

No. 764,906.

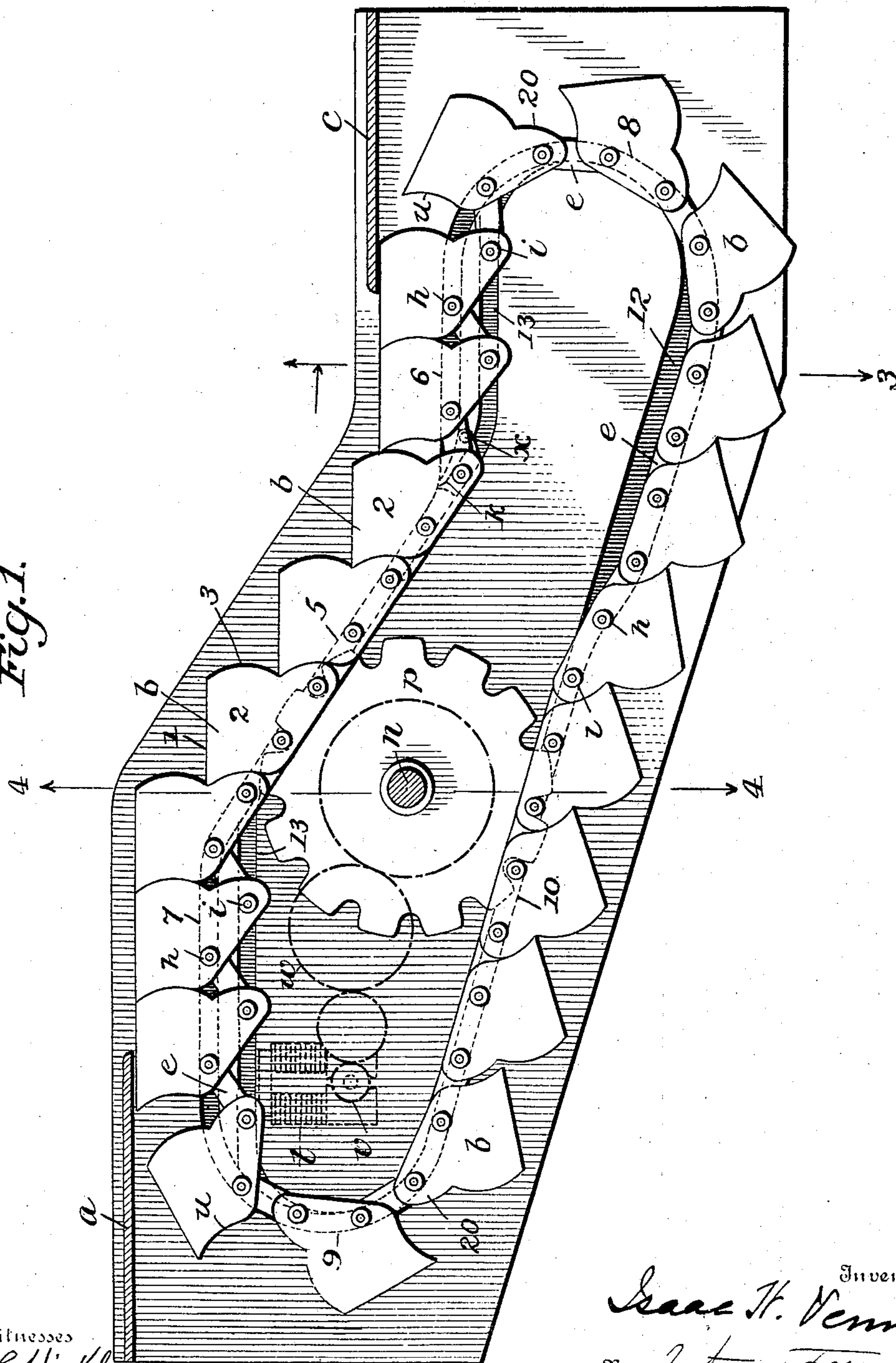
PATENTED JULY 12, 1904.

