

No. 773,713.

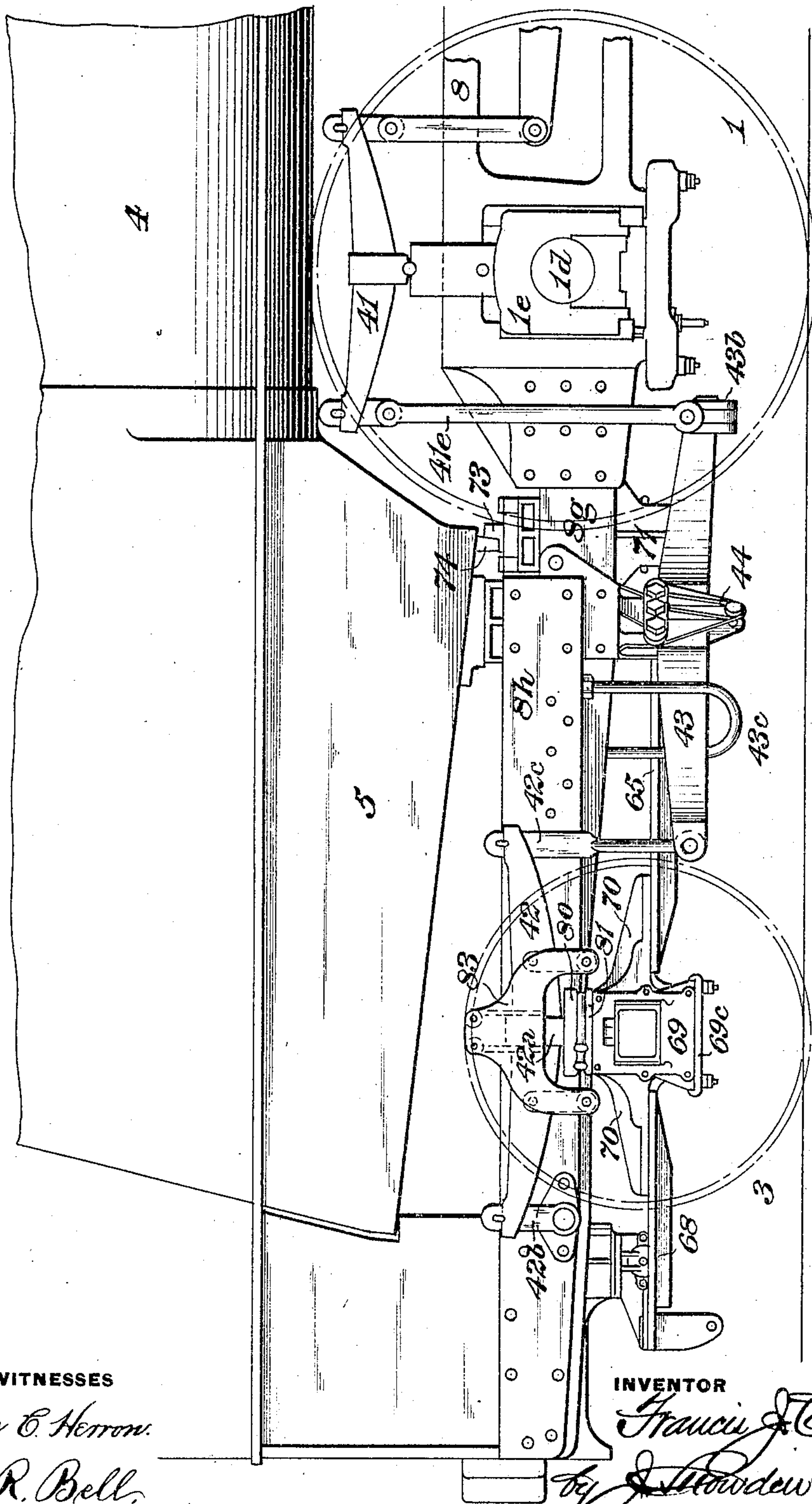
PATENTED NOV. 1, 1904.

F. J. COLE.
LOCOMOTIVE ENGINE.
APPLICATION FILED JUNE 8, 1904.

NO MODEL.

5 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

James C. Herrow.
S. R. Bell.

INVENTOR

Francis J. Cole.
by S. R. Bell,
Att'y.

No. 773,713.

PATENTED NOV. 1, 1904.

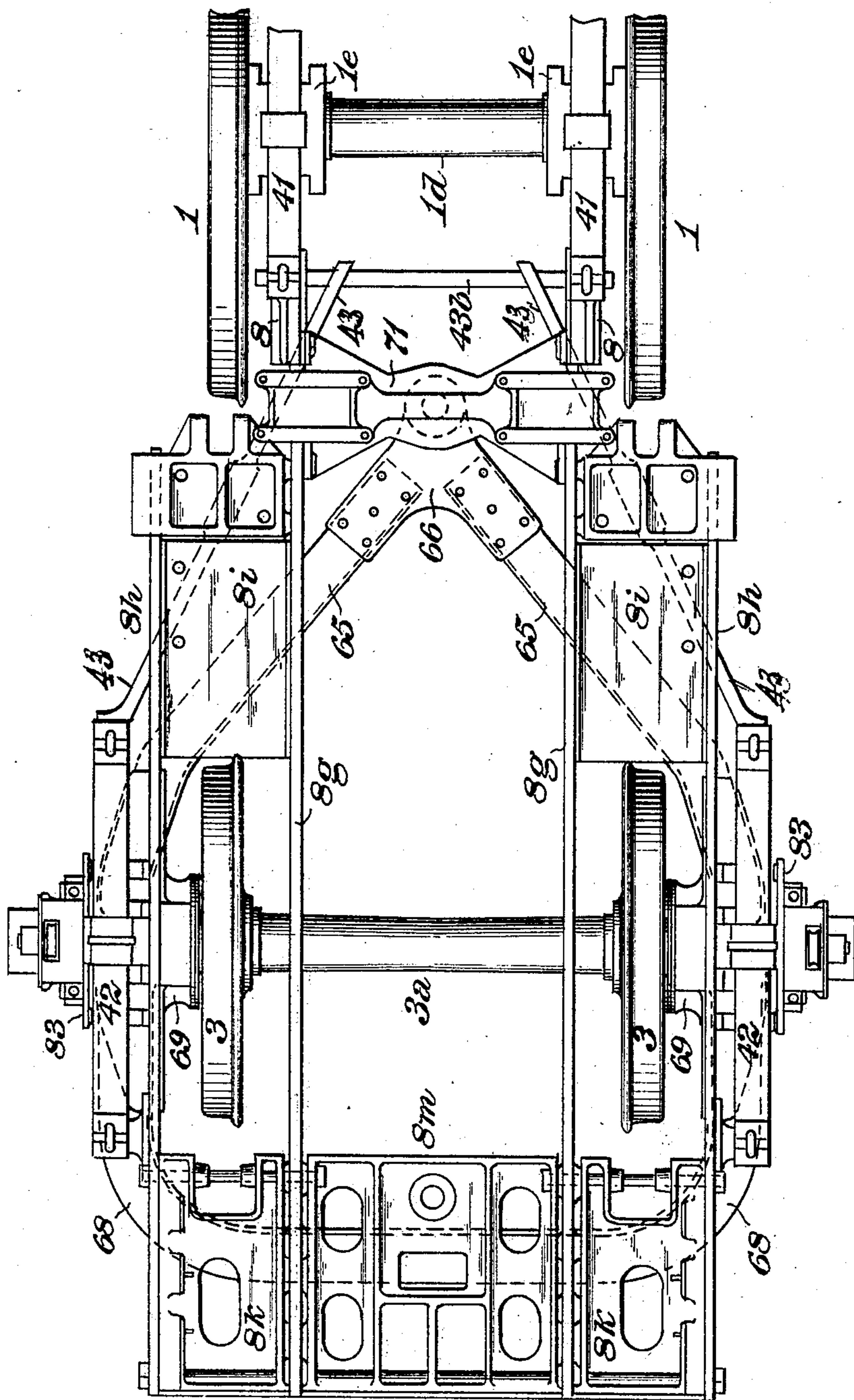
F. J. COLE.
LOCOMOTIVE ENGINE.

APPLICATION FILED JUNE 8, 1904.

NO MODEL.

5 SHEETS—SHEET 2.

FIG. 2.



WITNESSES

James C. Herron.
S. R. Bell.

INVENTOR

Francis J. Cole,
by J. Howard Bell,
Att'y.

