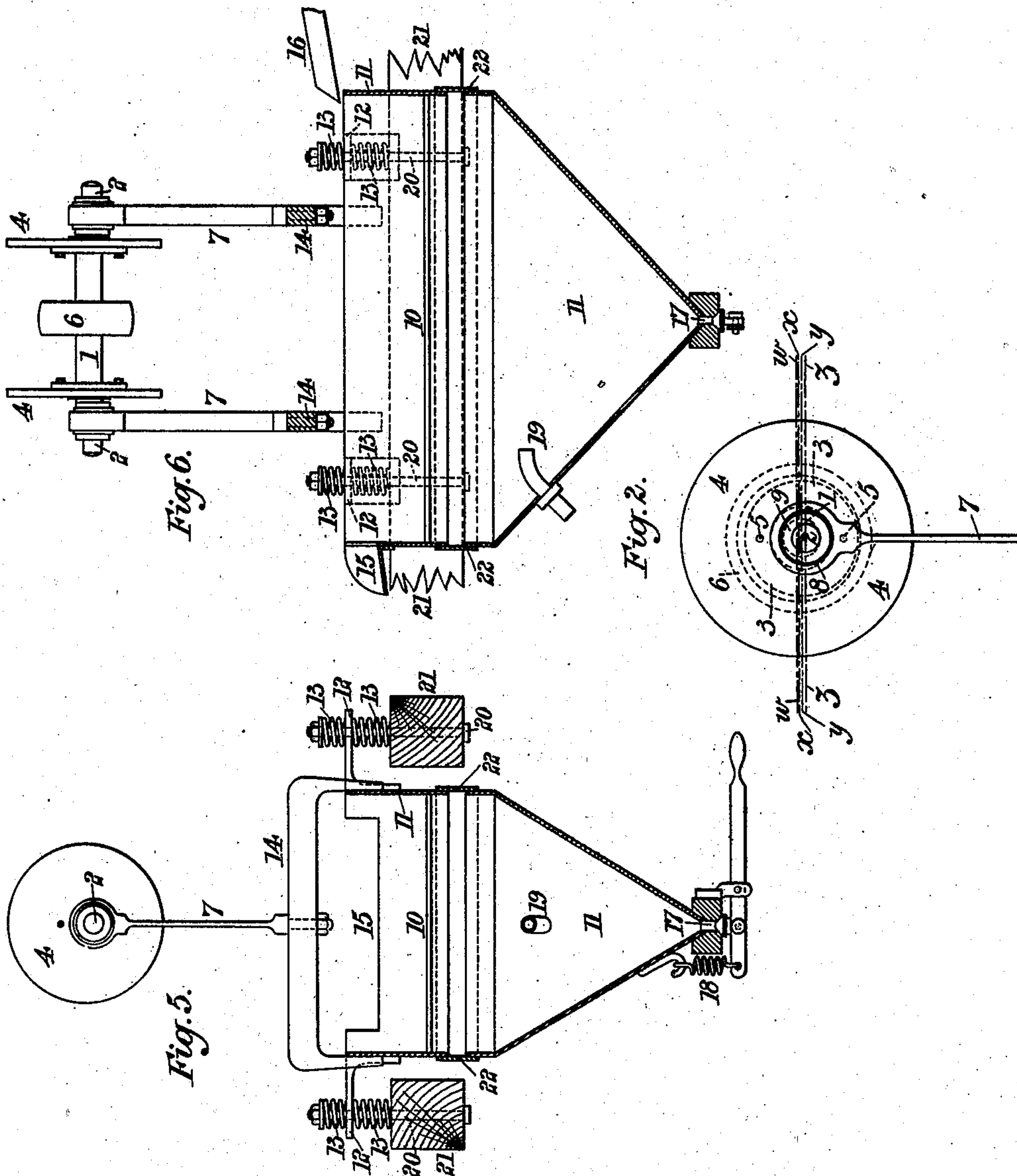
INVENTOR
Arthur Taylor
By
Howson and Howson
Attorneys

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WITNESSES
L. H. Grote
M. E. Keir