I. H. VENN.
TRAVELING STAIRWAY.
APPLICATION FILED JAN. 2, 1901.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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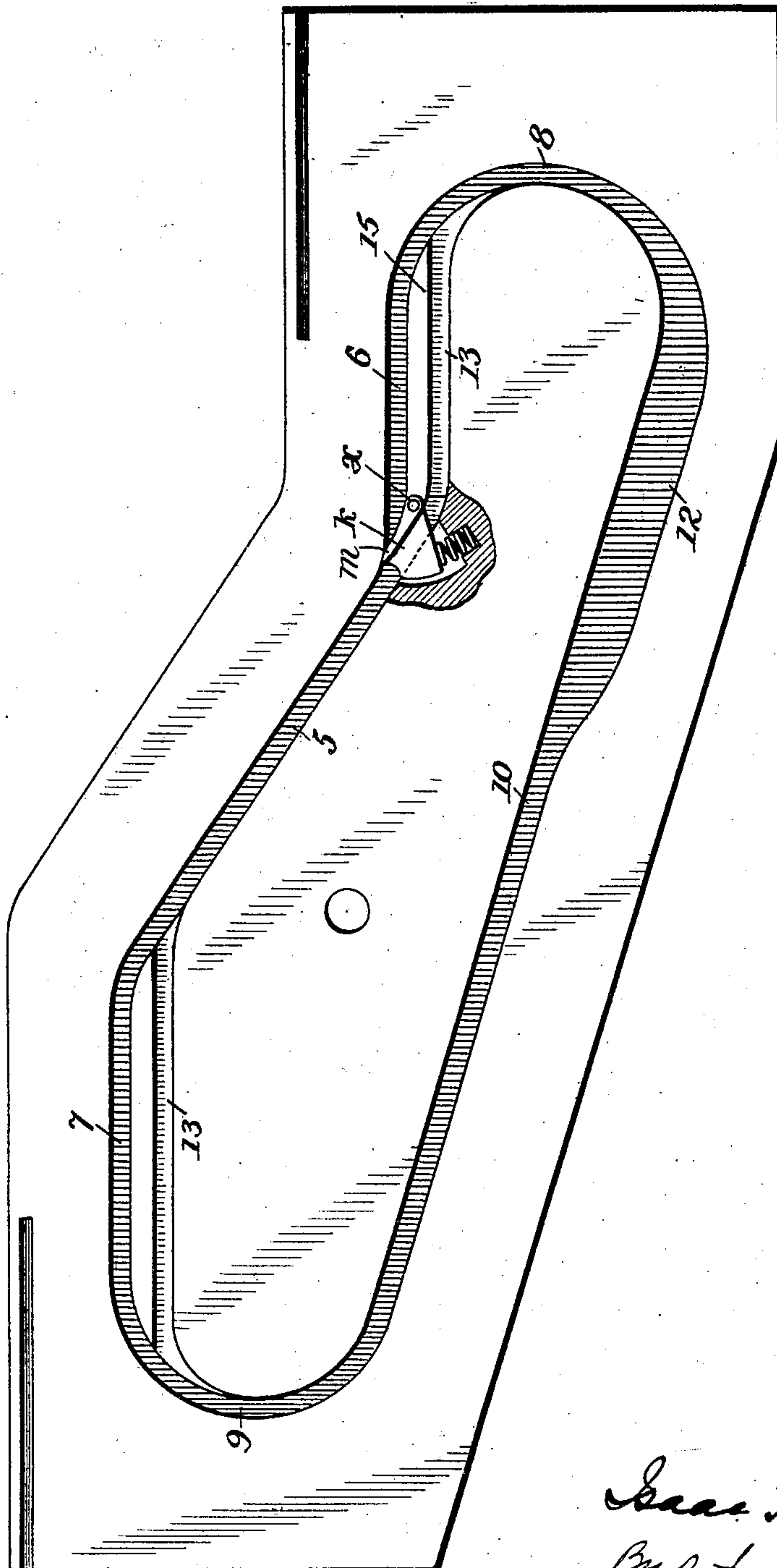
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

