

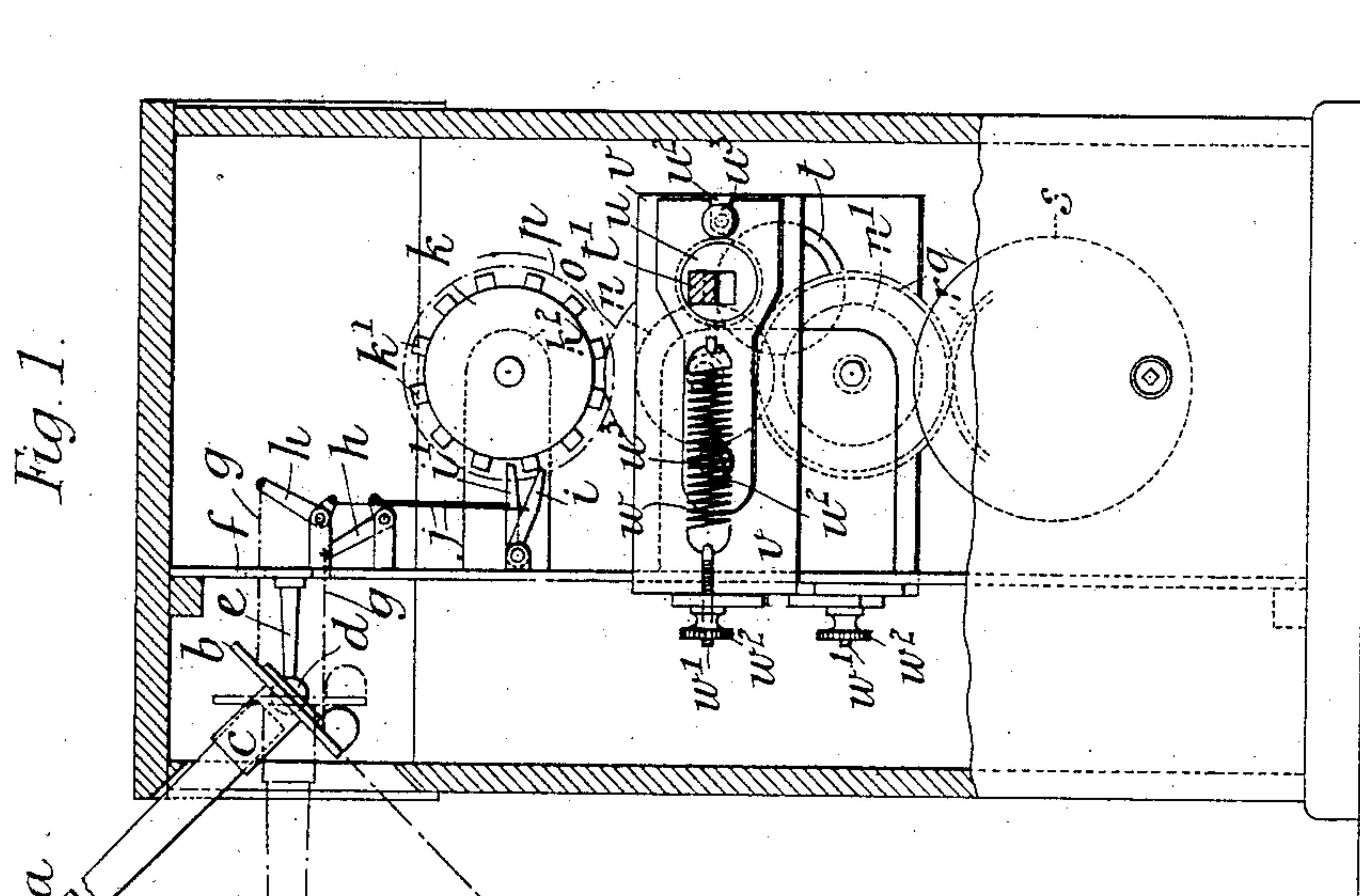