INVENTOR
Arthur Taylor
by Hanson and Hanson

A. TAYLOR.

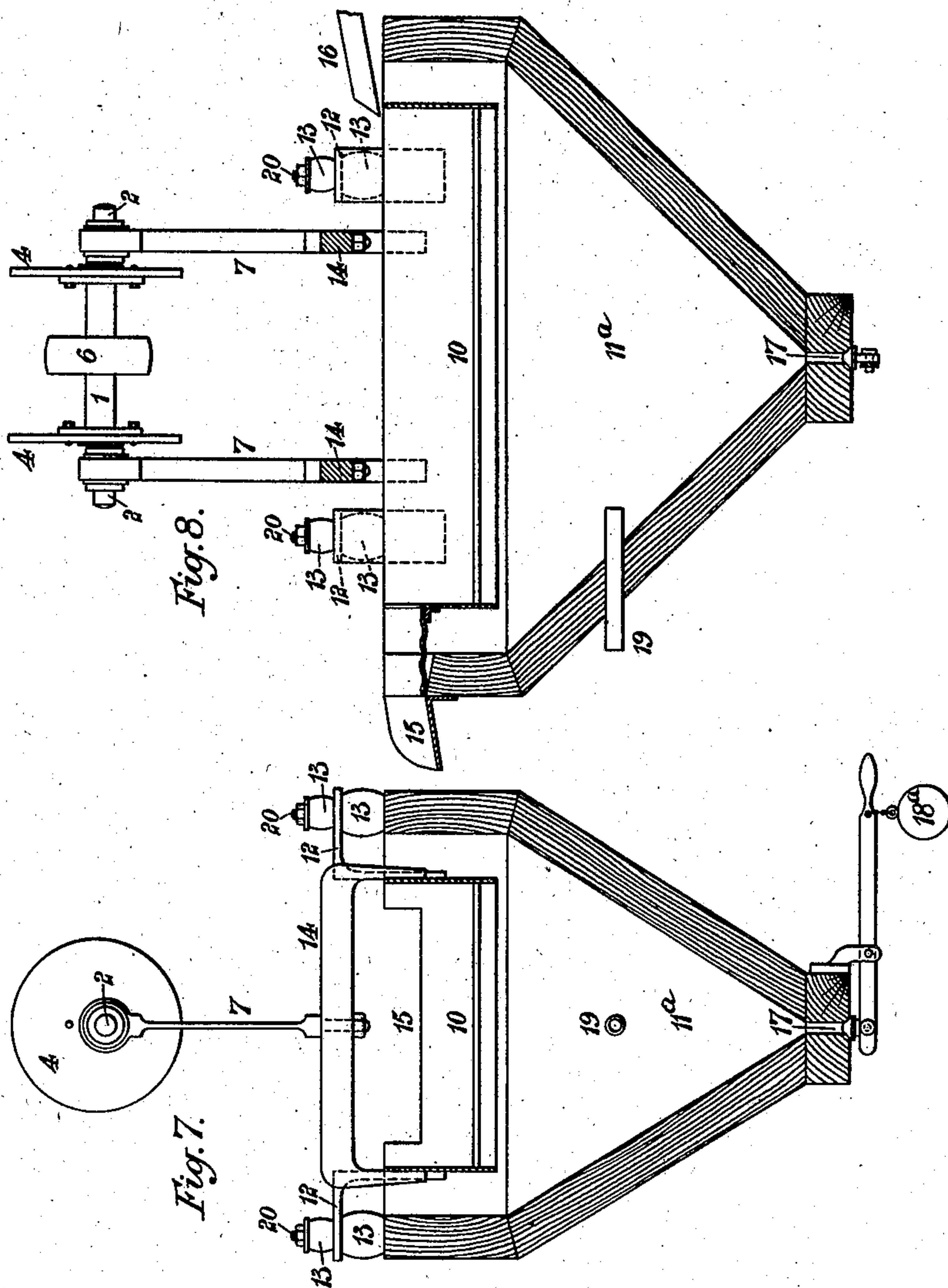
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L. H. Grote
M. E. Keir

INVENTOR
Arthur Taylor
BY
Horsman & Horsman
ATTORNEYS

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4 SHEETS—SHEET 4.