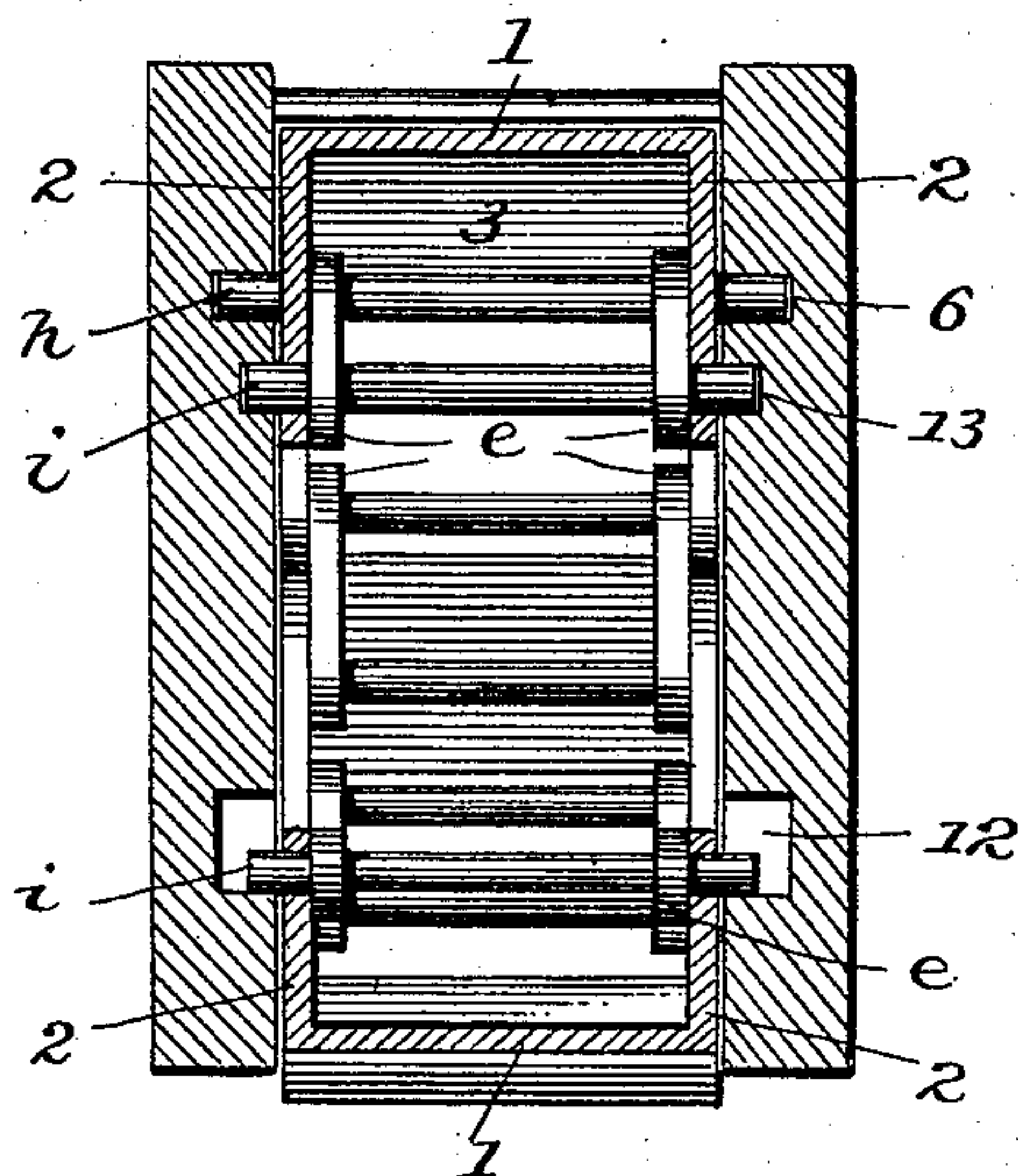
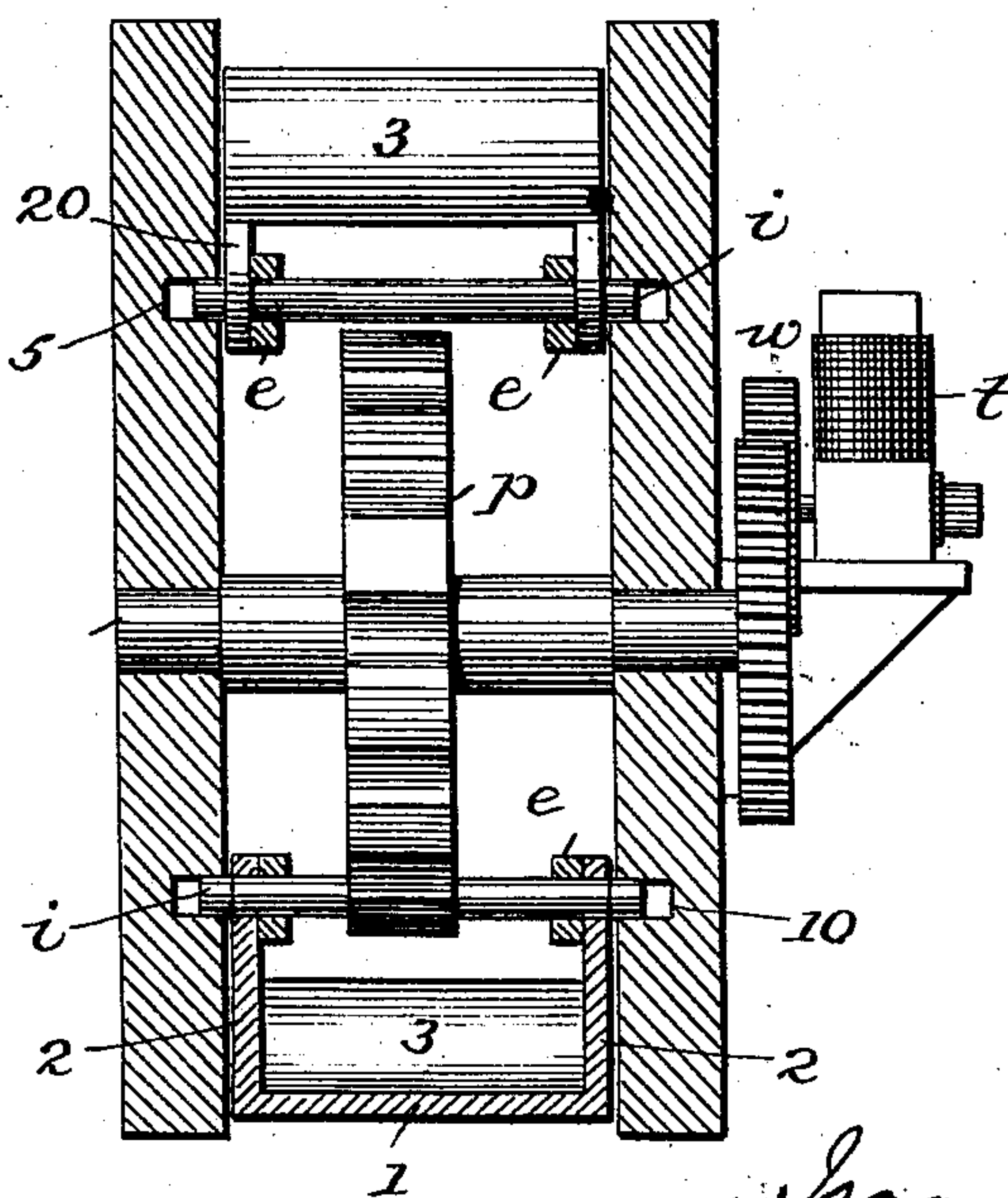


Fig. 4.