No. 773,713.

PATENTED NOV. 1, 1904.

F. J. COLE.
LOCOMOTIVE ENGINE.
APPLICATION FILED JUNE 8, 1904.

NO MODEL.

5 SHEETS—SHEET 3.

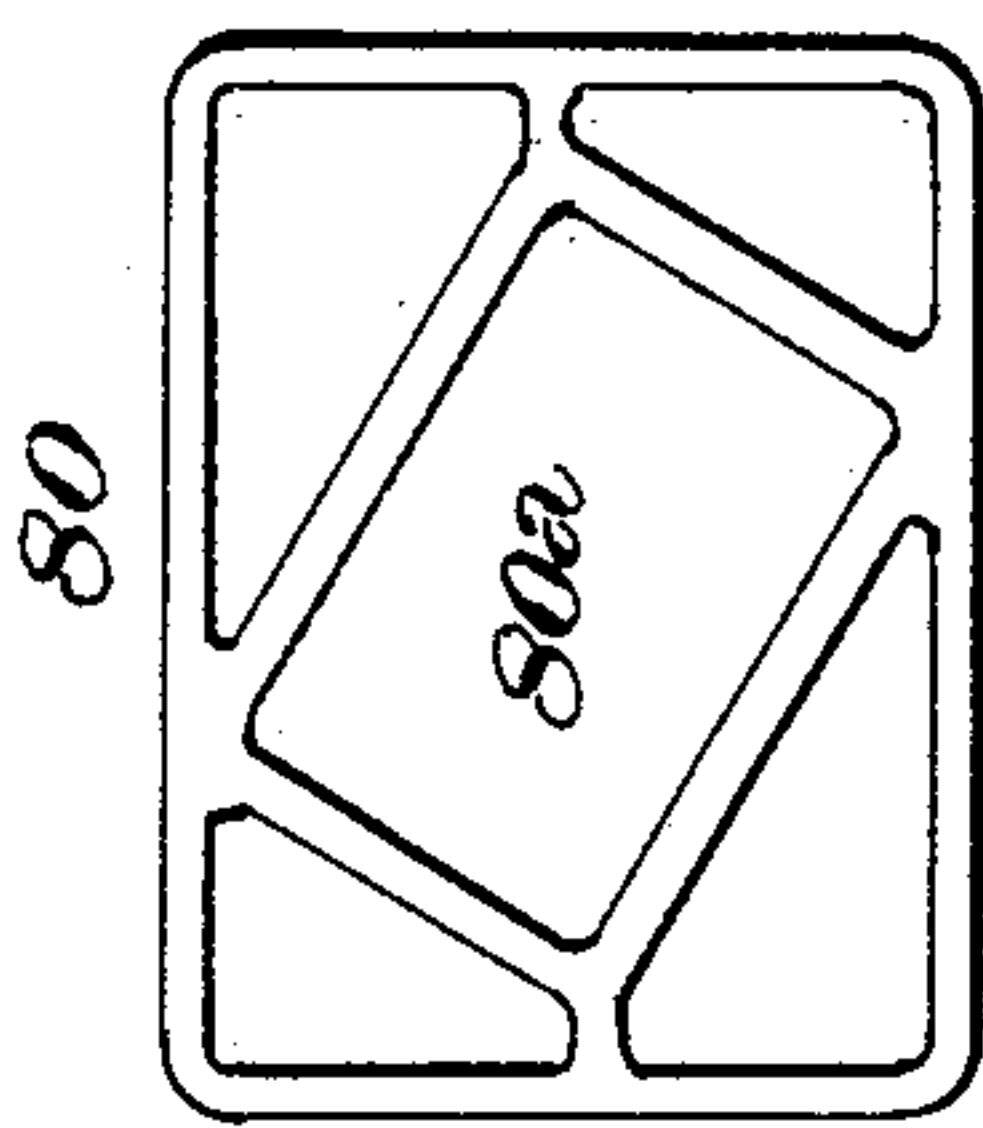


FIG. 4.

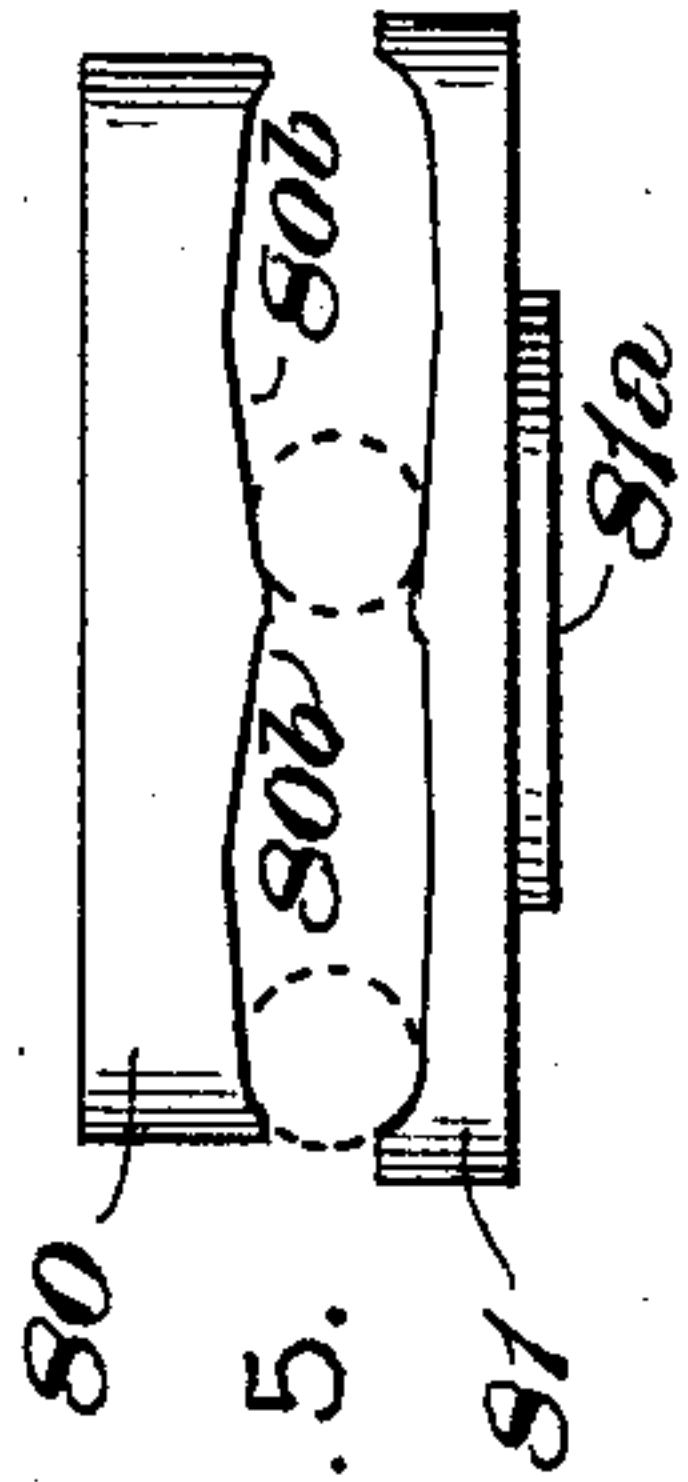


FIG. 5.