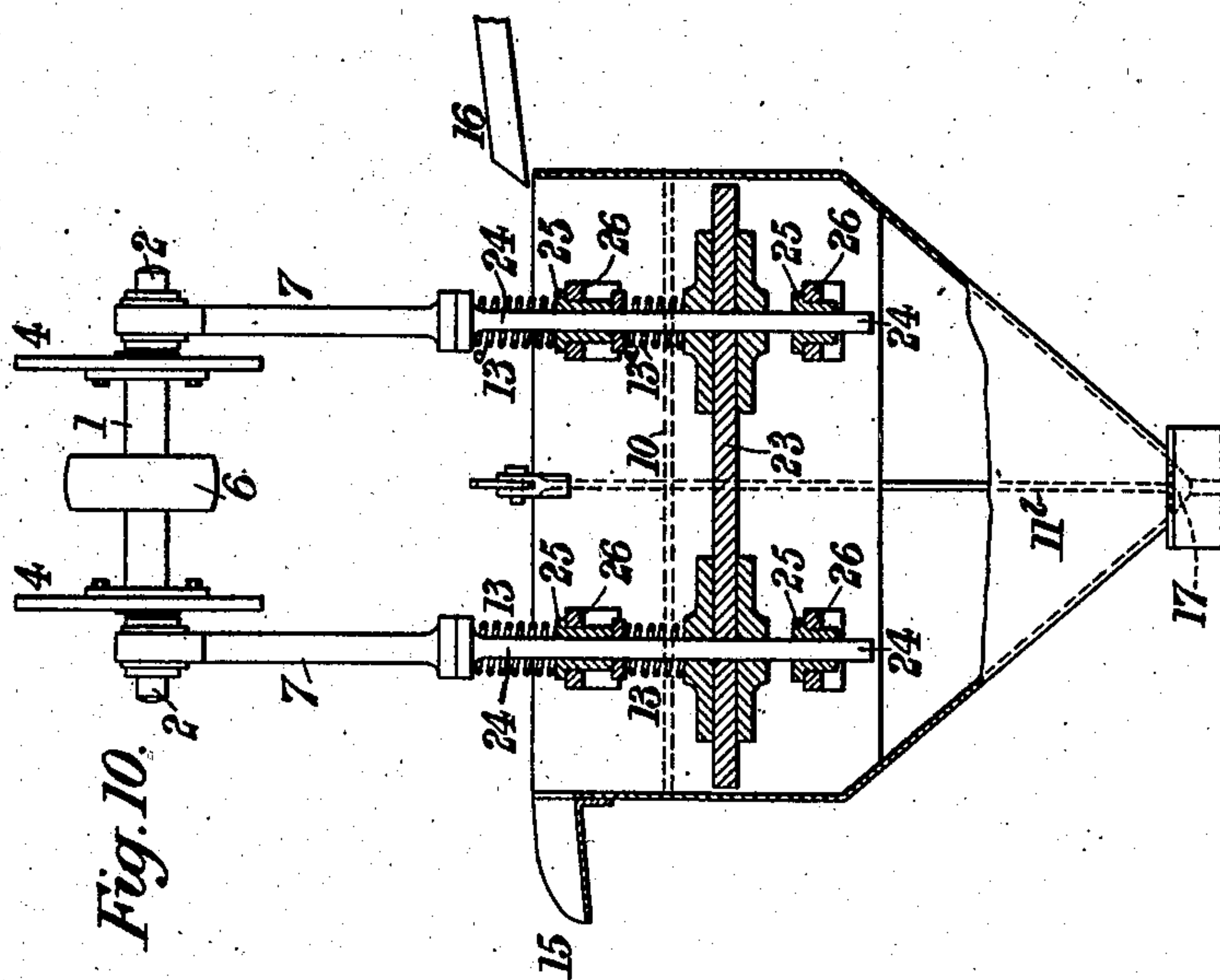


Fig. 10.