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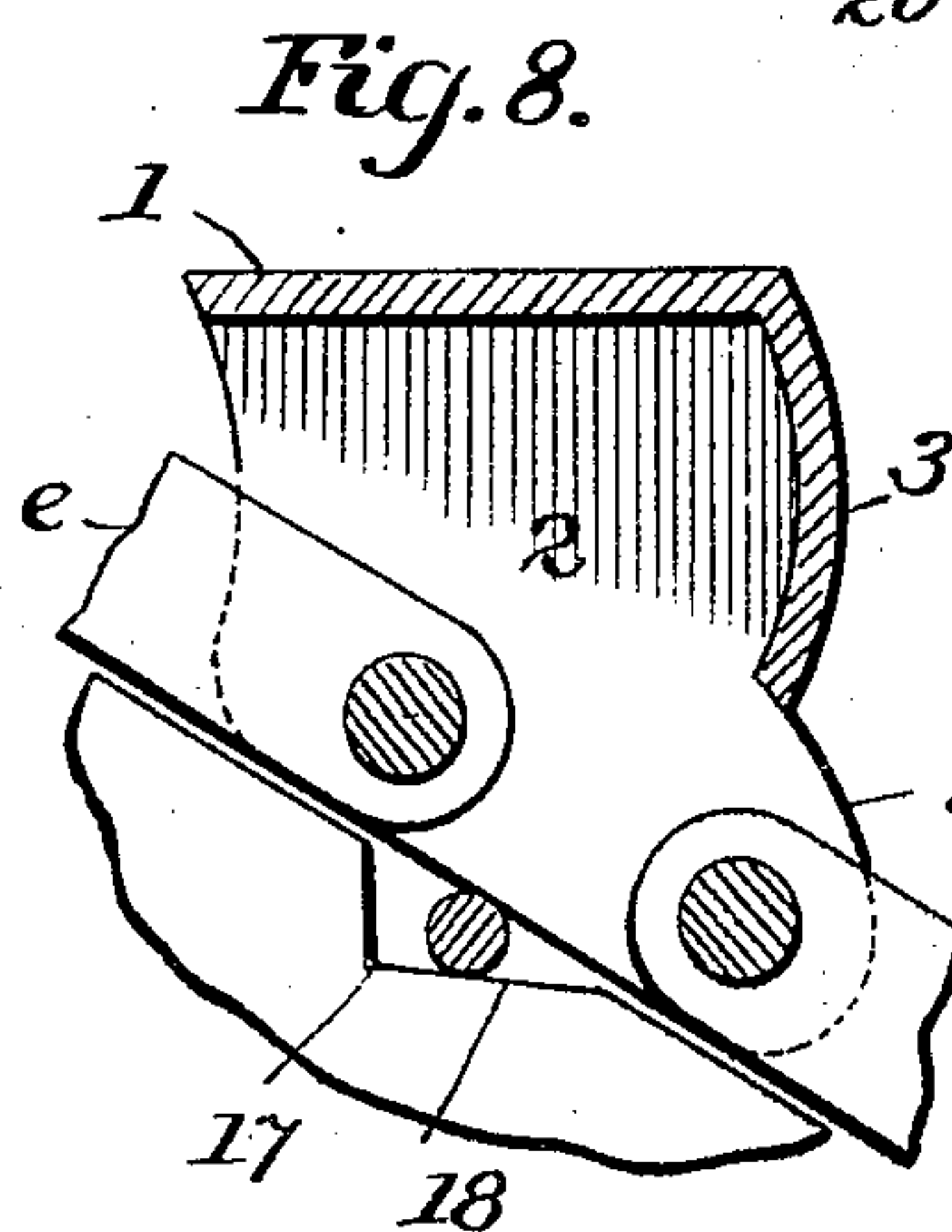
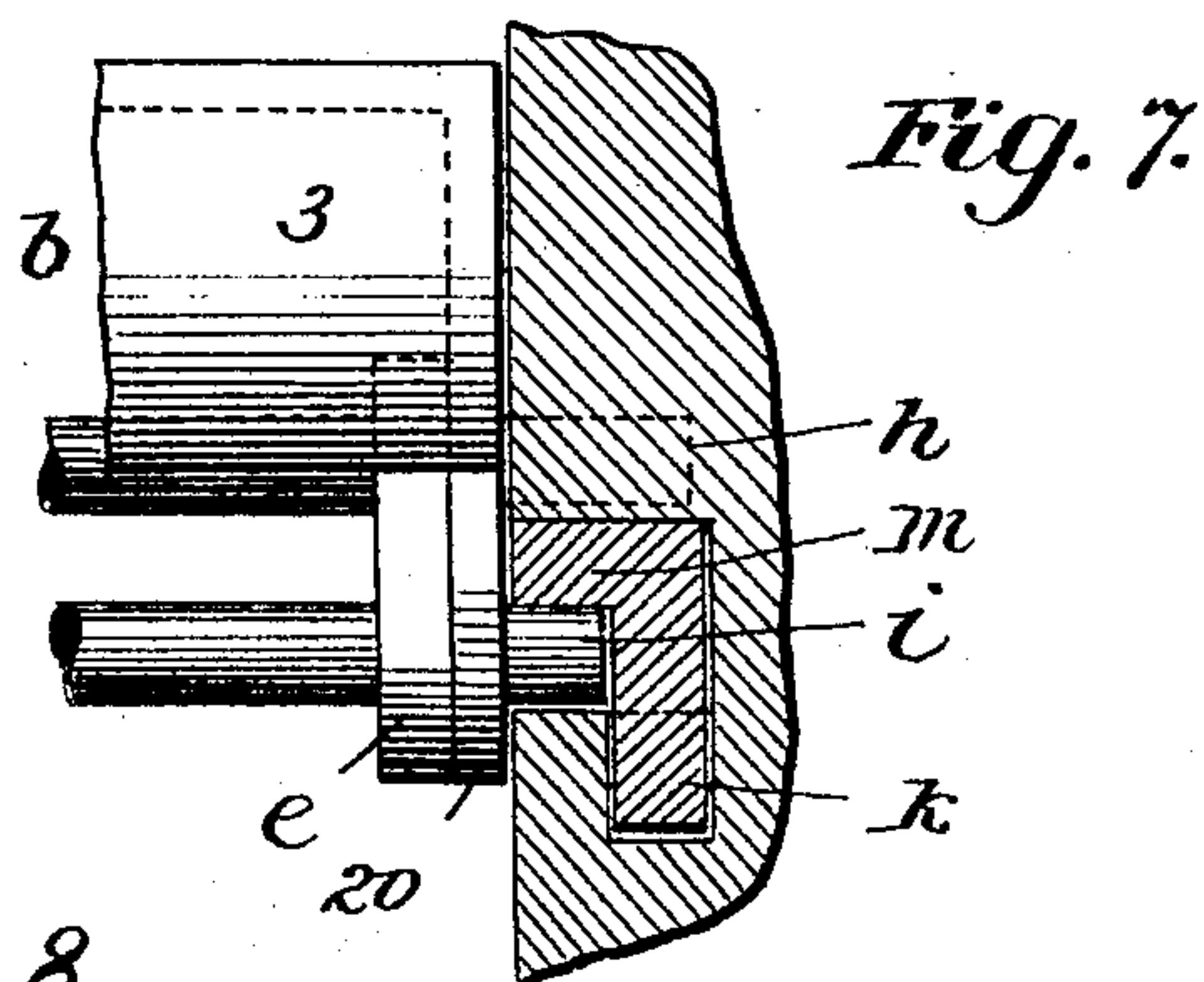