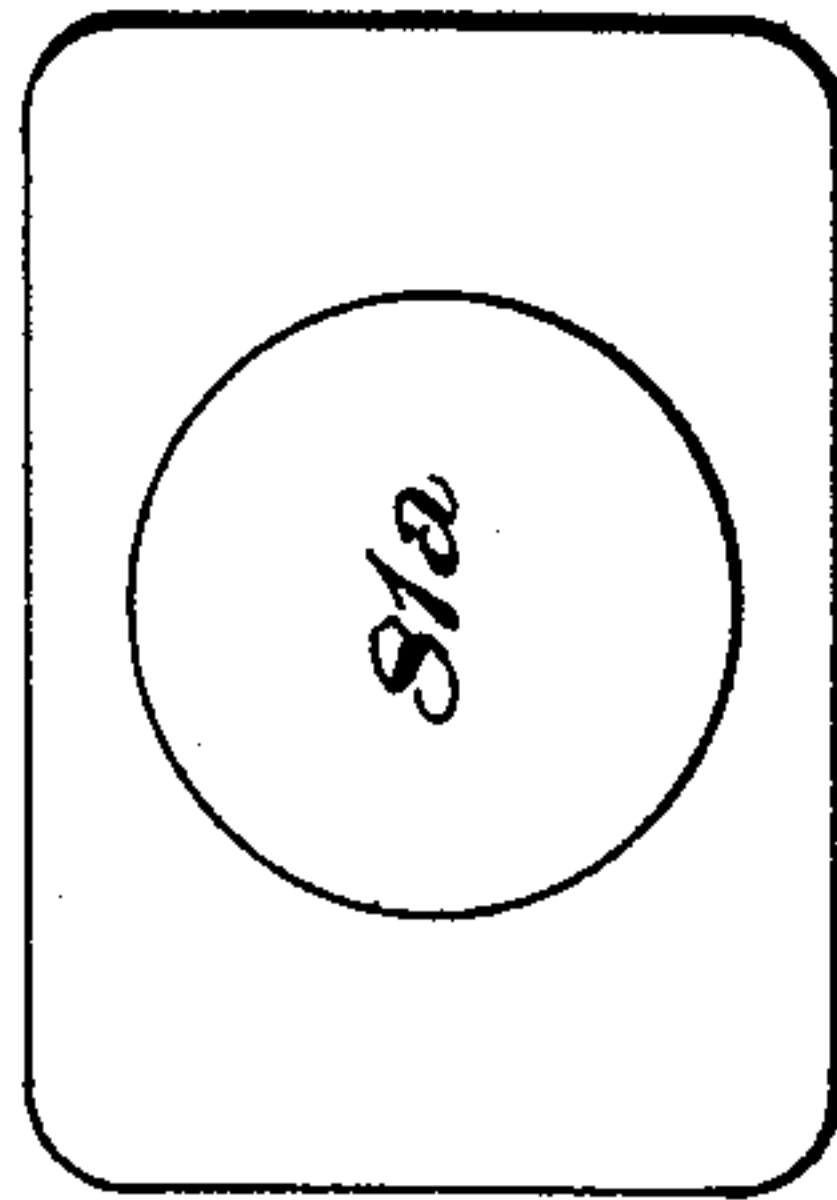


FIG. 6.

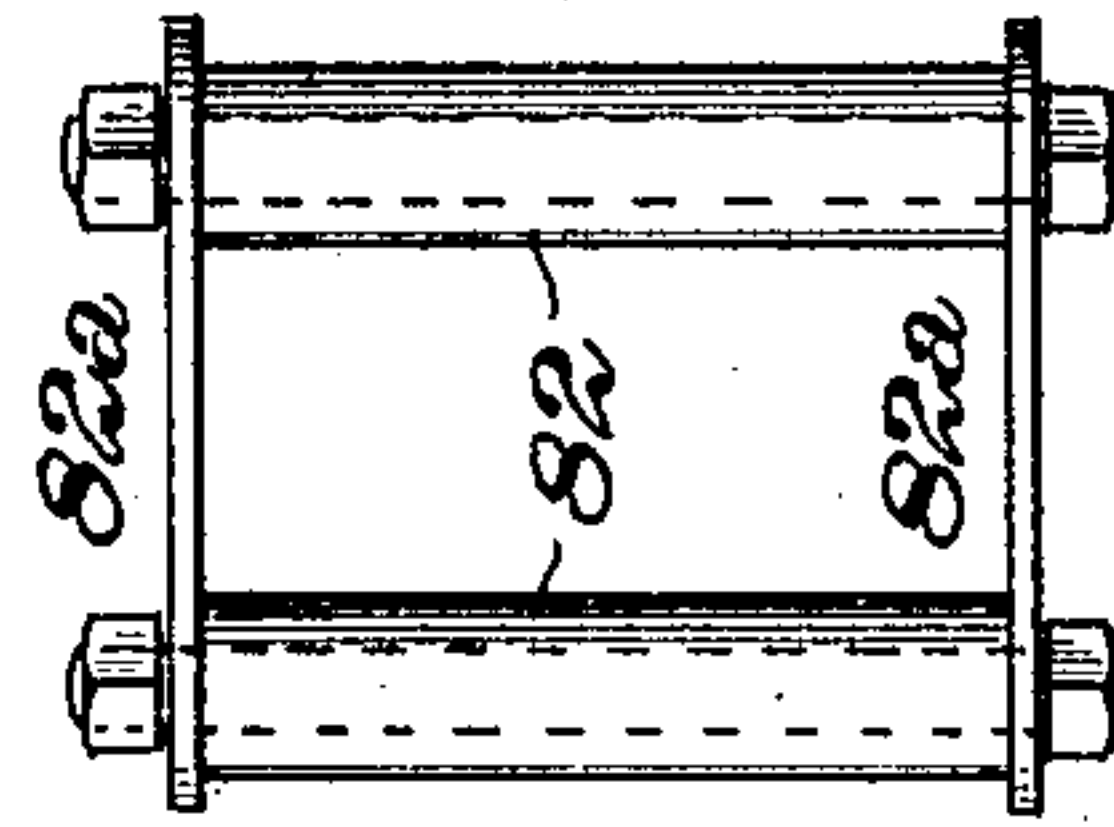
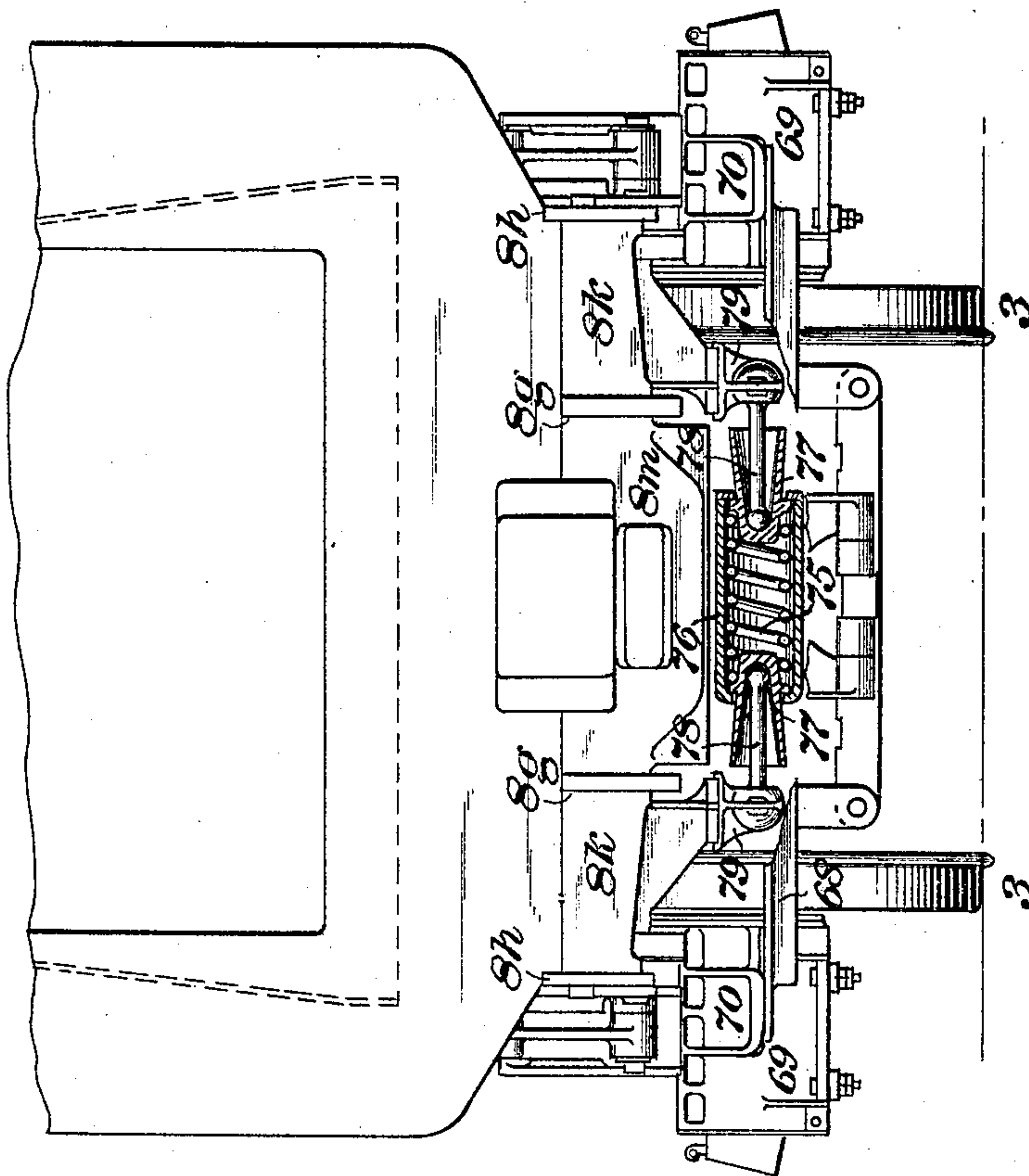


FIG. 7.