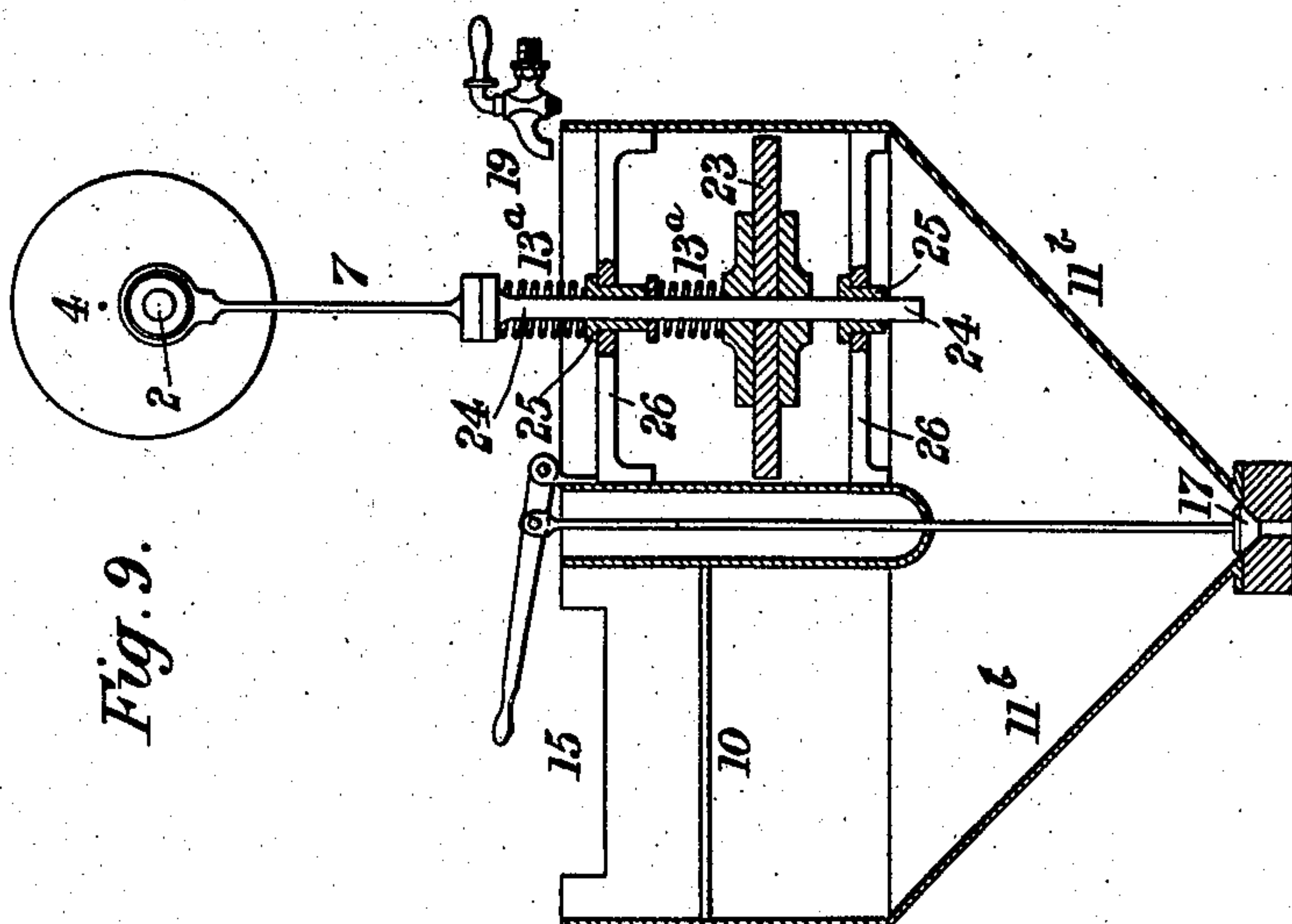


Fig. 9.

WITNESSES
L. H. Grote
M. E. Keir

INVENTOR
Arthur Taylor
BY
Hanson & Hanson
ATTORNEYS

UNITED STATES PATENT OFFICE.

ARTHUR TAYLOR, OF LONDON, ENGLAND.

SUITABLE APPARATUS FOR CONCENTRATING AND WASHING MINERALS.

No. 899,441.

Specification of Letters Patent.

Patented Sept. 22, 1908.

Application filed January 22, 1907. Serial No. 353,482.

To all whom it may concern:

Be it known that I, ARTHUR TAYLOR, a subject of the King of Great Britain and Ireland, of 71 Edith road, Kensington, in the county of London, England, engineer, and whose post-office address is 71 Edith road, Kensington, London aforesaid, have invented new and useful Improvements in Suitable Apparatus for Concentrating and Washing Minerals, of which the following is a specification.