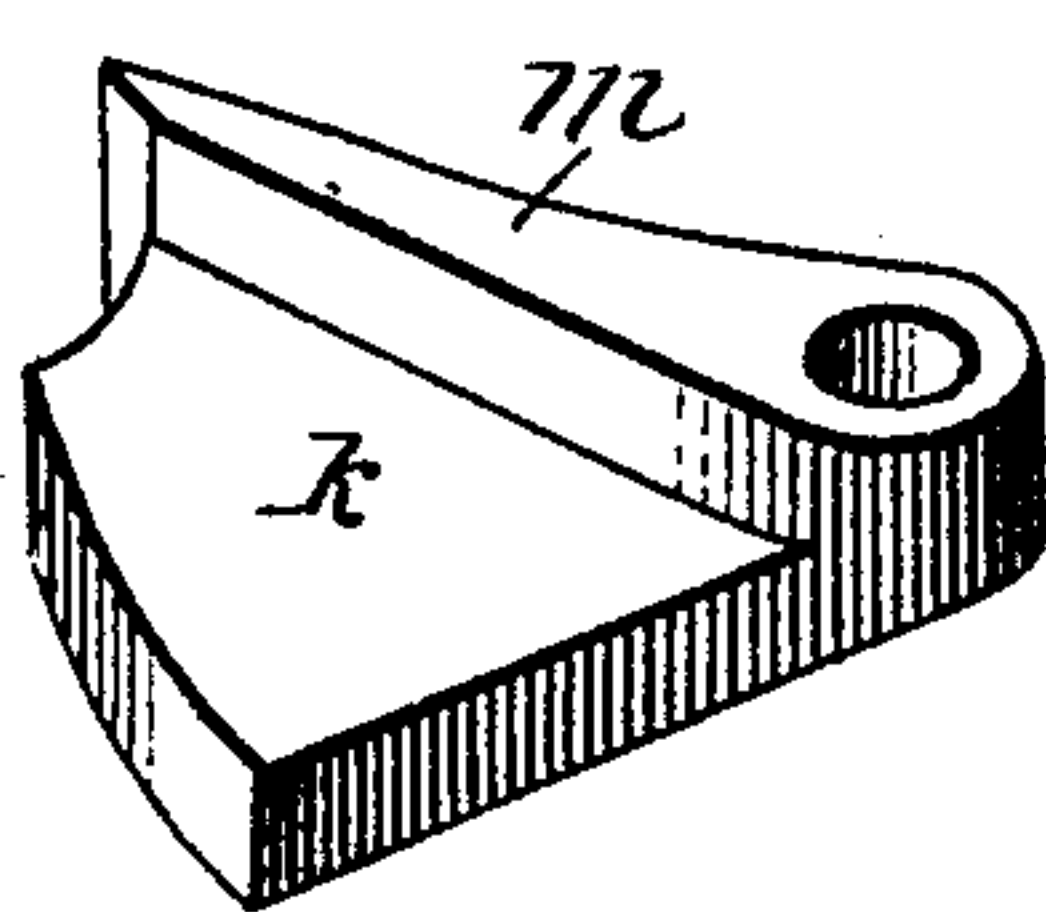
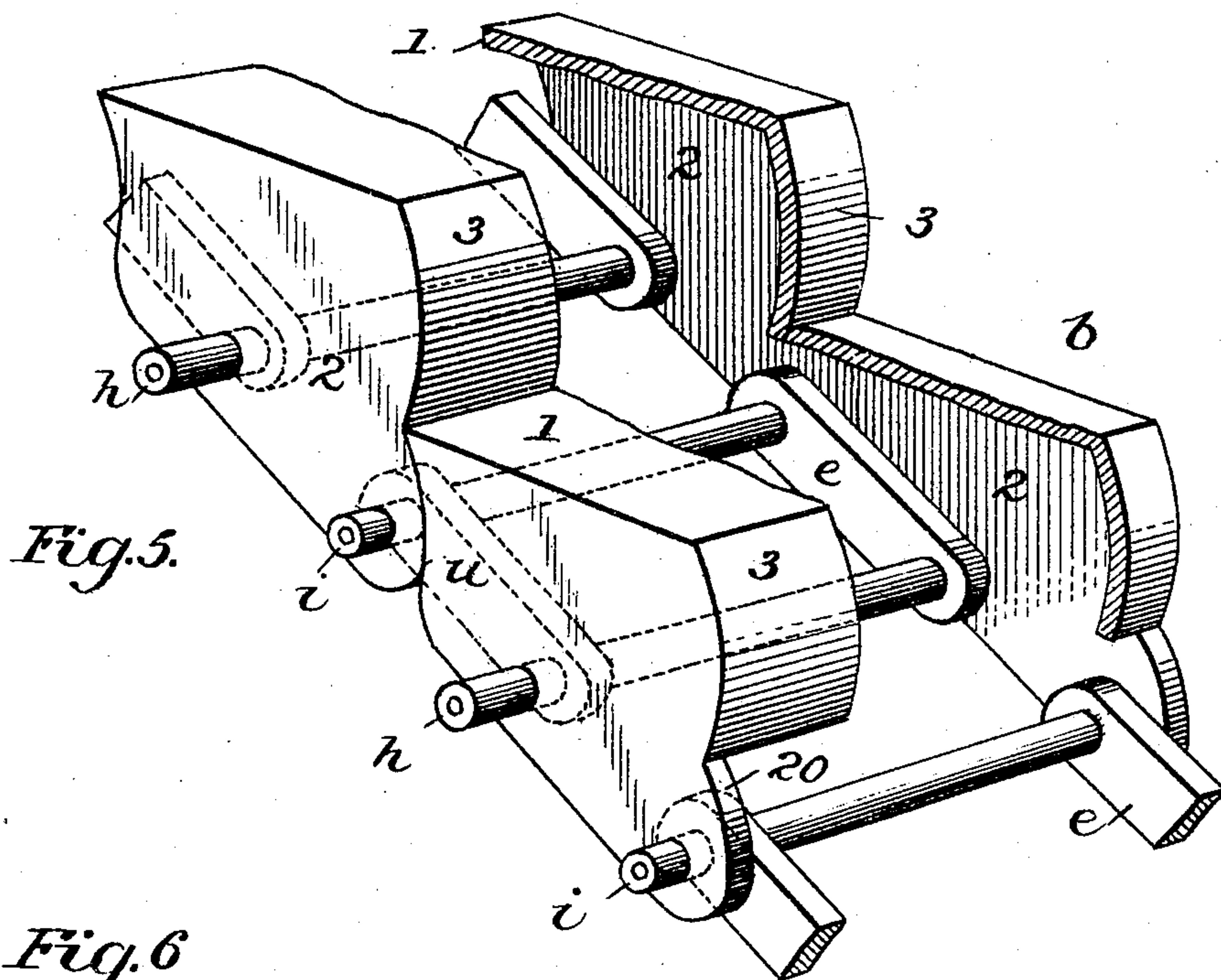
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4 SHEETS—SHEET 4.