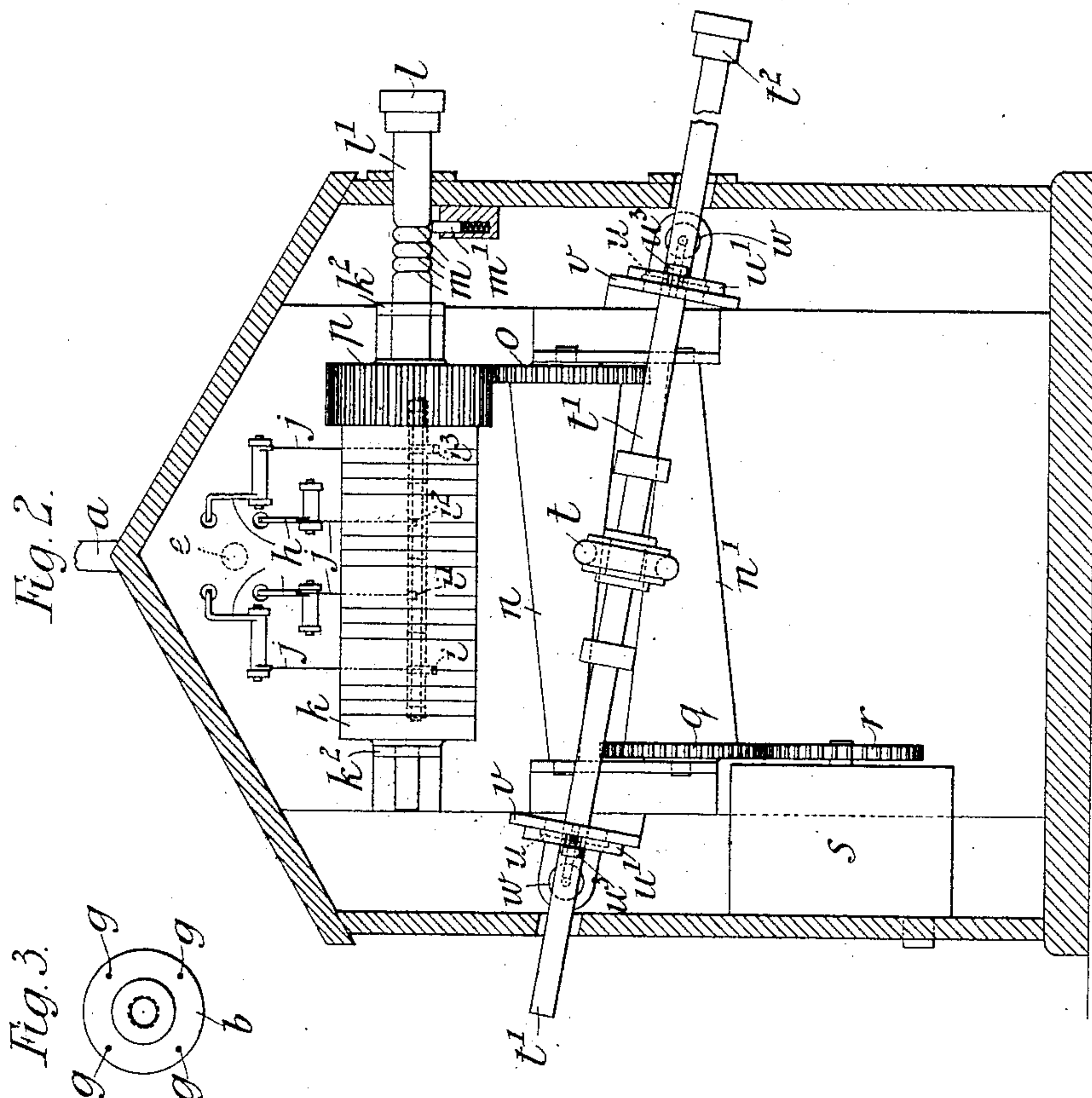
(No Model.)

