No. 742,216. PATENTED OCT. 27, 1903.

E. NICHOLSON.

SHIP'S LOG.

APPLICATION FILED JUNE 3, 1901.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 2.

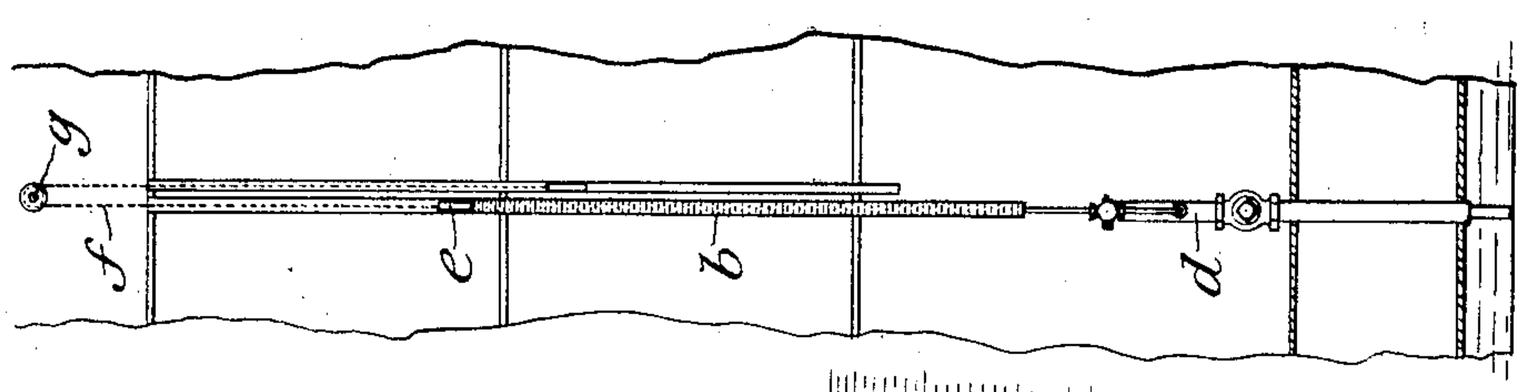
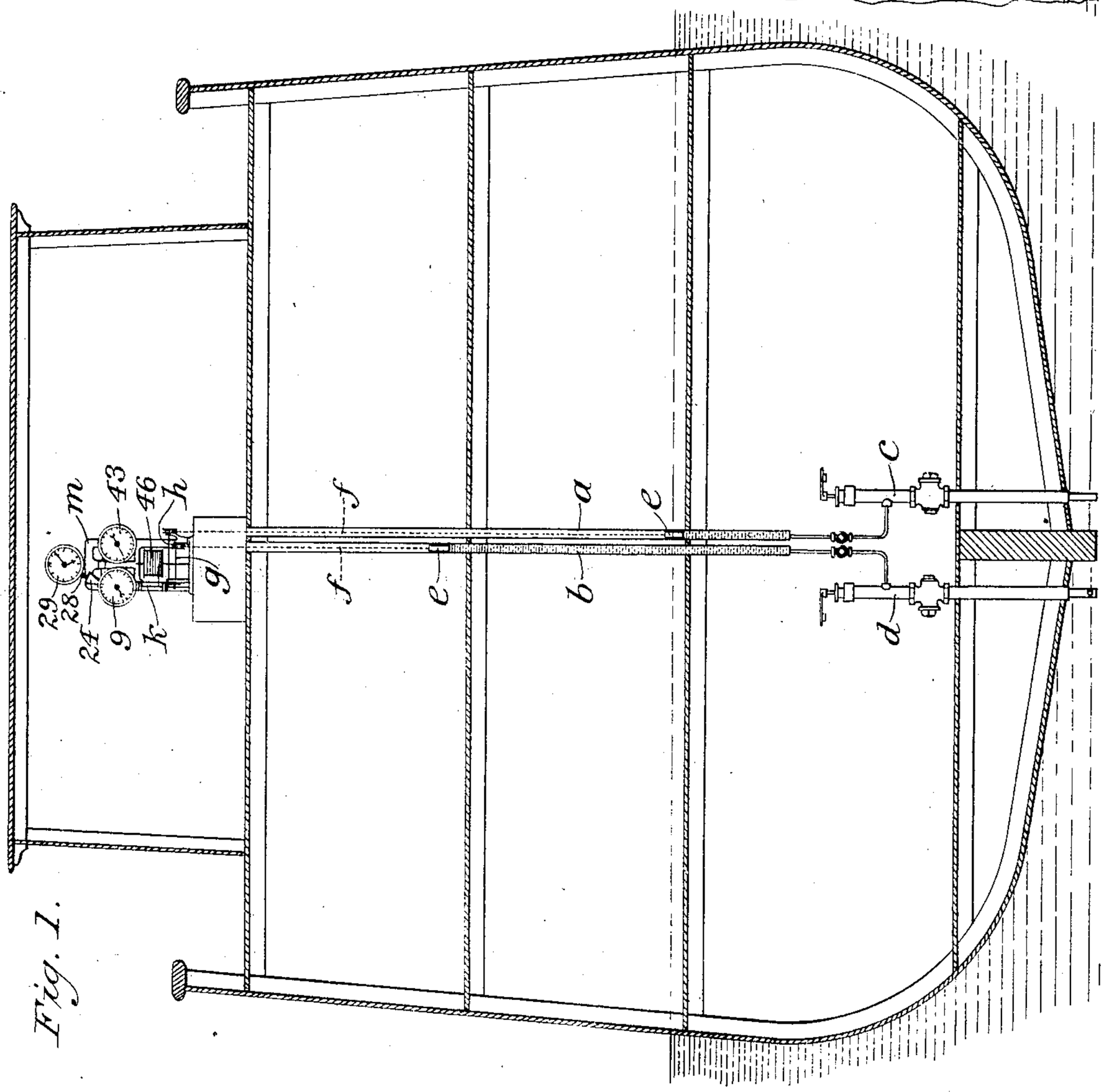