FIG. 3.



WITNESSES

James C. Heron.
S. R. Bell.

INVENTOR

Francis J. Cole,
by J. Howard Bell, Att'y.

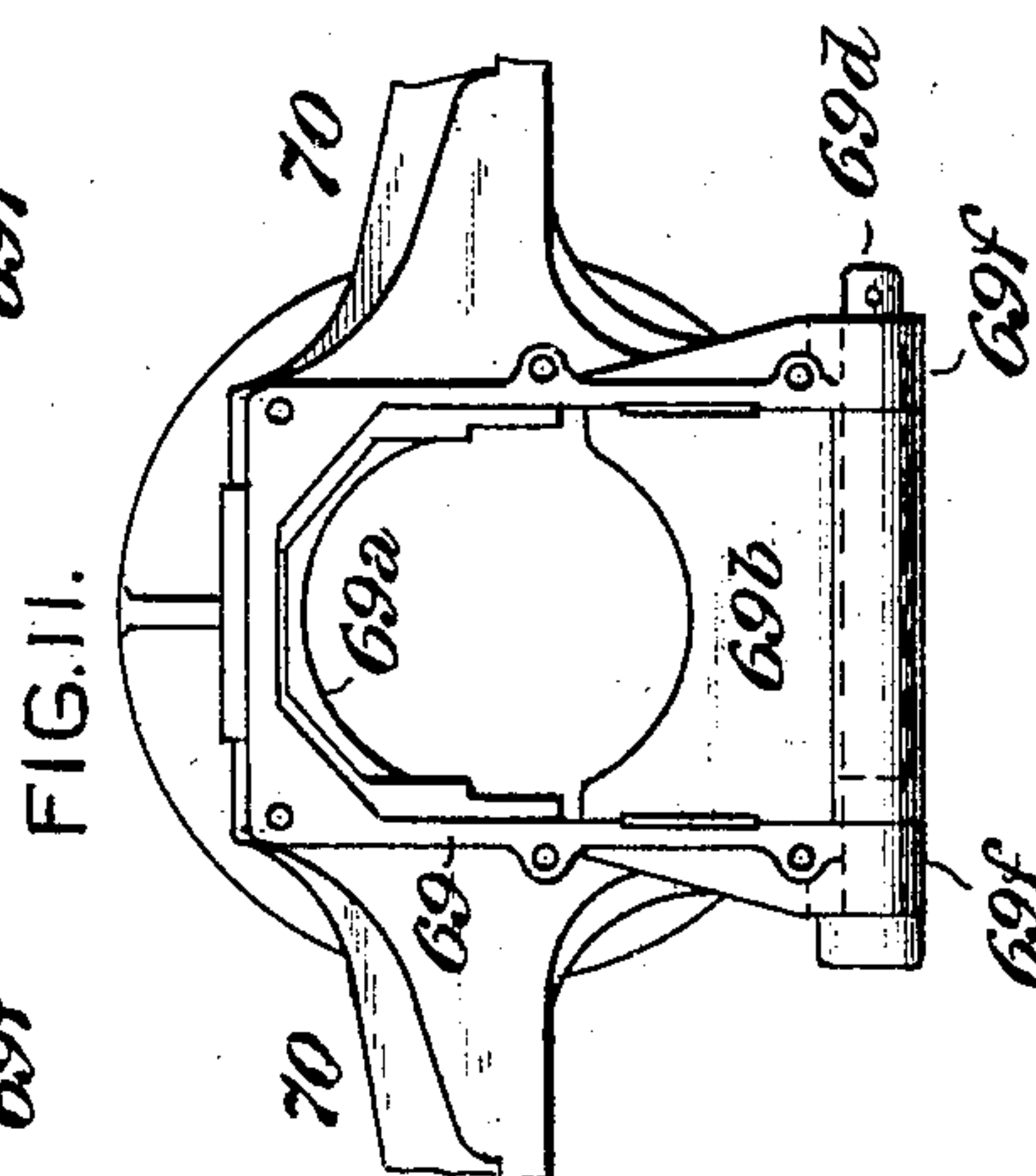
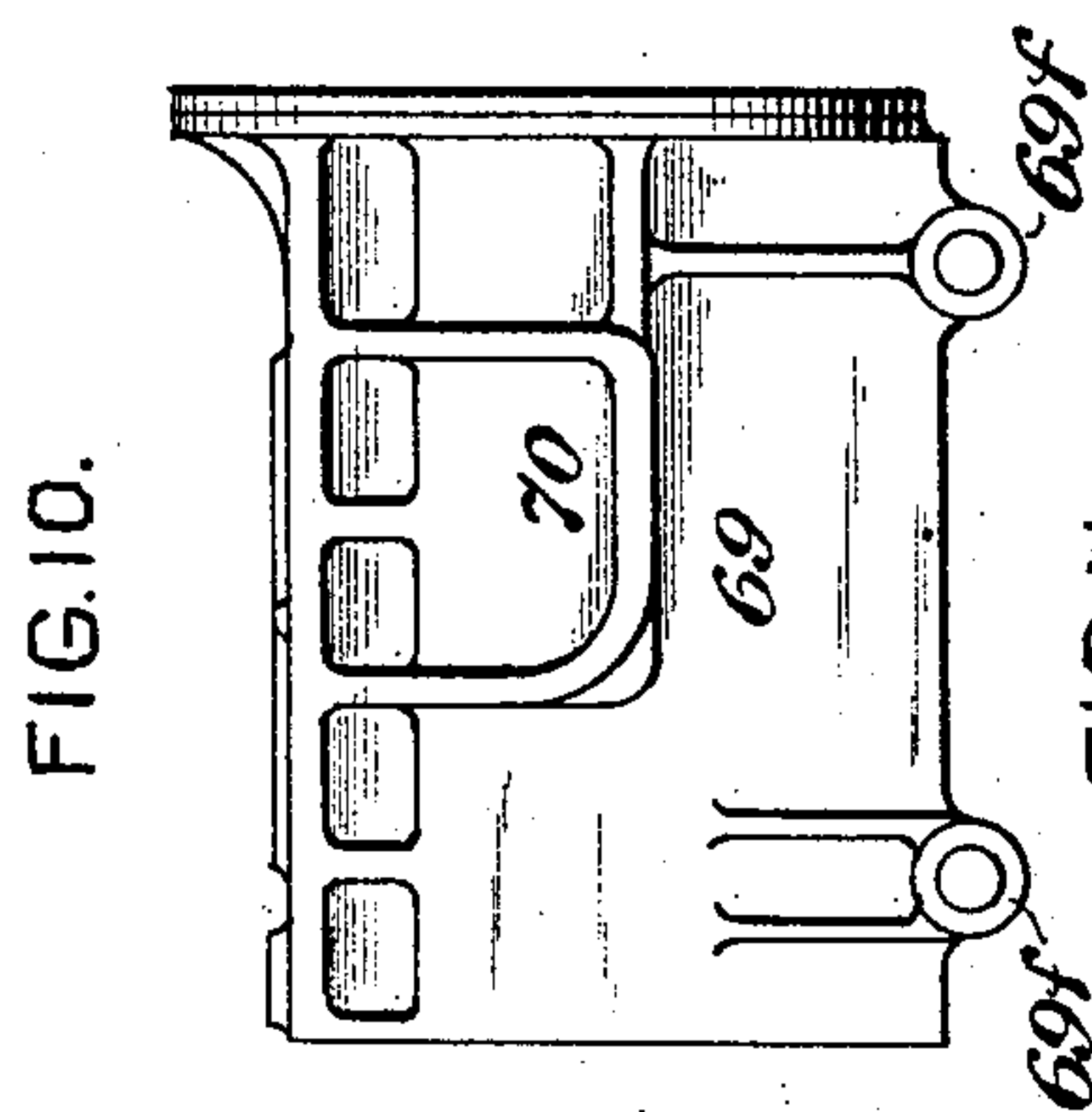
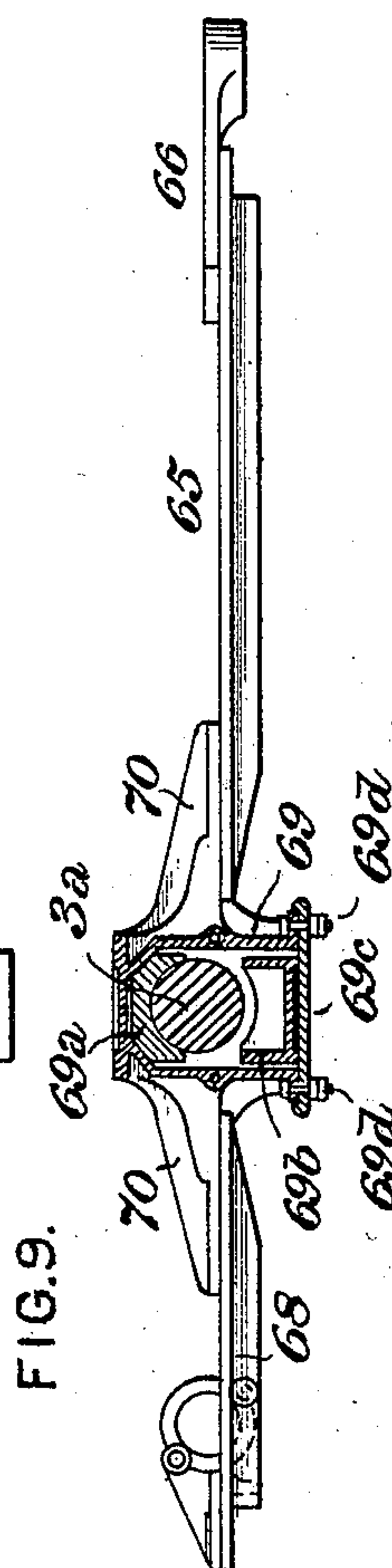
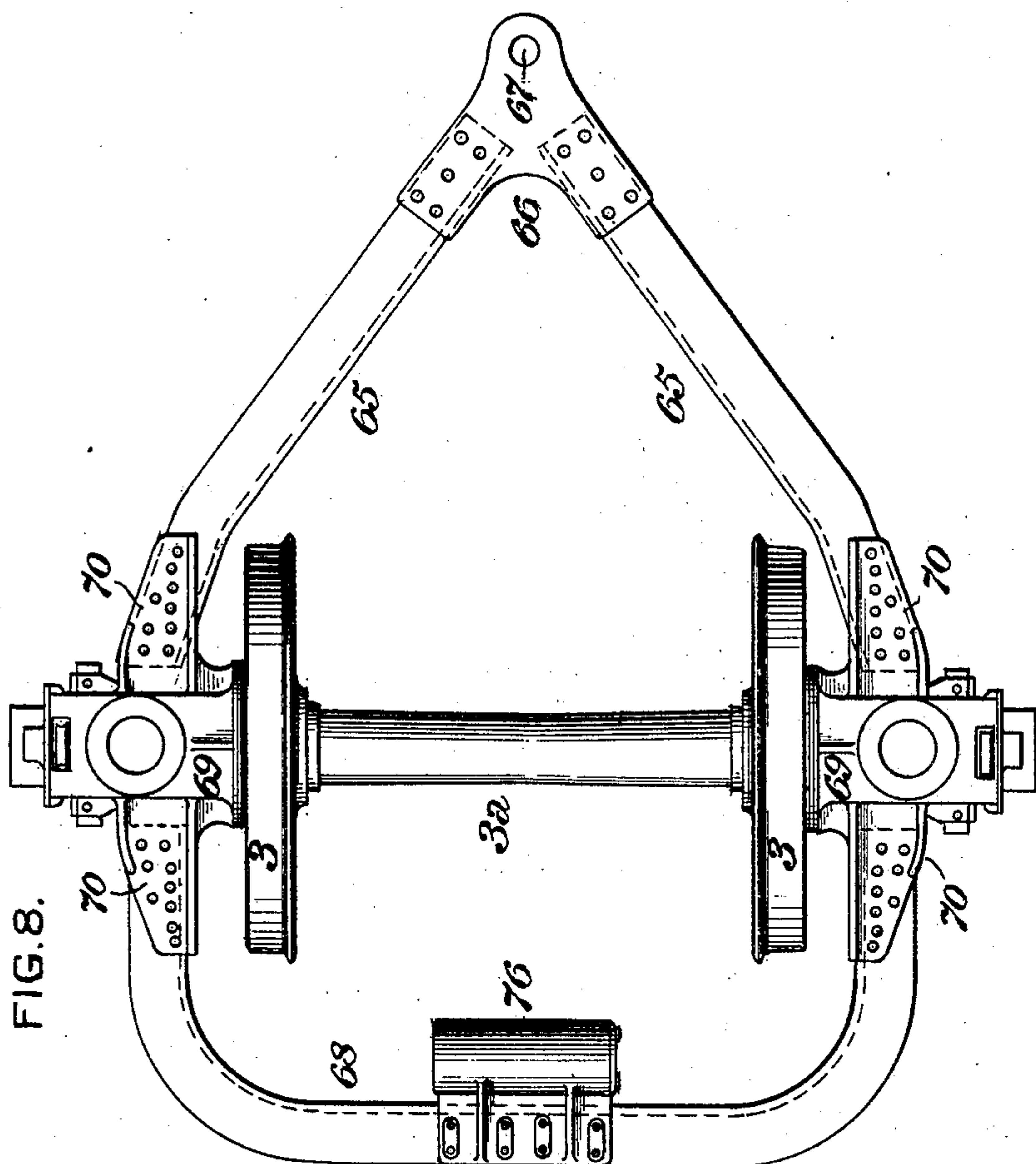
No. 773,713.