My invention has for its object to provide suitable apparatus for concentrating and washing minerals, such as finely divided ores, or small coal, whereby any desired rapidity of vibration can be imparted to the gratings, or sieves, or to the water in which the mineral is treated, with a minimum expenditure of motive power and with less wear and tear than heretofore and so that a very efficient concentrating, or washing effect, is obtained even in extremely finely divided minerals.

For efficient concentration, or washing, by jigging of finely divided minerals, the length of the pulsations, or strokes, due to the vibration, should be reduced to a minimum and the rapidity thereof should be increased to a maximum so as to produce very rapid pulsatory vibrations.

According to my invention I employ a vibrator in combination with the jig, or concentrating washing apparatus in such manner that its pulsations, or vibrations are imparted to the jig, or concentrating, or washing, apparatus, or a part, or parts, thereof so as to obtain the required movements, the vibrator being supported on and connected with the jig, or concentrating, or washing apparatus, or with a part thereof by flexible connections, and the said jig, or concentrating, or washing apparatus or the part thereof to which the vibrations are to be imparted being supported by springs, all as hereinafter more particularly explained.

The vibrator which I employ preferably consists of an eccentric rotatable shaft with journals, whose axes are not coincident with the axis of the shaft. This shaft should be provided with adjustable eccentric weights whose center of gravity can be brought nearer to, or further from, the center line of the journals. The said weights may consist, for example, of eccentric wheels, disks, or sleeves, fitted on the shaft so that by moving them round on the shaft, the centers of the wheels, disks, or sleeves, and the axes of the journals, can be brought nearer to, or fur-

ther from, each other, or the said weights may be otherwise attached to the shaft so that they can be fixed nearer to, or further from, the shaft, keys, or screws, or other suitable means, being provided for fixing the weights in their adjusted positions.

The vibrator may be driven by any suitable means, such, for instance, as a belt passing over a pulley keyed to the shaft and made with an eccentric boss so that it can be adjusted and fixed by keys, screws, or other fastenings, in such a position on the shaft, that it will rotate concentrically, or nearly so, when the shaft journals and weights are all rotating eccentrically, or the vibrator may be driven by the torsion of a flexible rod, or wire rope, or articulated driver, or by spring gear. The motions of the vibrator are transmitted therefrom in the required manner to the part, or parts, to be acted upon by it by flexible connecting rods attached at one end to the journals of the shaft by bearings, and at the other end to the part, or parts, of the jig or concentrating or washing apparatus to be acted on by bolts, screws, keys, or other means of attachment.

The accompanying drawings show examples of how my invention can be carried out in practice, but I do not limit myself to these examples.

Figure 1 is a side view of the vibrator, partly in section, Fig. 2 is an end elevation of the same. Fig. 3 is an end elevation of the vibrator as applied to a jig, shown partly in section; Fig. 4 is a side elevation partly in section at right angles to Fig. 3; Fig. 5 is an end elevation of the vibrator as applied to a jig of different construction; Fig. 6 is a side elevation of the same, partly in section, at right angles to Fig. 5; Fig. 7 is an end elevation, partly in section, of the vibrator as applied to a jig of still another construction; Fig. 8 is a side elevation, partly in section, of the same at right angles to Fig. 7; Fig. 9 is an end elevation, partly in section, of the vibrator applied to a jig embodying another modification; and Fig. 10 is a side elevation, partly in section, of the same partly in section at right angles to Fig. 9.

Fig. 1 shows the vibrator partly in section and partly in elevation, and Fig. 2 shows it in end elevation. The shaft 1 has, at its ends, journals 2 whose axes (z) are not in line with the axis y of the shaft 1. Keyed onto the shaft 1 are sleeves 3 concentric with the said shaft. The sleeves 3 carry disks, or fly-

wheels, 4, whose centers (in the line *w*) do not coincide with the centers of the sleeves, so that the said disks, or fly-wheels, 4, can, by turning them, be adjusted to, and fixed
 5 by the screws 5 in a position such that there will be the combined eccentricity from the center of the journals 2 of the disks, or fly-wheels, 4 and the shaft 1 together, or be ad-
 10 justed and fixed in an opposite position, in which the eccentricity of the shaft 1 will compensate that of the disks, or fly-wheels, 4 so that the said disks, or fly-wheels, 4 will be
 15 nearly concentric with the journals 2 of the shaft 1. By adjustment and fixing in intermediate positions, any intermediate eccentricity can be obtained.