Fig. 1.



WITNESSES:

Wm. A. Skinkle

A. N. Jesbera

INVENTOR:

Ezra Nicholson

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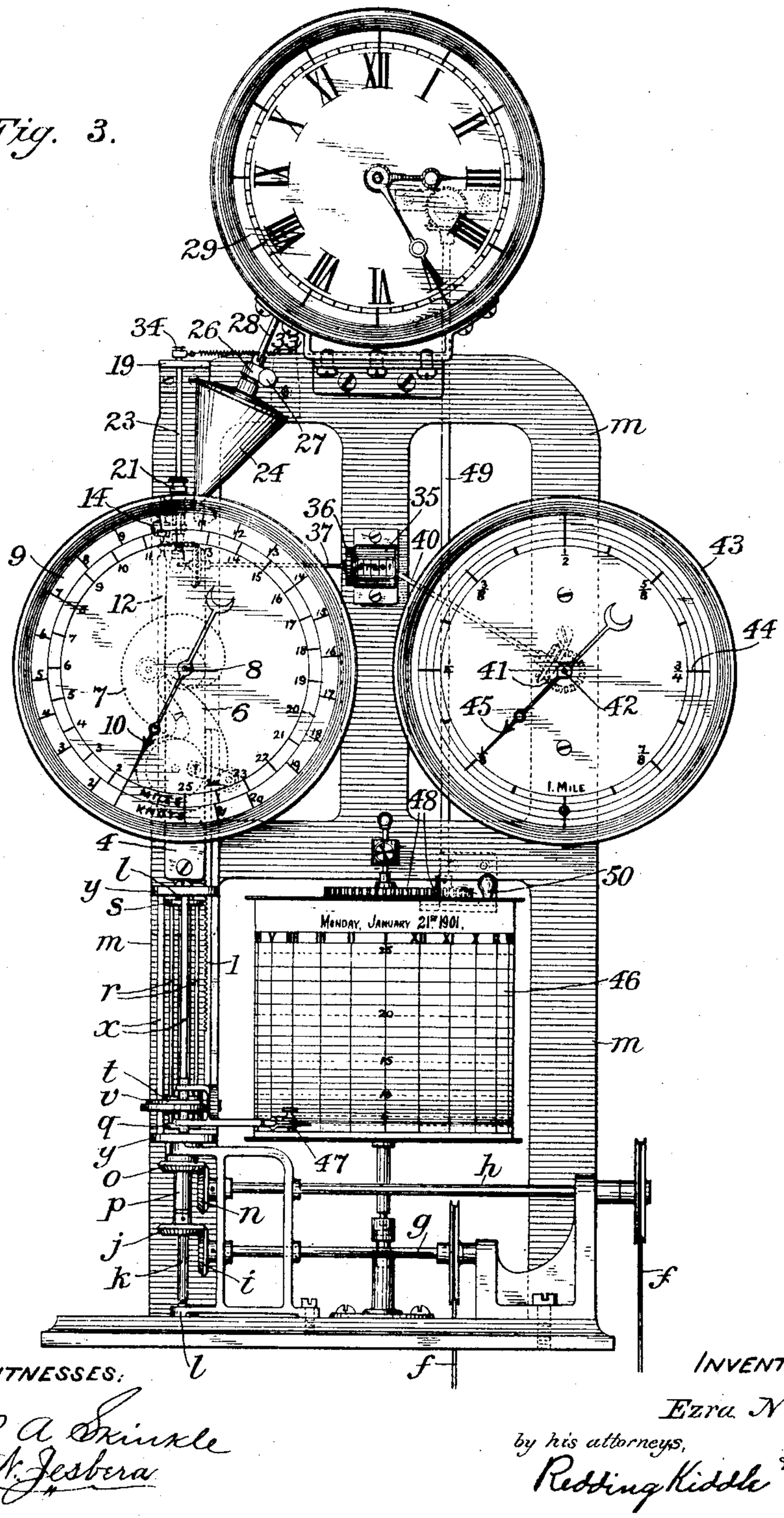
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 3.