PATENTED NOV. 1, 1904.

F. J. COLE.
LOCOMOTIVE ENGINE.
APPLICATION FILED JUNE 8, 1904.

NO MODEL.

5 SHEETS—SHEET 4.



WITNESSES

James C. Heron.
S. R. Bell.

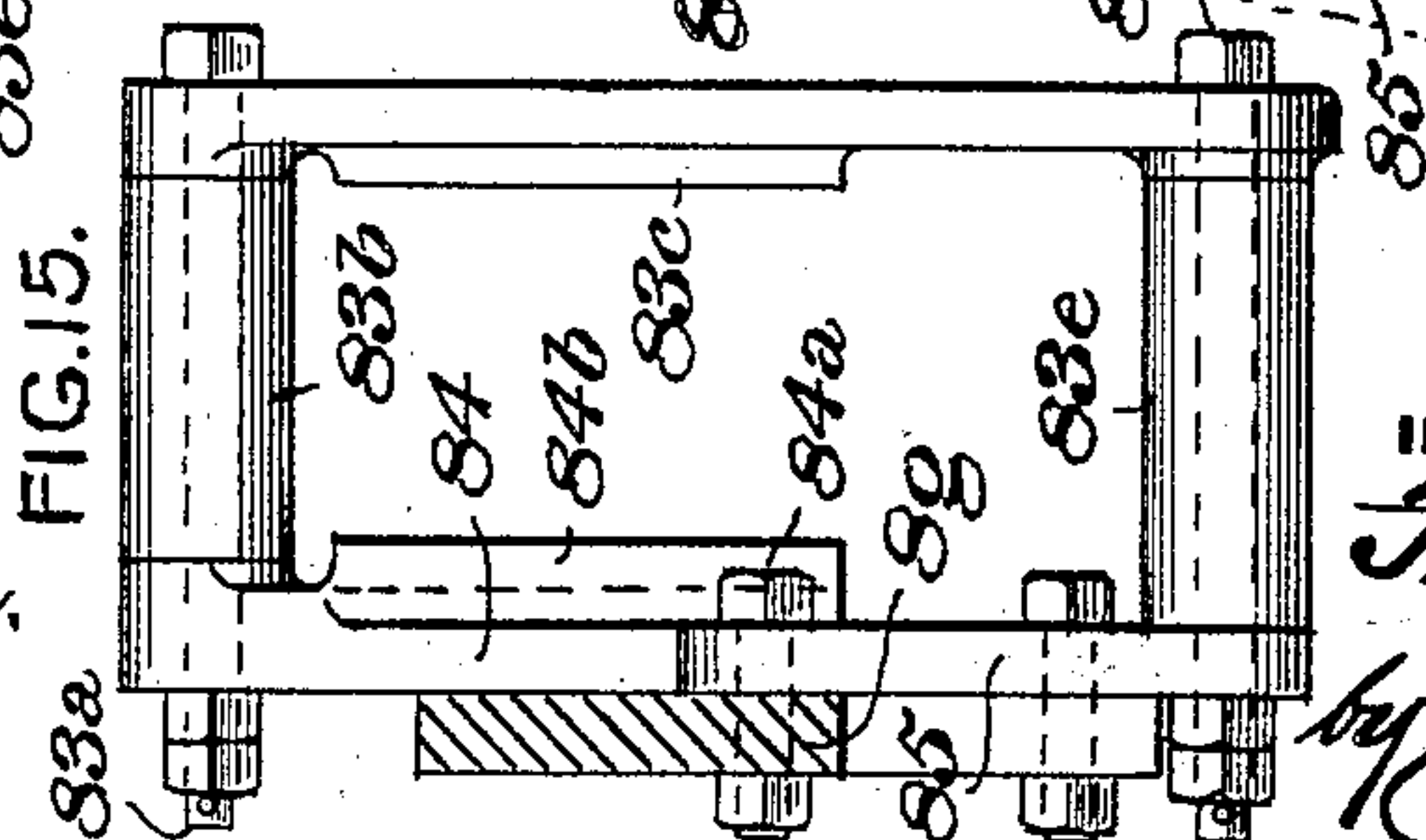
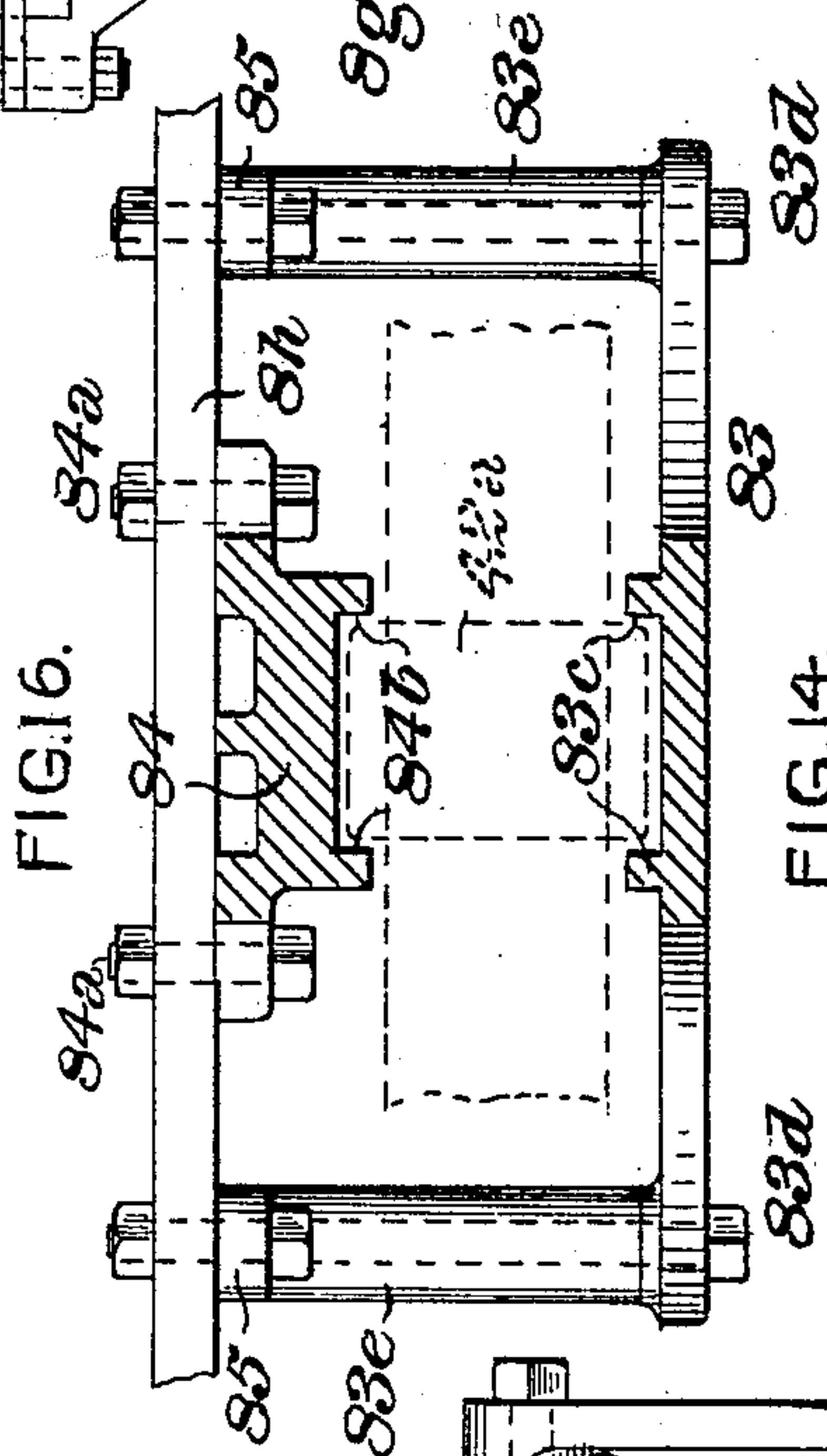
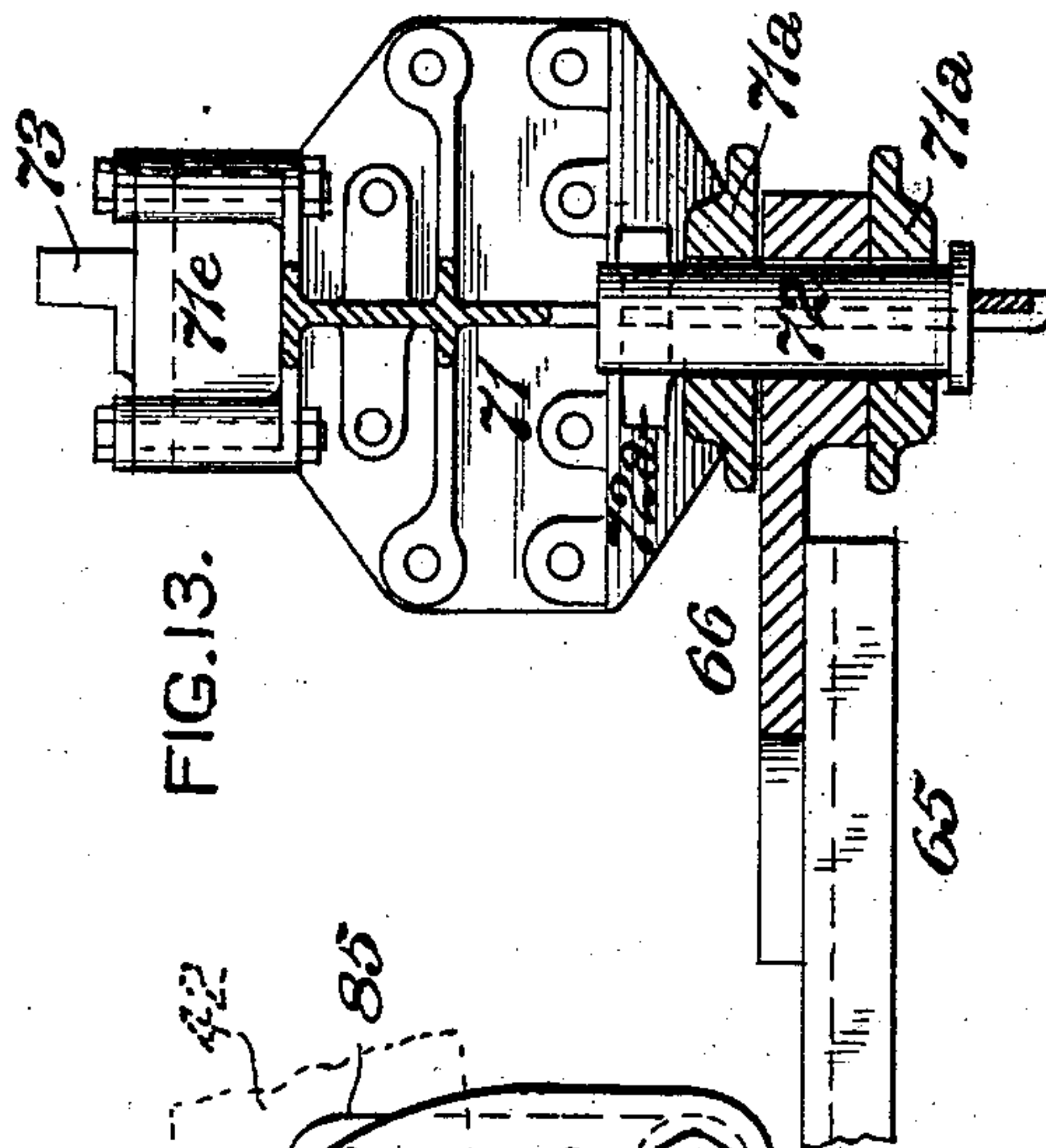
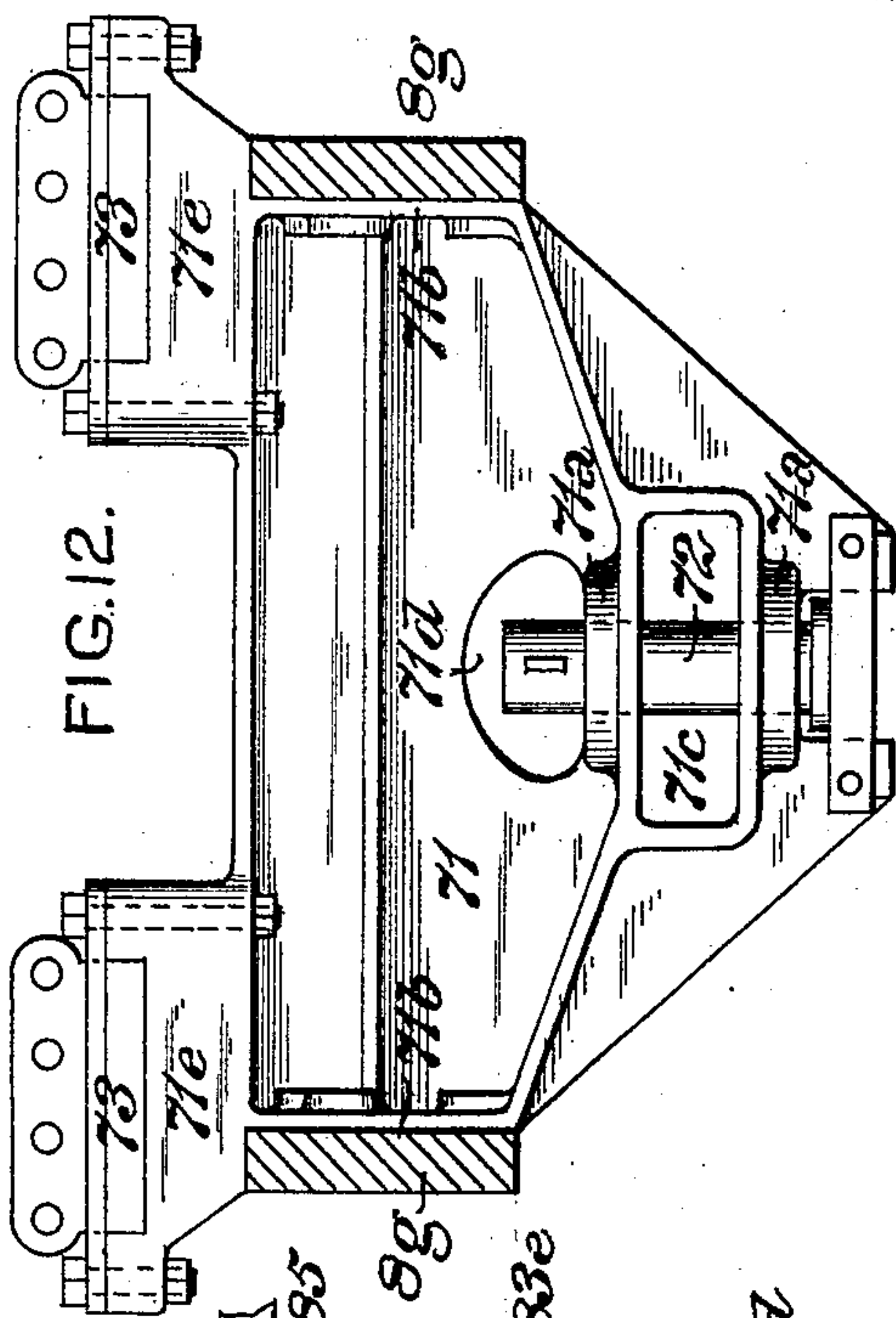
INVENTOR