Witnesses

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UNITED STATES PATENT OFFICE.

ISAAC H. VENN, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TRAVELING STAIRWAY.

SPECIFICATION forming part of Letters Patent No. 764,906, dated July 12, 1904.

Application filed January 2, 1901. Serial No. 41,864. (No model.)

To all whom it may concern:

Be it known that I, ISAAC H. VENN, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Traveling Stairways, of which the following is a specification.

My invention relates to certain improvements in that class of hoists in which there is a continuous chain of steps which occupy and travel in horizontal positions at some points of the course and which travel on inclines in the form of steps at other portions of the course; and my invention consists of certain means for guiding and supporting the chain of steps and in certain constructions of the parts, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a traveling stairway embodying my improvement. Fig. 2 is a view illustrating the construction and arrangement of the track portions of the structure. Fig. 3 is a transverse sectional elevation on the line 3 3, Fig. 1; Fig. 4, a transverse sectional elevation on the line 4 4, Fig. 1; Fig. 5, a perspective view illustrating two of the chain of steps in part section. Fig. 6 is a detached view of the switch. Fig. 7 is a section illustrating the arrangement of the switch in connection with the track and part of the chain of steps. Fig. 8 is a sectional view illustrating a modified form of detent for preventing the back movement of the chain, &c.

The construction of stairway illustrated in the drawings is one adapted for use where there are two horizontal conveying-platforms *a c*, one above the other, with the stairs or hoisting portion between, said structure for use in conveying passengers or material of any kind.

The stairway consists of a chain or series of connected steps *b*, and these are carried both horizontally and in an inclined direction, the treads of the steps when moving horizontally being in line with each other and constituting an unbroken conveying-surface flush with that of the platform *a* or *c* and being one above

the other when the steps are carried on an incline to constitute a hoisting portion between the horizontal portions.