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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 4.

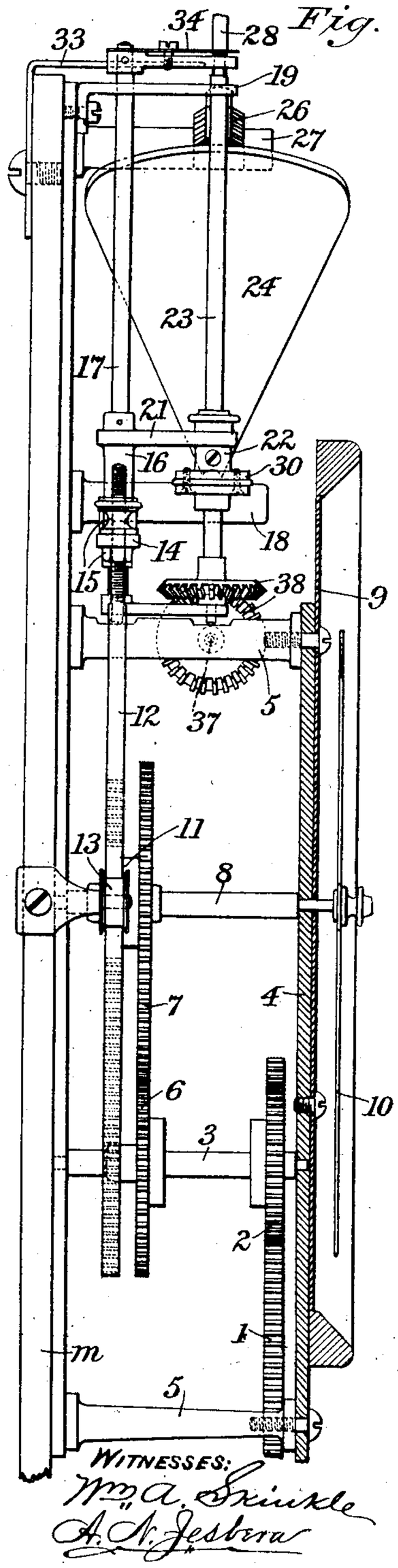

Fig. 5.