The shaft 1 is provided with the pulley 6 fixed to it and driven for example by a belt from a pulley vertically above it, or in any
 20 other suitable position. The pulley 6 is made with an eccentric boss so that, by being moved round on the eccentric shaft 1, it can be adjusted to, and fixed in the required
 25 position by any suitable keys, or bolts, in a position in which it will rotate concentrically itself, that is, with its axis in a line between the axes of the disks, or fly-wheels, 4 and the axes of the journals 2 of the shaft 1.

The motion of the vibrator is transmitted
 30 by the spring connecting rods 7 to the part of the jig, or concentrating, or washing apparatus to be acted upon, the said rods 7 being fitted at one end onto the journals 2 and provided with the bushings 8 kept in position by
 35 washers 9 held in place by pins, keys, nuts, or the like. The main parts of the rods 7 are of flexible material, such as thin, well tempered, spring steel to allow of free lateral vibration. The other, and lower, ends of the
 40 said rods 7 are connected to the part of the jig, or concentrating or washing apparatus to be acted upon, which connection can be done by forming screws on such end, passing these screws through attachments to the
 45 part to be acted upon and screwing on nuts, or the ends may be slotted to receive cotter pins, or any other suitable means of attachment can be used. The mass constituted by
 50 the shaft 1, sleeves 3, disks, or fly-wheels, 4 and pulley 6, will tend to rotate on the center of gravity of the whole mass. If the journals 2 be not in the center of rotation, they will tend to rotate eccentrically and will impart a gyratory motion to the upper ends
 55 of the rods 7, and as the spring of the rods 7 allows of free movement laterally, only vertical vibrations, or pulsations, will be transmitted by the lower ends of the rods, and consequently no power is absorbed in the lateral
 60 vibration and the whole of the power, less a minimum of friction, is usefully applied to the part to be acted upon.

Figs. 3 and 4 are sectional elevations, at right angles to each other, showing the ap-
 65 plication of the vibrator to a jig in which a

grating 10 is fixed in the hutch 11, the projections 12 from which rest between the springs 13. The sides of the lower part of the hutch 11 should be thin metal, or other flexible material, to allow of their vibrating,
 70 or pulsating. The flexible rods 7 of the vibrator are connected to the upper part of the hutch by the bridge-pieces 14. The overflow is marked 15 and 16 is the spout for feeding in the material to be treated. The con-
 75 centrates are drawn off through the valve 17, which is provided with a spiral spring 18 to keep it normally closed by acting on the opening lever. Water is supplied under the
 80 grating 10 by the pipe 19 connected to a source of water supply by a flexible tube. The projection 12 and the springs 13 are shown as being held in position by rods 20 and are carried by beams 21. In this ar-
 85 rangement the whole apparatus vibrates, or pulsates, the flexibility of the sides of the hutch 11 allowing the water to rise and fall through the grating 10 at each vibration, or pulsation. This apparatus is especially
 90 adapted for treating the finest slimes. In this arrangement the flexible rods 7 from the vibrator may be applied to any other convenient part, such as the lower part of the
 95 hutch, or to one, or more, of the sides of the hutch made especially thin to allow of the requisite vibration.

Figs. 5 and 6 are sectional elevations at right angles to each other showing the application of the vibrator to a jig in which the
 100 grating 10 is fixed in the upper part of the hutch 11, which is divided into two parts joined by a flexible joint at 22. The upper part of the hutch 11 may, or may not, be provided with projections 12 resting on
 105 springs at 13, and the lower part of the hutch may, or may not, be held by supports. In this arrangement the upper part of the hutch vibrates, or pulsates, with the grating, and it is especially adapted for the treatment
 110 of sand and slimes.

Figs. 7 and 8 illustrate, in sectional elevations at right angles to each other, the application of the vibrator to the grating 10 of
 115 a jig, the said grating being suspended in a fixed hutch 11^a. The grating 10 is suspended by the projections 12 on springs 13, held in position by rods 20, on the top of the hutch and is provided with an overflow 15 attached to the hutch by a flexible connection to allow
 120 of the grating moving and prevent the escape of water, except from above the grating 10. The draw-off valve 17 for the concentrates is shown as being normally kept closed by a lever and weight 18^a. In this arrangement
 125 the grating 10 only vibrates, or pulsates. The said arrangement is suitable for treating sand and coarse slimes.