2 Sheets—Sheet 1.

J. T. HANSON.
METRONOME.

No. 512,470.

Patented Jan. 9, 1894.



Witnesses
G. W. Drew
S. A. Pambuschmidt

Inventor:
By John D. Hanson
Whitaker & Brewster attys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

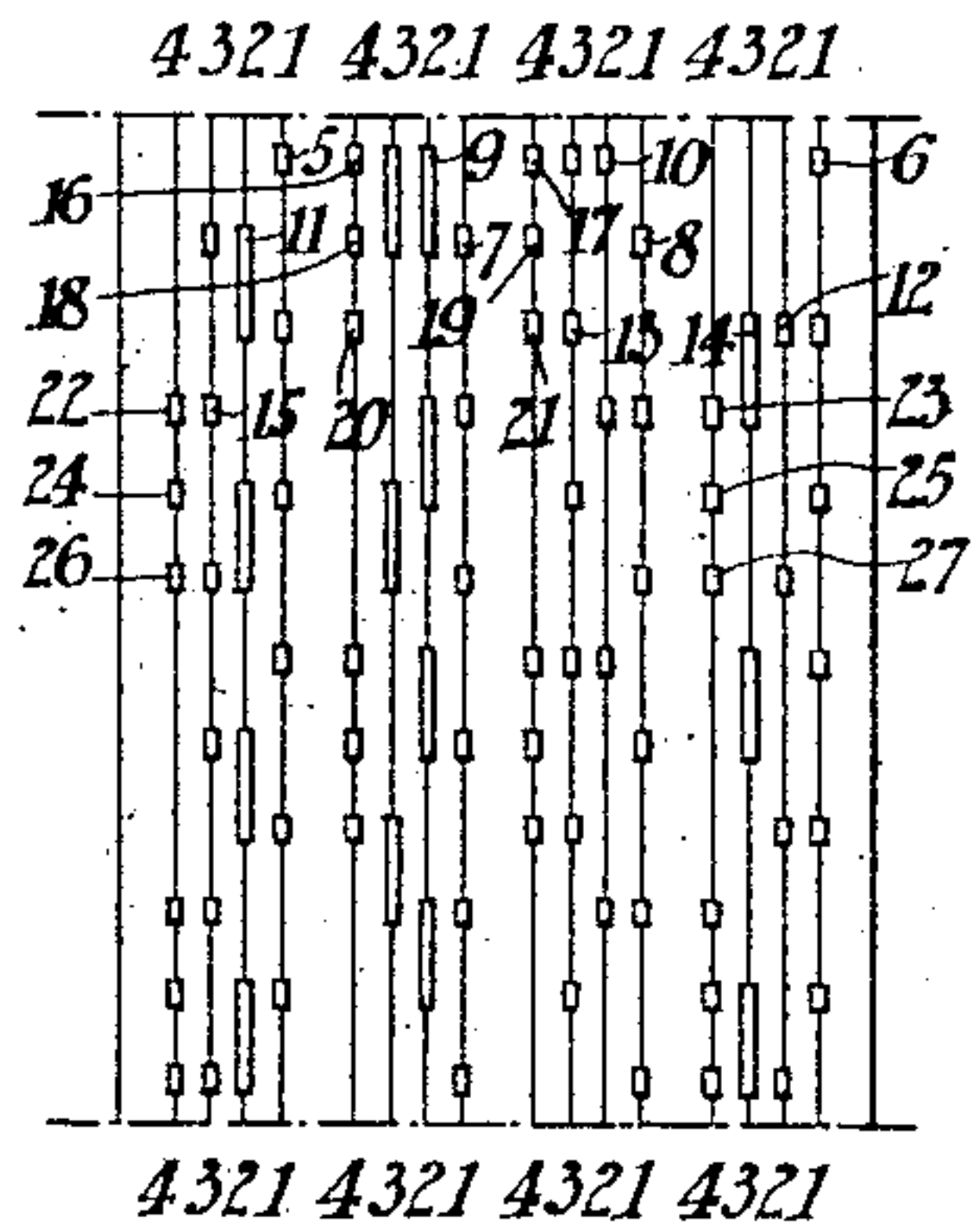


Fig. 5.

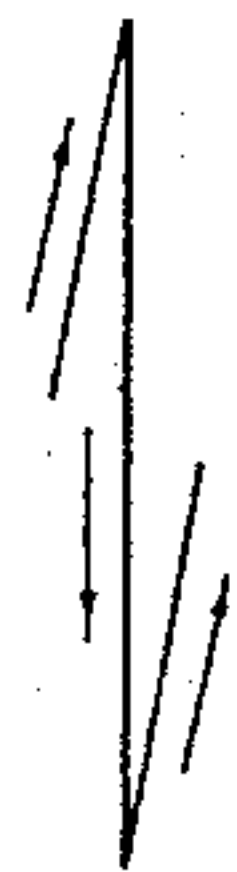


Fig. 6.