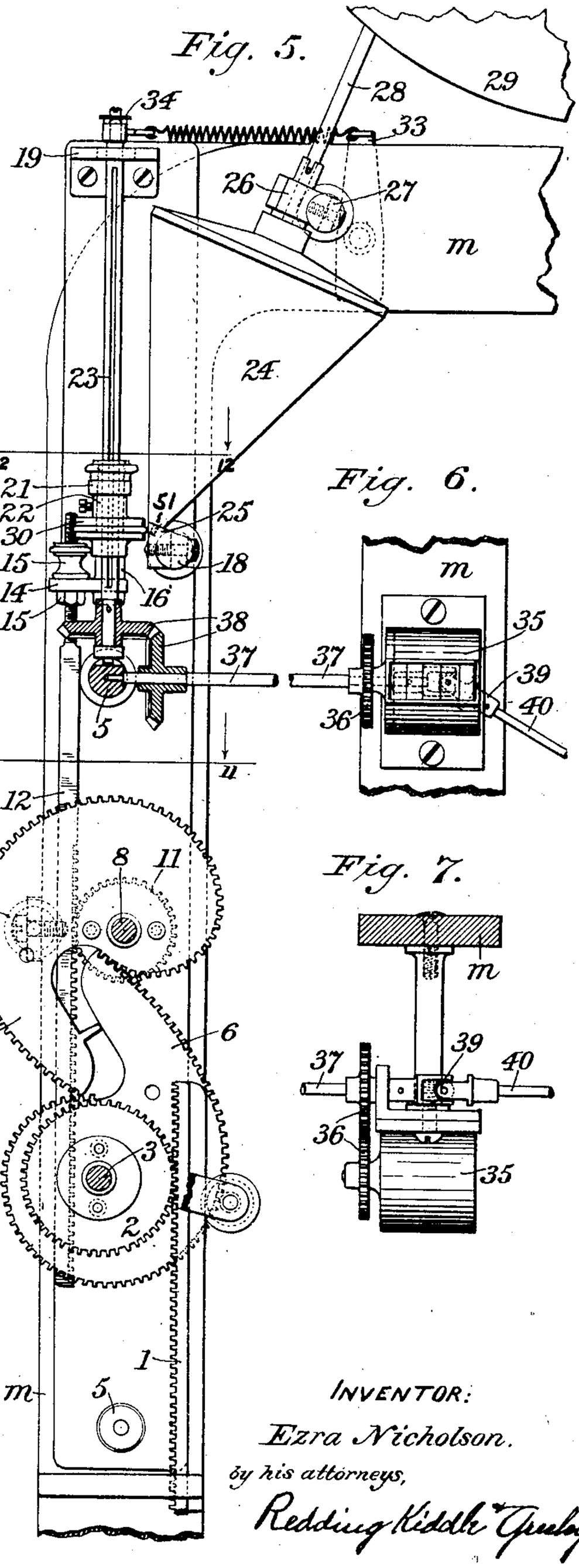

Fig. 6.

Fig. 7.

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NO MODEL. 5 SHEETS—SHEET 4.

Fig. 8.