Francis J. Cole,
by J. Andrew Bell,
Att'y

F. J. COLE.
LOCOMOTIVE ENGINE.
APPLICATION FILED JUNE 8, 1904.

NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES

James C. Herrow.
S. R. Bell.

INVENTOR

Francis J. Cole
by Howard Bell,
Att'y.

UNITED STATES PATENT OFFICE.

FRANCIS J. COLE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO AMERICAN LOCOMOTIVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

LOCOMOTIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 773,713, dated November 1, 1904.

Application filed June 8, 1904. Serial No. 211,597. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS J. COLE, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Locomotive-Engines, of which improvement the following is a specification.

The object of my invention is primarily to provide a simple, effective, and inexpensive radial truck which shall be specially and desirably applicable for supporting an overhung fire-box of the present standard wide type in locomotive-engines having a comparatively long wheel-base, as those of the "Pacific" or 4-6-2 type.

A further object of my invention is to provide means whereby the side frames of the engine may be firmly connected at their rear ends, the fire-box supported with the capacity of movement to relieve strains resultant on expansion, and the truck and its accessories properly supported, controlled, and connected with the main frame.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a view in elevation of the rear portion of a locomotive-engine, illustrating an application of my invention; Fig. 2, a plan or top view with the boiler and fire-box removed; Fig. 3, a rear view partly in section; Fig. 4, a plan view of a truck-spring seat; Fig. 5, a side view of the same and of the bearing-plate for the top of the journal-box; Fig. 6, a bottom view of the bearing-plate; Fig. 7, a plan view of the rollers which support the spring-seat; Fig. 8, a plan view of the truck detached; Fig. 9, a side view of the same; Fig. 10, a side view, on an enlarged scale, of a truck journal-box; Fig. 11, a front view of the same; Fig. 12, a side view in elevation of the expansion cross-tie; Fig. 13, an end view of the same; Fig. 14, a front view of one of the truck-spring guides; Fig. 15, a side view of the same, and Fig. 16 a horizontal section on the line *a a* of Fig. 14.

My invention is herein illustrated as applied in a locomotive-engine having a plurality of driving-wheels 1, only the rear pair of which is shown, and having its boiler 4 pro-

vided with a wide fire-box 5, which is overhung or set behind the rear driving-wheels. The driving-wheels are fixed upon axles 1^d, the journals of which rotate in boxes 1^e, fitted in pedestals in the main frame members 8, and the overhanging weight of the fire-box is carried upon a radial truck, the construction of which will now be described.

The frame of the truck, which is of the two-wheeled radial type, is substantially triangular in plan and is made up of two forwardly and inwardly inclined radius-arms 65, a V-shaped connecting-plate 66, which is secured to and connects together the forward ends of the arms 65 and is provided with a center-pin socket 67, a U-shaped rear member 68, and two journal-box castings 69, which form parts of the sides of the frame, said castings having lateral arms 70, which are connected to the radius-arms 65 and to the rear member 68, respectively.

The portions of the main engine-frame members 8 in which the journal-boxes 1^e of the axles 1^d of the driving-wheels are fitted is of the usual bar type, and the portions 8^g of said main frame members which extend rearwardly from the pedestals of the rear driving-axle and below the fire-box are made separate from the forward portions and are deeper and narrower than the latter, to which they are secured removably by transverse bolts adjacent to the rear pedestals. The rear sections 8^g of the main frames are connected and braced transversely by an expansion cross-tie 71, which is interposed between them below the front of the fire-box and which serves the further purpose of an expansion-brace for supporting the forward end of the fire-box and a support for the center pin or pivot 72 of the radial truck. Bearings or sockets 71^a are formed in the lower portion of the expansion cross-tie, through which and through the socket 67 of the truck-frame-connecting plate 66 the center-pin 72 passes and is held in position by a key 72^a, the truck swiveling upon the axial line of the pin 72.