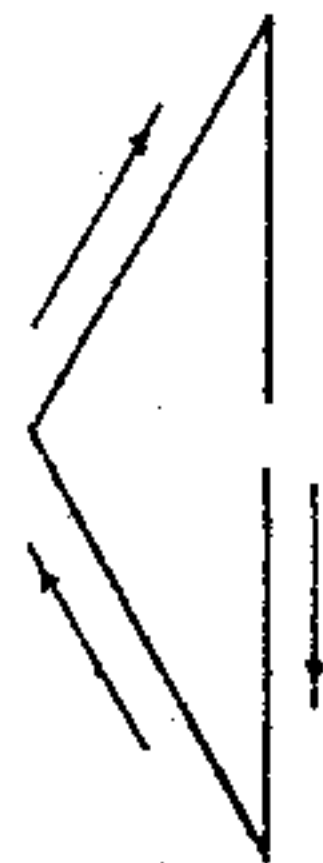


Fig. 7.

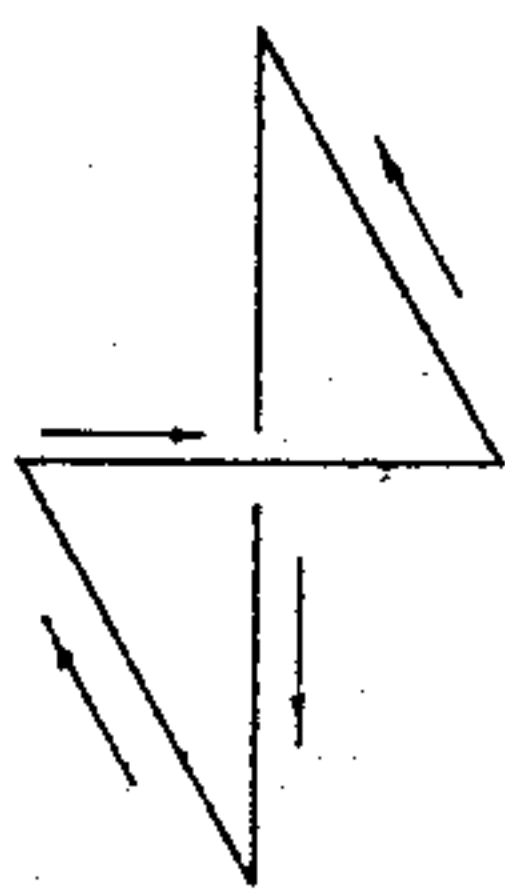


Fig. 8.



Witnesses.

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By *John T. Hanson* Inventor
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UNITED STATES PATENT OFFICE.

JOHN TREADWAY HANSON, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF TO ERNEST RADCLYFFE CRUMP, OF SAME PLACE.

METRONOME.

SPECIFICATION forming part of Letters Patent No. 512,470, dated January 9, 1894.

Application filed March 13, 1893. Serial No. 465,789. (No model.)

To all whom it may concern:

Be it known that I, JOHN TREADWAY HANSON, a subject of the Queen of Great Britain, residing at London, England, have invented
5 a new and useful Improved Metronome, of which the following is a specification.

This invention relates to an improved metronome in which a conductor's baton for marking and beating time is employed, the
10 operation of said baton being effected by mechanical means.

In carrying out the invention I employ a socket for holding the baton and supported on a ball and socket or other universal joint
15 to enable it to be moved in any required direction. I advantageously effect this by constructing the socket with a disk connected at certain points by rods or chains and suitable bell-crank levers and rods to a series of key-
20 levers adapted to be operated by teeth on a rotating cylinder or drum. The said teeth are arranged in groups corresponding with the time to be marked or beaten and the drum is adapted to be moved longitudinally so as
25 to bring any group of teeth into correspondence with the key-levers.

The toothed cylinder or drum is advantageously driven by clock-work mechanism, and in order to vary the speed at which the baton
30 moves or beats time I advantageously employ conical drums or rollers with parallel axes but arranged so that the large end of each drum is adjacent to the small end of the other drum. One of the said drums is operated by
35 the clock-work mechanism and imparts its movement to the other drum (which drives the toothed cylinder or drum hereinbefore described) by means of a friction wheel or roller adapted to be moved along the drums
40 so as to engage different portions of their adjacent surfaces.