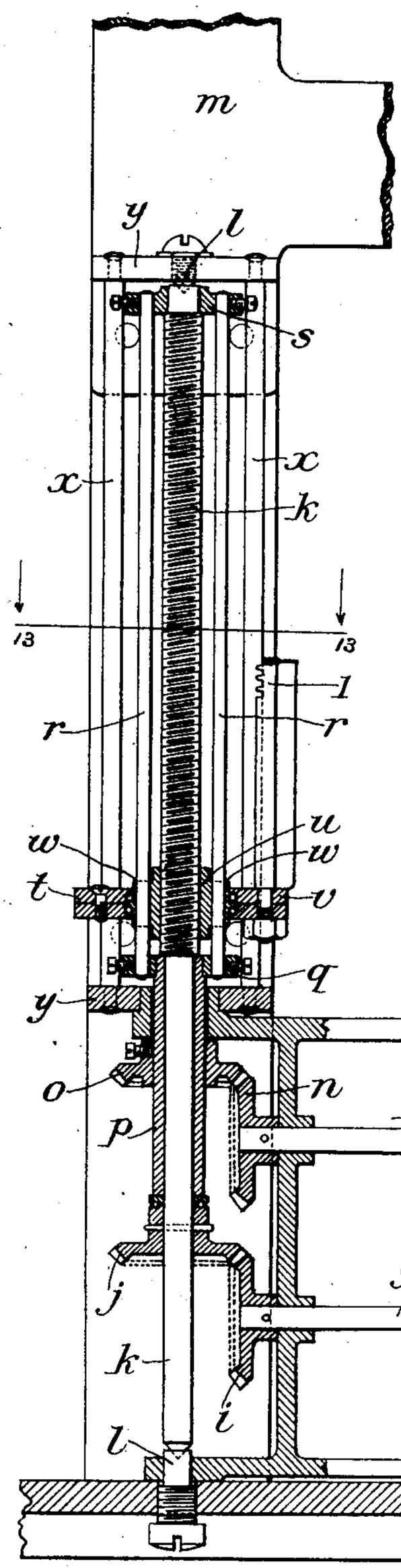
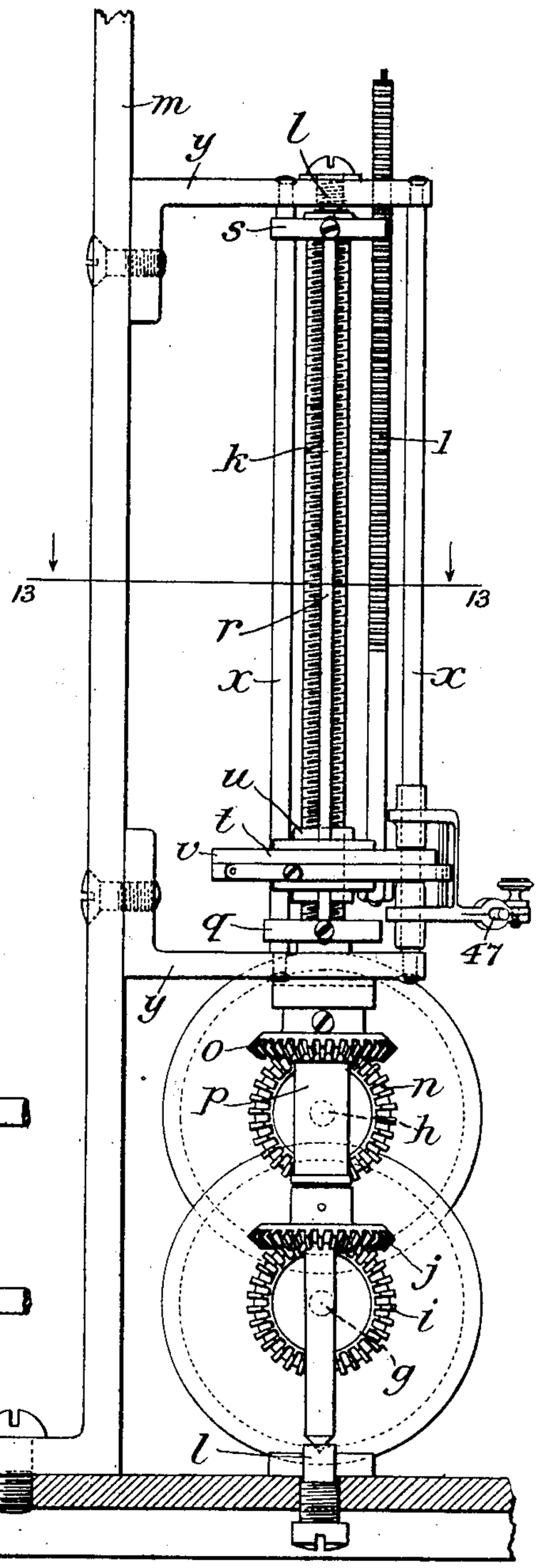


Fig. 9.



WITNESSES:

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APPLICATION FILED JUNE 3, 1901.

NO MODEL. 5 SHEETS—SHEET 5.

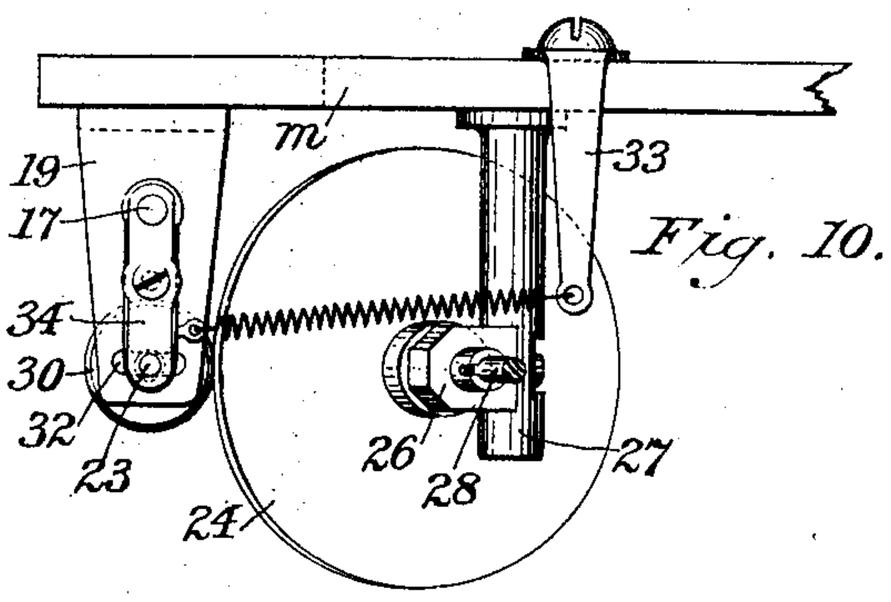

Fig. 10.