The expansion cross-tie 71 is a vertical plate strengthened by horizontal ribs or flanges and

60 The lateral movements of the truck are controlled and limited and the truck normally maintained with its longitudinal central plane in coincidence with that of the locomotive by a transverse centering-spring 75, which is fitted in a box or case 76, secured centrally to the rear member 68 of the truck-frame. The ends of the spring 75 abut on follow- 65 ers 77, which in turn abut against the ends

versed inclines 80^b. The tops of the journal-box castings 69 carry bearing-plates 81, having cylindrical projections or bosses 81^a on their lower faces, which fit in corresponding 125 recesses in the journal-box castings and which permit them to be adjusted to any desired angle with the truck-frame in accordance with the swing or degree of lateral movement of the truck. The tops of the bearing-plates are 130

lipped at their ends and slightly raised centrally to form a bed or track for a pair of cylindrical rollers 82, connected at their ends by links 82^a, which rollers are interposed between the bearing-plates 81 and the inclined lower faces of the spring-seats 80. In the lateral movements of the truck in passing curves the rollers 82 move with minimum friction under the inclines 80^b and transfer the weight borne by the springs to the journal-box castings, while allowing the movement of the latter relatively to the springs and main frame without displacement of or abnormal strain on the springs, the relation of the rollers to the inclines acting in unison with the centering-spring to return the truck-frame to central position in passing from a curve to a tangent of the road. If it be desired to provide merely the capacity of lateral movement of the journal-boxes with the truck-frame independently of the springs, this may be effected by permitting the spring-seats to rest directly upon the tops of the journal-box castings without the interposition of the rollers; but the construction described and shown is deemed preferable by me in view of its greater advantages.

The truck-springs 42 are guided and controlled so as to be prevented from moving otherwise than vertically by spring-guides, which are fixed to the supplemental frame members 8^h, each of which guides is of the following construction: An outer guide-plate 83, having a central upwardly-extending arm and two lateral downwardly-extending arms set sufficiently far apart to clear the journal-box casting, has its upper arm connected, by bolts 83^a, passing through thimbles or distance-pieces 83^b, with an inner guide-plate 84, which abuts on and is connected by bolts 84^a to the supplemental frame member 8^h in line centrally with the outer guide-plate. Vertical guide-flanges 83^c and 84^b are formed on the guide-plates 83 and 84, respectively, said flanges being spaced at such distance apart on each plate as to permit the spring-band 42^a to fit easily between them. The upper arm of the outer guide-plate is connected, as above described, to the inner guide-plate 84, and the lower arms of the outer guide-plate are connected, by bolts 83^d passing through thimbles 83^e, to arms or lugs 85, which are bolted to the supplemental frame members. It will be seen that by a guide device substantially as above described the spring is permitted to move freely in a vertical plane, as required in operation, but is prevented from being moved in any other direction under the influence of the swiveling movements of the truck.

The truck herein set forth, while more particularly designed for application as a trailing truck in locomotive-engines having an overhung wide fire-box, is not limited to such ap-

plication, as it may without variation of essential structural or operative principle be used as a leading truck. It will also be obvious that other features of my invention as herein set forth may be applied in connection with supporting-wheels which operate in trucks of other constructions or which have their journals fitted in bearings in a rigid frame.

I claim as my invention and desire to secure by Letters Patent—

1. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a boiler supported on the main frame and having its fire-box back of the rear driving-wheels, a radial truck pivoted to the main frame below the fire-box, and journal-boxes fixed to the truck-frame on the outer sides of the truck-wheels.

2. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a boiler having its fire-box back of the rear driving-wheels, an expansion cross-tie connecting the side members of the main frame below the fire-box, means for supporting the fire-box upon the expansion cross-tie, and a radial truck pivoted to the expansion cross-tie.

3. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a boiler having its fire-box back of the rear driving-wheels, an expansion cross-tie connecting the side members of the main frame below the fire-box, fire-box-supporting seats at the upper portion of the expansion cross-tie, feet fixed to the fire-box and resting, with the capacity of longitudinal movement, on said seats, a radial truck located below the fire-box, and a pin coupling the frame of said truck to the expansion cross-tie.

4. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame, journal-boxes fixed to the truck-frame on the outer sides of the truck-wheels, and supplemental frame members fixed at both their ends to the main frame and extending over the truck journal-boxes.

5. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame, journal-boxes fixed to the truck-frame on the outer sides of the truck-wheels, supplemental frame members extending longitudinally above the truck journal-boxes, front and rear castings interposed between and connecting the main and supplemental frame members, and a bumper-casting interposed between and connecting the rear ends of the main frame members.

6. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, supplemental frame members fixed at their ends to the outer sides of the main frame, a radial truck pivoted to the

main frame, and springs bearing on the journal-boxes of the truck and connected to the supplemental frame members.

7. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a boiler having its fire-box back of the rear pair of driving-wheels, supplemental frame members fixed at both their ends to the outer sides of the main frame, a radial truck pivoted to the main frame, and springs connected to the supplemental frame members and transmitting weight of the overhanging fire-box from said members to the truck journal-boxes.

8. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted at one end of its frame to the main frame, and centering mechanism connected to the end of the truck-frame, on the side of the axle farther from the truck-pivot, for returning said frame to its normal central position and maintaining it therein while passing over track tangents.

9. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted at one end of its frame to the main frame, a transverse spring-case connected to the truck-frame at the end thereof farther from its pivot, a centering-spring in said case, followers bearing on said spring and on the ends of the spring-case, and thrust-rods bearing on the followers and on the main frame.

10. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame and having its axle-journals outside the wheels, springs through which weight borne by the main frame is transmitted to the journal-boxes of the truck, and means for permitting lateral movement of the truck-frame without interruption of the bearing of the truck-springs thereon.

11. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame and having its axle-journals outside the wheels, springs through which weight borne by the main frame is transmitted to the journal-boxes of the truck, and seats on which said springs are supported, and which rest on the journal-boxes without positive connection thereto.

12. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame, springs through which weight borne by the main frame is transmitted to the journal-boxes of the truck, seats in which said springs are supported and which are provided with reverse inclines on their lower faces, and rollers interposed between said seats and bearing on the journal-boxes.

13. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in

bearings therein, a radial truck pivoted to the main frame and having its axle-journals outside the wheels, springs through which weight borne by the main frame is transmitted to the journal-boxes of the truck, seats having diagonal recesses in their upper faces in which the bands of the springs are supported and reverse inclines on their lower faces, bearings fitted adjustably on the journal-boxes, and rollers interposed between said bearings and the lower faces of the spring-seats.

14. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, a radial truck pivoted to the main frame, springs through which weight borne by the main frame is transmitted to the journals of the truck, and guides connected to the main frame and provided with projections between which the springs are allowed free traverse in a vertical direction and which restrain them from movement in other directions.

15. In a locomotive-engine, a radial truck-frame comprising two inwardly and forwardly inclined radius-arms, united at their forward ends and provided thereat with a center-pin socket, a U-shaped rear member, and journal-box castings having lateral arms which are connected to the radius-arms and to the rear frame member, respectively.

16. In a locomotive-engine, a radial truck-frame comprising two inwardly and forwardly inclined radius-arms, a V-shaped connecting-plate secured to the forward ends of the radius-arms and provided with a center-pin socket, a U-shaped rear member, and journal-box castings having lateral arms which are connected to the radius-arms and to the rear frame member, respectively.

17. In a locomotive-engine, a radial truck-frame comprising two inwardly and forwardly inclined radius-arms, united at their forward ends and provided thereat with a center-pin socket, a U-shaped rear member, and journal-box castings which are entirely open at bottom and are provided with lateral arms which are connected to the radius-arms and to the rear frame member, respectively.

18. In a locomotive-engine, an expansion cross-tie comprising a vertical plate having lateral bearing-faces for connection to frame members, fire-box-supporting seats at its top, and a truck center-pin socket adjacent to its bottom.

19. In a locomotive-engine, a truck-spring guide comprising two plates having vertical guides on their adjacent faces to fit on opposite sides of a spring-band, connecting-bolts passing through interposed thimbles or distance-pieces, and arms or lugs for connection to a frame member.

20. In a locomotive-engine, the combination of a main frame, driving-wheels journaled in bearings therein, supplemental frame members fixed at their ends to the outer sides of

the main frame, a radial truck pivoted to the
main frame, springs bearing on the journal-
boxes of the truck and connected to the sup-
plemental frame members, springs bearing
5 on the journal-boxes of the rear driving-
wheels and connected at their front ends to
the main frame members, a transverse bar
connecting the hangers of the rear ends of
said last-named springs, inwardly and for-

wardly inclined equalizers coupling said trans- 10
verse bar with the truck-springs, and fulcrums
for said equalizers interposed between the
main and supplemental frame members.

FRANCIS J. COLE.

Witnesses:

F. T. MARKS,
A. J. BRAMAN.