To enable my invention to be fully understood I will describe how it can be carried into practice by reference to the accompanying
45 drawings, in which—

Figure 1 is a side elevation with a part of the case removed of a metronome constructed according to my invention. Fig. 2 is a sectional elevation of the same looking from the
50 rear. Fig. 3 is a view of a detail. Fig. 4 is a development of a surface of the toothed

cylinder or drum; and, Figs. 5 to 8 are diagrams indicating approximately the movement of the baton in beating different kinds of time.

a is the baton, and *b* the disk having the socket *c* carrying the baton, the said disk being weighted so as to maintain the baton normally in the position indicated by the dotted lines in Fig. 1.

d is the ball and socket joint supporting the disk *b* and allowing it to be moved in any required direction, the ball of the joint being carried by an arm *e* attached to a part of the frame *f* of the instrument.

g, g are the rods or chains (four of which are preferably used) attached to the disk *b* at points equidistant from the center of the disk and from one another, as clearly shown in Fig. 3 which is a rear view of the said disk.

h, h are the bell-cranks connected to the rod or chains *g, g* which latter pass through holes in the frame *f*, and *i, i', i'', i'''* are the key-levers connected to the bell-cranks by rods *j, j*.

k is the toothed cylinder or drum, the teeth *k'* on which, when the cylinder is rotated, are adapted to depress the key-levers and operate the baton. In Fig. 2 the teeth *k'* are omitted for the sake of clearness. The cylinder *k* is provided with four series of teeth corresponding with four different kinds of time to be beaten by the baton as hereinafter described, and in order that each of these series may be placed to correspond and engage with the key-levers as required, the cylinder *k* is adapted to be moved by hand longitudinally in its bearings *k², k²* by a knob *l* on an extension *l'* of its axis.

m, m, m, m are four grooves in the extension *l'*, with each of which grooves a spring-stop *m'* is adapted to engage so as to keep the cylinder *k* from longitudinal movement when any one of the series of teeth *k'* is opposite or adjacent to the key-levers.

n, n' are the conical drums or rollers, the former of which is provided with a spur-wheel *o* which gears with a similar wheel *p* on the cylinder *k* while the roller *n'* is provided with a spur-wheel *q* driven by a spur-wheel *r* of a suitable clock-work mechanism contained in a case *s* or by other suitable means.

t is the friction roller advantageously formed

with an india-rubber periphery and mounted loosely on a rod t' provided with a knob t^2 so that it can be moved by hand longitudinally in its bearings to enable the said roller t to
 5 engage or bear against different adjacent portions of the surfaces of the rollers n, n' to alter the speed of the cylinder k and consequently of the baton a , the rollers n, n' , the axes of which are parallel, being for this purpose arranged so that the large end of the one
 10 is adjacent to the small end of the other. In order that the roller t may be moved out of contact with the surfaces of the rollers n, n' when it is required to move it longitudinally
 15 as just described, I advantageously mount its rod t' in eccentric disks u, u' carried in plates u', u' , which plates are provided with slots w^2 by which they are supported on pins w^3 on brackets v, v , the said slots enabling the plates
 20 u', u' to move relatively to the brackets v, v to accommodate themselves to the different positions of the roller t . The rod t' is advantageously of a square section to rotate the eccentric disks u, u' with it in whatever position
 25 it may be in longitudinally.

w, w are springs attached at one end to adjusting screws w', w' held by nuts w^2, w^2 to the frame f and at the other end to the plates u', u' so as to impart a spring-pressure to the
 30 roller t .

The rods l' and t' are graduated to enable the operator to adjust them in any required position.

To demonstrate clearly the operation of the
 35 apparatus I have shown in Fig. 4 a development of the surface of the toothed cylinder or drum with the four series of teeth thereon and numbered 1, 2, 3 and 4, and in Figs. 5 to 8 four diagrams representing approximately the
 40 movements of the baton corresponding respectively to the said four series of teeth, the said series of teeth and movements also corresponding respectively to what are known as $\frac{2}{4}$ and $\frac{3}{4}$ to $\frac{4}{4}$ or common time and to $\frac{6}{8}$ time.
 45 The four series of teeth are each composed of four rows, one for each key-lever.