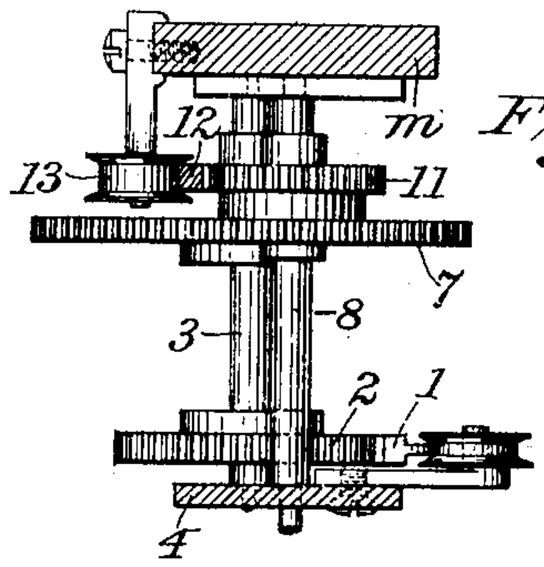

Fig. 11.

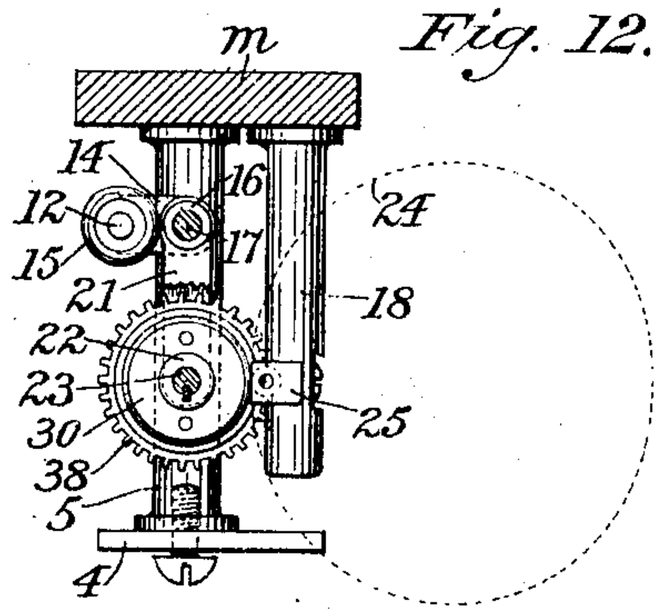

Fig. 12.

Fig. 13.

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No. 742,216. Patented October 27, 1903.

UNITED STATES PATENT OFFICE.

EZRA NICHOLSON, OF LAKEWOOD, OHIO.

SHIP'S LOG.

SPECIFICATION forming part of Letters Patent No. 742,216, dated October 27, 1903.

Application filed June 3, 1901. Serial No. 62,920. (No model.)

To all whom it may concern:

Be it known that I, EZRA NICHOLSON, a citizen of the United States, residing in Lakewood, Cuyahoga county, State of Ohio, have invented certain new and useful Improvements in Ships' Logs, of which the following is a specification.

The invention relates especially to improvements in the distance indicating and recording mechanism of ships' logs and also to the other new and novel features of construction set forth and claimed.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, said detailed construction being but one of various mechanical forms in which the principle of the invention may be used.

In said drawings, Figure 1 represents a vertical transverse section of a vessel, showing the log in place, the stand-pipes being in section. Fig. 2 is a detail elevation of the stand-pipes and intake-tubes, the stand-pipes being in section. Fig. 3 represents a front elevation of the log. Fig. 4 represents a side elevation, on an enlarged scale, of the upper part of the log as seen from the left of Fig. 3. Fig. 5 represents a front elevation of the parts shown in Fig. 4, the speed-dial and pointer being removed. Fig. 6 is a detail view showing the distance-recorder and the means for operating same. Fig. 7 is a plan view of the parts shown in Fig. 6. Fig. 8 represents a detail front elevation, partly in section, showing the speed-indicating mechanism of the log. Fig. 9 represents a side elevation of the mechanism shown in Fig. 8. Fig. 10 is a plan view of the cone, its support, and the friction-wheel for actuating the distance-recording mechanism. Figs. 11 and 12 represent cross-sections on the lines 11 11 and 12 12, respectively, of Fig. 5. Fig. 13 represents a plan view of the charting mechanism, partly in section, on the plane of the line 13 13 of Figs. 8 and 9.