Each two adjacent steps are connected by two links *e e* and may be constructed in different ways; but, as shown, the end 2 of each step constitutes a link, the tread 1 extending between the two end pieces and the riser 3 being curved outward and extending between the two end pieces, the curve of the riser 3 being such that during the change of position of the step to carry the tread from a position level with the adjacent step to one above it the face of the riser 3 will at all points be close to the forward edge of the tread 1 of the adjacent step.

The steps are guided in their proper course by means of a main track, the forwarding portion of which has an inclined section 5, a lower horizontal section 6, and an upper horizontal section 7, the horizontal section connected with each inclined section by a comparatively abrupt curve, and with the horizontal sections are connected curved terminal sections 8 9, which connect with the return-track section 10, thus constituting a practically continuous track. Near the lower end of the structure at 12 each return-track is depressed, so that the chain of steps may swing downward and take up slack, thus maintaining it taut.

At the end of each step are two bearings *h*—as, for instance, pins provided with anti-friction-rollers—the bearing next the riser being farther from the tread than the other bearing, and the links *e e*, connecting each step with the next, are pivoted thereto at points coinciding with the axes of the adjacent bearing-points, and preferably the latter on each step are the same distance apart as the distance between the pivotal points of the links.

Adjacent to the horizontal section of each main track and parallel thereto is a supplemental or branch track 13, which merges into the inclined and curved sections of the main track at the ends, and the upper bearings *h* of each step are adapted to run on the main

track only, while the lower bearings will run on the main track at the inclined and curved sections, but will run also on the branch track at the horizontal sections.

5 The pins or bearings to which each link is jointed are preferably equidistant from each other, and all the pivotal points are in line with each other when the treads 1 of the steps
10 are one above the other to constitute the inclined stairway, so that at the time when the greatest strain is upon the traveling structure the links of the chain will all be in line with each other and with the direct line of draft.

15 While the links of the chain are in line with each other upon the inclined portions of the track, they occupy each an angle to the line of travel of the steps when upon the horizontal portions, so that the draft upon the line
20 of steps or chain connecting the same exerts a tendency to carry the bearings *i* upward toward the main track, and it is therefore necessary to provide the supplemental or branch track with a bearing-face 15, which will re-
25 sist this upward movement of the bearings *i* and constitute part of the track upon which they travel passing toward the main track, the lower face 13 supporting the steps, so that they will not swing down under any weight
30 upon them.

To insure against any possibility of the pins or bearings *h* of the steps passing from the main line onto the branch line or track-sections, I make the bearings *h* longer than the
35 bearings *i* and the main track which receives the bearings *h*, wider than the supplemental track, which receives the shorter bearings *i*. The latter therefore can pass freely to or from such supplemental track and also on the main
40 track, while the bearings *h* cannot possibly take their positions upon any but the main track.

To insure the continuity of the track-bearing faces between the branch and the inclined
45 sections of the main track at the lower part of the structure, I provide switches *k*, each consisting of a tongue pivoted at *x* and weighted or provided with a spring to normally occupy a position across the main track,
50 as in Fig. 2, but yielding for the passage over it of one of the long bearings *h*. The tongue has a rib *m*, Figs. 2 and 7, which is normally a continuation of the face 15 of the supplemental or branch track, so that there is no
55 break in the upper support for the bearings *i* in passing from the branch to the main track. The rib *m* is not so deep as the thickness of the switch-tongue, the body of which thus extends across the main track, so
60 that if the motion of the steps is reversed the long bearings *h* will make contact with the switch, and thus the motion will be arrested.

Any other substitute device may be used for preventing such return motion—as, for in-
65 stance, balls or rollers 17, Fig. 8, in a pocket

having a downwardly-inclined face 18, between which and the steps the roller will wedge on any return movement.

The chain of steps as above described supported by the track, as set forth, may have 70 movement imparted to the same continuously or intermittently in any suitable manner. A preferable arrangement consists of a shaft *n*, provided with one or more toothed wheels *p*, which engage connecting-rods extending the 75 length of the steps and which may constitute at their ends the bearings *h* *i* and also pivots for the links, the said wheels being arranged between the points of change of direction of movement and between the rising and return 80 portions of the chain, so as to take hold of the cross-pins between the ends of the steps, as shown in Fig. 4, engaging the upper part to drive it positively and the lower part of the chain to prevent it sliding down, so that the 85 rotation of the driving-wheel *p* not only exerts a force tending to raise the upper portion of the chain toward the upper platform, but supporting the inclined part of the lower portion of the chain, and the weight of the lower portion of 90 the chain thus tends to counterbalance that of the upper portion. The drive wheel or wheels are arranged away from the curved parts of the chain to permit freedom of movement between the linked parts at the curved sections 95 of the track.

To aid in maintaining the steps in line horizontally on the ascending part of the structure, I provide each end of each step with a projection 20, to which is adapted a part *u* of 100 the next succeeding step, which overhangs and bears on and is supported by said projection.

The driving-wheel may have movement imparted in any suitable manner—as, for in- 105 stance, as shown in Fig. 4 and by dotted lines, Fig. 1, by means of a train of wheels *w*, driven from a pinion *v* on the armature of a motor *t*.

I do not here claim, broadly, a traveling stairway in which the steps alternate with links 110 to form a continuous chain nor the other features shown herein and claimed in my application Serial No. 52,022.