I will now describe how the baton is operated to beat the various kinds of time enumerated above, assuming in each instance
 50 the initial position of the baton to be in its normal or central position.

To operate the baton to beat $\frac{2}{4}$ time the cylinder k must be moved longitudinally to place the series of teeth marked 1 in such a position that when the said cylinder is rotated the key-levers will be operated by them. By now allowing the cylinder to rotate it will be seen that the two teeth marked 5, 6 will simultaneously operate the key-levers i, i^3 and
 60 raise the baton vertically from its normal position to its highest central position. The continued rotation of the cylinder will then cause the teeth marked 7, 8 to operate the key-levers i', i^2 and lower the baton vertically
 65 to its lowest position, the succeeding teeth in the series 1 (which teeth are arranged similarly to the teeth 5, 6, 7 and 8) continuing

this up and down movement of the baton. To cause the baton to beat $\frac{3}{4}$ time the series of teeth marked 2 must be placed to operate
 70 the key-levers, in which case it will be seen that the teeth marked 9, 10 operating on the key-levers i', i^2 will lower the baton, the tooth 11 acting on the key-lever i in conjunction with the continuation of the tooth 9 still acting
 75 on the key-lever i' will move the baton to the left hand of the apparatus and the tooth 12 acting on the key-lever i^3 in conjunction with the continuation of the tooth 11 still acting on the key-lever i will raise the baton to
 80 its highest central position and so on. In beating $\frac{4}{4}$ or common time it will be seen by reference to the series of teeth marked 3 that the two first movements just described with reference to $\frac{3}{4}$ time, that is to say, the down
 85 and left hand movements are effected by a similar arrangement of teeth to those described, but for moving the baton to the right hand side the teeth 13 and 14 will operate the key-levers i^2, i^3 and for finally raising
 90 the baton a tooth 15 will act on the key-lever i in conjunction with the continuation of the tooth 14 still acting on the key-lever i^3 . In beating $\frac{6}{8}$ time the teeth marked 16 and 17 of the series 4 will act upon the key-levers
 95 i', i^2 to lower the baton, the tooth 17 being made of a relatively greater height than the tooth 16 in order that the baton may as it is lowered be moved to a position slightly to the right. The teeth 18 and 19 which are of the
 100 same height operate the said key-levers i', i^2 to move the baton into its lowest central position and the teeth 20 and 21 also operating on the said key-levers (the tooth 20 being of greater relative height than the tooth 21) to
 105 move the baton slightly to the left. A series of teeth 22, 23, 24, 25, 26, and 27 will now operate upon the key-levers i, i^3 to raise the baton and impart a similar series of movements to those imparted by the teeth 16 to 21
 110 when in its lowest position but toward the right hand side, the teeth marked 22 and 27 being of relatively greater height than the teeth 23 and 26 respectively while the teeth 24 and 25 are equal in height.

Although I have described the disk b as being connected at four points to the key-levers I may in some cases connect it at a greater number of points, such as eight, to a similar number of key-levers operated by suitable
 120 teeth on the cylinder k .

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—
 125

1. In a metronome the combination with a baton, and a support for the same, said baton and support being connected by a universal joint, a series of levers connected with said baton to move it in different directions and a
 130 device for moving said levers singly or two together or in succession to give said baton simple and compound movements, substantially as described.

2. In a metronome the combination with a baton, mounted for universal movement, a series of levers connected with said baton for moving it in different directions, a longitudinally movable cylinder for operating said levers, said cylinder being provided with two or more rows of projections for each of said levers, substantially as described.

3. In a metronome the combination with a baton, mounted for universal movement, of separate operating devices connected with the said baton at points about and at a short distance from the baton's center of movement whereby the operation of each device will move the baton in a certain direction and the operation of two adjacent devices will move it in a different direction, substantially as described.

4. In a metronome the combination with the baton provided with laterally projecting portions and a universal joint construction for supporting said baton, of a series of controlling levers, connections from said levers to said laterally projecting portions connected thereto at points about and a short distance from the center of movement of the baton, and a cylinder provided with projections for operating said levers, substantially as described.

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