The log is actuated primarily by variations in the height of two columns of water contained in stand-pipes *a* and *b*, that are connected with valve-controlled intake-pipes *c* and *d*, respectively, which project below the bottom of the vessel. The intake-pipe *c* is provided with an opening, so that the column of water contained in the stand-pipe *a* will always correspond with the water-level of the vessel, and the pipe *d* is provided with an opening, so that the column of water contained in the stand-pipe *b* will vary according to the speed at which the vessel is driven forward. The pipes are provided with floats *e*, that are operatively connected by means of cords or chains *f* with the shafts *g* and *h*, whereby said shafts may be rotated. The shaft *g* is connected with the float contained in the stand-pipe *b* and is provided at its inner end with a gear *i*, meshing with a corresponding gear *j*, that is keyed to a feed-shaft *k*, rotatable in bearings *l*, provided by brackets upon the frame *m*. The shaft *h* is rotated by the float contained in the stand-pipe *a* and is operatively connected through gears *n* and *o* with a sleeve *p*, rotatable upon the shaft *k*. Said sleeve is provided at or near its top with a disk or head *q*, and rods *r*, parallel with the shaft, are secured in said disk and in a corresponding disk *s*, rotatably mounted at the top of said shaft *k*. The feed-shaft is screw-threaded a portion of its length and is provided with a feed-disk *t*, comprising a hub *u*, threaded upon the shaft, and an outer annular ring *v*, secured to the hub portion in any suitable manner, as by a tongue-and-groove connection. Said rods *r* pass through perforations *w*, provided in the hub, so that said hub will be rotated upon the shaft by the movement or rotation of the sleeve. The outer or ring portion *v* of the disk is held against rotation, but is permitted movement lengthwise of the feed-shaft by means of rods *x*, secured to brackets *y* on the frame. A rack 1 is secured to the outer portion of the disk and engages with a pinion 2, secured to a shaft 3, rotatable in the frame, and a plate 4, that is supported by brackets 5. A spiral gear 6, forming one member of the compensating gearing, is secured to said shaft and meshes with a compensating spiral gear 7 upon a shaft 8, likewise journaled in the frame and plate. These spirals are so constructed that the upper spiral will move the same distance for every corresponding increase in the speed of the vessel, and consequently the speed will be accurately indicated thereby. A dial 9, provided with graduation-marks, is secured to the plate 4, and the end of shaft 8 projects

through the dial and is provided with a pointer 10 to indicate the speed thereon.

The shaft 8 has a gear 11 keyed thereon that meshes with the rack 12, which is guided and held in engagement with the pinion, preferably by means of the roller 13. The rack is provided at its top with an arm 14, that is adjustably secured by means of nuts 15 to a sleeve 16, movable upon a shaft 17, supported by brackets upon the frame. Said sleeve is connected by a carrier-arm 21 with a sleeve 22, mounted upon and movable lengthwise of a shaft 23, rotatable in bearings provided in the bracket 5 and a bracket 19 upon the frame. A cone 24 is arranged adjacent to the shaft with its face parallel thereto. A small portion of the cone at the apex is removed, and a pin 51, which may be formed integral with the cone and which is in line with its axis, is journaled in suitable bearings in a base-block 25, supported by a bracket 18, arranged near the bottom of the shaft and which is held in place by a bearing 26 upon an arm or bracket 27. A shaft 28 is secured to the cone, that is operatively connected with the mechanism of a clock 29, whereby said cone is rotated at a uniform rate of speed. A movable contact member or friction-wheel 30 is secured to or formed integral with the sleeve 22, that engages with the face of the cone and is rotated thereby. Preferably a wheel or disk having a facing of rubber or similar material to engage the cone is used as the movable contact or coupling member; but it is obvious that any mechanism movable on the face of the cone and rotatable thereby may be used. Since the sleeve is splined upon a shaft, the rotation of the friction-wheel will be imparted to said shaft, the speed of rotation depending on the point of contact between said wheel and the cone. The base-block is arranged or constructed to permit the friction-wheel to pass below the apex of the cone when the vessel is not in motion. Lost motion is prevented in any suitable manner, as by permitting a slight movement of the shaft 23 in a slot 32, provided in the bracket 19, and securing a spring between the shaft and an arm 33 upon the frame. The shaft may be held against movement in the direction of its axis by a spring 34, that presses upon its top.