Without limiting myself to the precise construction and arrangement of parts shown, I 115 claim as my invention—

1. The combination with the side tracks of a hoist, having each a single inclined section and two connecting horizontal sections, of a series of steps, each with two bearings at each 120 end and at different distances from the tread, and each step connected to each of the adjacent steps by a pair of links pivoted to the steps at the points adjacent to the bearings, substantially as described. 125

2. A hoist provided with side tracks each having a single inclined section connected with double horizontal sections, and with a chain having steps, the ends of which are connected to or form parts of the chain-links, 130

the alternate links extending between and connecting the steps, substantially as set forth.

3. A hoist provided with side tracks each having single inclined and connected double horizontal sections, and with a chain having steps with ends connected to or forming parts of the chain-links, the alternate links extending between and connecting the steps, the pins connecting the links extended to form journals for roller-bearings for the steps upon the track-sections, substantially as set forth.

4. A traveling stairway having a continuous main track with connected inclined horizontal and curved sections, supplemental or branch tracks adjacent to the horizontal sections, a chain consisting of links pivoted together and steps the ends of which constitute the alternate links, and two bearings at the end of each step, one adapted to run on the main track and the other to run on both the main and branch tracks, substantially as set forth.

5. The combination in a traveling stairway, of a series of steps each having two bearings at each end and at different distances from the tread, side tracks having connected horizontal, inclined and curved sections, supplemental sections adjacent to the horizontal sections only, and a switch at the junction of each lower horizontal track-section and the inclined section, substantially as set forth.

6. The combination in a traveling stairway, of a series of steps each having two bearings at each end and at different distances from the tread, side tracks having connected horizontal inclined and curved rail-sections, supplemental sections adjacent to the horizontal sections only, and switches adapted to support the upper bearings while yielding on the forward movement of the lower bearings, substantially as set forth.

7. The combination in a traveling stairway, of a series of steps each having two bearings at each end and at different distances from the tread, side tracks having connected horizontal, inclined and curved sections, supplemental sections adjacent to the horizontal sections only, and a switch at the junction of each lower horizontal track-section and the inclined section, said switches slotted to permit the forward movement of the lower step-bearings without affecting the switches, substantially as set forth.

8. The combination of the chain of steps each connected to the adjacent step by a pair of links, tracks having connected horizontal inclined and curved sections, supplemental tracks adjacent to the horizontal sections of the main track, and two bearings at each end of each step, the upper bearing adapted to run on the main sections of the track and the lower bearing adapted to run on the main and the supplemental sections, substantially as set forth.

9. A traveling stairway having a continu-

ous main track with connected inclined horizontal and curved sections, supplemental or branch tracks adjacent to the horizontal sections only, a chain consisting of links pivoted together, and steps each connected at two points at each end with the alternate links, and two bearings at the end of each step, one adapted to run on the main track and the other to run on both the main and branch tracks, the branch track adapted to receive one series of bearings only, substantially as set forth.

10. A traveling stairway having a continuous main track with inclined horizontal and curved sections, supplemental or branch tracks adjacent to the horizontal sections, a chain consisting of links pivoted together and steps connected with or forming parts of the links, and each with a riser curved outward as set forth, and two bearings at the end of each step, one adapted to run on the main track and the other to run both on the main and branch tracks, with switches at the junction of the inclined and lower horizontal sections, substantially as set forth.

11. A traveling stairway having a continuous main track with inclined horizontal and curved sections, supplemental or branch tracks adjacent to the horizontal sections, a chain consisting of links pivoted together and steps connected with or forming parts of the links, and each with a riser curved outward as set forth, and two bearings at the end of each step, one adapted to run on the main track and the other to run both on the main and branch tracks, with switches, having slots for the passage of the lower bearings of the steps, at the junction of the inclined and lower horizontal sections, substantially as set forth.

12. A traveling stairway having a continuous main track with connected inclined horizontal and curved sections, supplemental or branch tracks adjacent to the horizontal sections, a series of steps, links connecting the same, with two connecting-pins at each end of each step extended outward to different distances to form bearings for the step on the tracks, substantially as set forth.

13. The combination of the track having inclined horizontal and curved sections, branch tracks adjacent to the horizontal sections, a series of connected steps each having two bearings at each end, one adapted to run on the main track only and the other to run on both the main and branch tracks, and driving means arranged away from the curved sections of the track between the outgoing and return portions of the chain to engage both, substantially as described.

14. The combination of the track having inclined horizontal and curved sections, branch tracks adjacent to the horizontal sections, a series of connected steps each having two bearings at each end, one adapted to run on the main track only and the other to run on

both the main and branch tracks, and a wheel arranged to engage the inclined portions of the chain away from the curved sections of the track between the outgoing and return portions of the chain to engage both, substantially as described.

15. The combination of the chain of connected steps having each two end bearings and connecting-links, with two connecting-points at each end of each step and an elevating-track at each side having inclined, horizontal and curved sections, and a return-track arranged to permit the chain of steps to swing

downward to take up slack at the lower part of the structure, substantially as set forth. 15

16. The combination of the chain of steps each with a projection 20 below the riser constituting a bearing for the next step, substantially as set forth.

In testimony whereof I have signed my name 20 to this specification in the presence of two subscribing witnesses.

ISAAC H. VENN.

Witnesses:

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W. CLARENCE DUVALL.