Figs. 9 and 10 illustrate, in sectional elevations at right angles to each other, the application of the vibrator to a jig with a plun-
 130

ger 23. The flexible connecting rods 7 are fixed to the plunger rods 24, which pass through guides 25 in cross-bars 26 fixed across one division of the upper part of the hutch 5 11^b. The plunger is supported by springs 13^a as shown. In this arrangement the plunger moves and communicates pulsations to the water, while the grating 10 is fixed in the other division of the upper part of the hutch 10 11 and is motionless. This arrangement is especially suitable for treating coarser materials.

The parts which are shown in Figs. 5 to 10 corresponding to those shown in Figs. 3 15 and 4 are marked with the same reference numerals.

It will be evident that my invention can be analogously applied in various ways to suit various conditions, or requirements.

20 By the use of a combined vibrator and jig, or concentrating, or washing apparatus as described, minerals in a fine state of division, as well as in a coarser state, can be brought to the highest, or any required, de- 25 gree of concentration. It will be seen that the apparatus is of very simple construction, requiring but a minimum of motive power. It is subject to a minimum of wear and tear, and entails a minimum cost of labor in the 30 concentrating, or washing, of minerals.

I am aware that it has been proposed to impart gyrating, vibrating, reciprocating, or shaking, motion to sieves, sorting, separating and dressing apparatus molds, filling 35 tables and the like, by means of an unbalanced rotating spindle and weight or by a rotating spindle and unbalanced weight and I wish it to be understood that I do not claim this.

40 I claim as my invention:

1. In a washer for concentrating and washing materials, a rotary vibrator, a spindle on which said vibrator is mounted and a flexible member supporting said spindle on 45 the part of the washer to be vibrated.

2. In apparatus for concentrating and washing minerals, a rotary vibrator supported on the part of the washer to be vibrated, a spindle carrying said vibrator and 50 a flexible member supporting said spindle on the vibrated part.

3. In apparatus for concentrating and washing minerals, a vibrated part of the washer, a resilient support for the same, a 55 rotary vibrator, a spindle on which said vibrator is mounted and a flexible support for said spindle on said vibrated part.

4. In a washer for concentrating and washing materials, a vibrated part of the

washer, a resilient support for the same, a 60 rotary vibrator, a spindle on which said vibrator is mounted and a flexible standard carrying said spindle and mounted on the said vibrated part, substantially as described.

5. In a washer for concentrating and 65 washing materials, a vibrator connected with a part to be actuated thereby, said vibrator comprising an eccentrically journaled shaft, an adjustable disk eccentrically mounted on said shaft, and means for rotating said shaft, 70 substantially as described.

6. In a washer for concentrating and washing materials, a vibrator connected with a part to be actuated thereby, said vibrator comprising an eccentrically journaled shaft, 75 a sleeve concentric with said shaft, a disk eccentrically mounted on and adjustable with relation to said sleeve, and means for rotating said shaft, substantially as de- 80 scribed.

7. In a washer for concentrating and washing materials, a vibrator connected with a part to be actuated thereby, said vibrator comprising an eccentrically journaled shaft and a weight thereon, in combination with 85 a driving pulley adjustably mounted thereon so that it may be made to rotate concentrically during the eccentric rotation of the shaft, substantially as described.

8. In a washer for concentrating and 90 washing materials, a vibrator connected with a part to be actuated thereby, said vibrator comprising an eccentrically journaled shaft and a weight thereon, in combination with a driving pulley provided with an eccentric 95 boss whereby it is adjustably mounted thereon so that it may be made to rotate concentrically during the eccentric rotation of the shaft, substantially as described.

9. In a washer for concentrating and 100 washing materials, an eccentric rotating on a substantially horizontal axis and means for communicating only the vertical thrust thereof to the part of the washer to be vi- 105 brated.

10. In a washer for concentrating and washing materials, an eccentric rotating on a substantially horizontal axis and flexible means for communicating only the vertical thrust thereof to the part of the washer to 110 be vibrated.

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

ARTHUR TAYLOR.

Witnesses:

WILLIAM GERALD REYNOLDS,
GILBERT FLETCHER TYSON.