A distance-register 35 is supported upon the frame and is actuated in any suitable manner, as by gears 36, one of which is secured upon a shaft 37, that is rotatably connected with the shaft 23 by gears 38. Said shaft is secured by a gimbal-joint 39 with a shaft 40, connected through gears 41 with a spindle 42, rotatable in bearings upon the frame. The spindle projects through a dial 43, supported by the frame and having graduation-marks 44 upon its face and its outer end provided with a pointer 45 to indicate the distance traveled in fractions of miles or knots. Preferably a chart-drum 46 is rotatably mounted upon the frame adjacent to the feed-disk *t*, so as to be engaged by a pencil 47, that is secured to said disk and movable therewith. The drum is rotated by the clock at a uniform rate of speed through a chain of gears 48 and a shaft 49, rotatably connected with the clock. The lower end of said shaft is preferably journaled in a lever 50, pivoted to the frame, whereby one of said gears may be thrown out of mesh and the rotation of the drum discontinued, if so desired.

It is obvious that various changes may be made in the construction herein described without departing from the spirit of the invention, provided the means set forth in any one of the following claims is employed.

I claim as my invention—

1. In a ship's log, the combination with distance-registering mechanism, of a cone, means to rotate said cone regularly, a rotatable shaft operatively connected with said mechanism, a friction-wheel operatively engaging said cone and rotatively mounted on said shaft, a sleeve on said shaft secured to said friction-wheel, an arm connected with said sleeve for moving same lengthwise of the shaft, mechanism operatively connected with said arm whereby the sleeve is raised and lowered on the shaft the same distance for corresponding increases in the speed of the vessel.

2. In a ship's log, the combination of distance-registering mechanism comprising a distance-indicator and a permanent recorder, a clock, a cone rotated by said clock at a uniform rate of speed, a shaft operatively connected with said distance-indicator, and arranged parallel with the face of the cone, a friction-wheel rotatively mounted on said shaft and movable lengthwise thereon, compensating spirals operatively connected with the friction-wheel for moving said wheel the same distance for each corresponding increase in the speed of the vessel, and means for yieldingly holding said friction-wheel in engagement with the face of the cone whereby said distance-indicator is actuated.

3. In a ship's log, the combination with speed and distance indicating and registering mechanism, of a clock, a cone rotated by said clock, means operated by said cone for actuating the distance registering and indicating mechanism, a chart-drum rotated at a uniform speed by said clock, and means for indicating changes in the speed of the vessel on said chart-drum, substantially as described.

4. In a ship's log, the combination with distance-registering mechanism and speed-indicating mechanism, of a cone, means for regularly rotating said cone, a shaft parallel to the face of said cone, a contact member adapted to rotate with said shaft and operatively connected with both said registering mechanism and said indicating mechanism, and means to move said contact member out of engagement with said cone.

5. In a ship's log, the combination with distance-registering mechanism and speed-indicating mechanism, of a cone, means for

regularly rotating said cone, a shaft parallel to the face of said cone, a contact member adapted to rotate with said shaft and operatively connected with both said registering mechanism and said indicating mechanism, and means to move said contact member a corresponding distance for each corresponding increase in the speed of the vessel, said contact member being moved out of engagement with said cone when the registering mechanism is not in operation.

6. In a ship's log, the combination with distance-registering mechanism and speed-indicating mechanism, of a cone, means for regularly rotating said cone, a friction-wheel operatively connected with said registering mechanism, a carrier upon which said wheel is mounted, and means to adjust the position of the carrier.

7. In a ship's log, the combination with distance-registering mechanism and speed-indicating mechanism, of a cone, means for regularly rotating said cone, a shaft parallel to the face of said cone, a contact member adapted to rotate with said shaft and operatively connected with both said registering mechanism and said indicating mechanism, a carrier upon which said contact member is mounted, and means to move said carrier a distance corresponding to each increase in the speed of the vessel.

8. In a ship's log, the combination with distance-registering mechanism and speed-indicating mechanism, of a cone, means for regularly rotating said cone, a shaft parallel to the face of said cone, a contact member adapted to rotate with said shaft and operatively connected with both said registering mechanism and said indicating mechanism, a carrier upon which said contact member is mounted, means to adjust the position of the carrier, and means to move said contact member a distance corresponding to each increase in the speed of the vessel, said contact member being out of engagement with said cone when the registering mechanism is not in operation.

In testimony whereof I sign this application, in the presence of two witnesses, this 23d day of February, 1901.

EZRA NICHOLSON.

Witnesses:
CHAS. E. FERRELL,
CHARLES F. MORGAN.