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B. JACKSON.

TRACTION ENGINE.

No. 502,820. Patented Aug. 8, 1893.

Fig. 1.

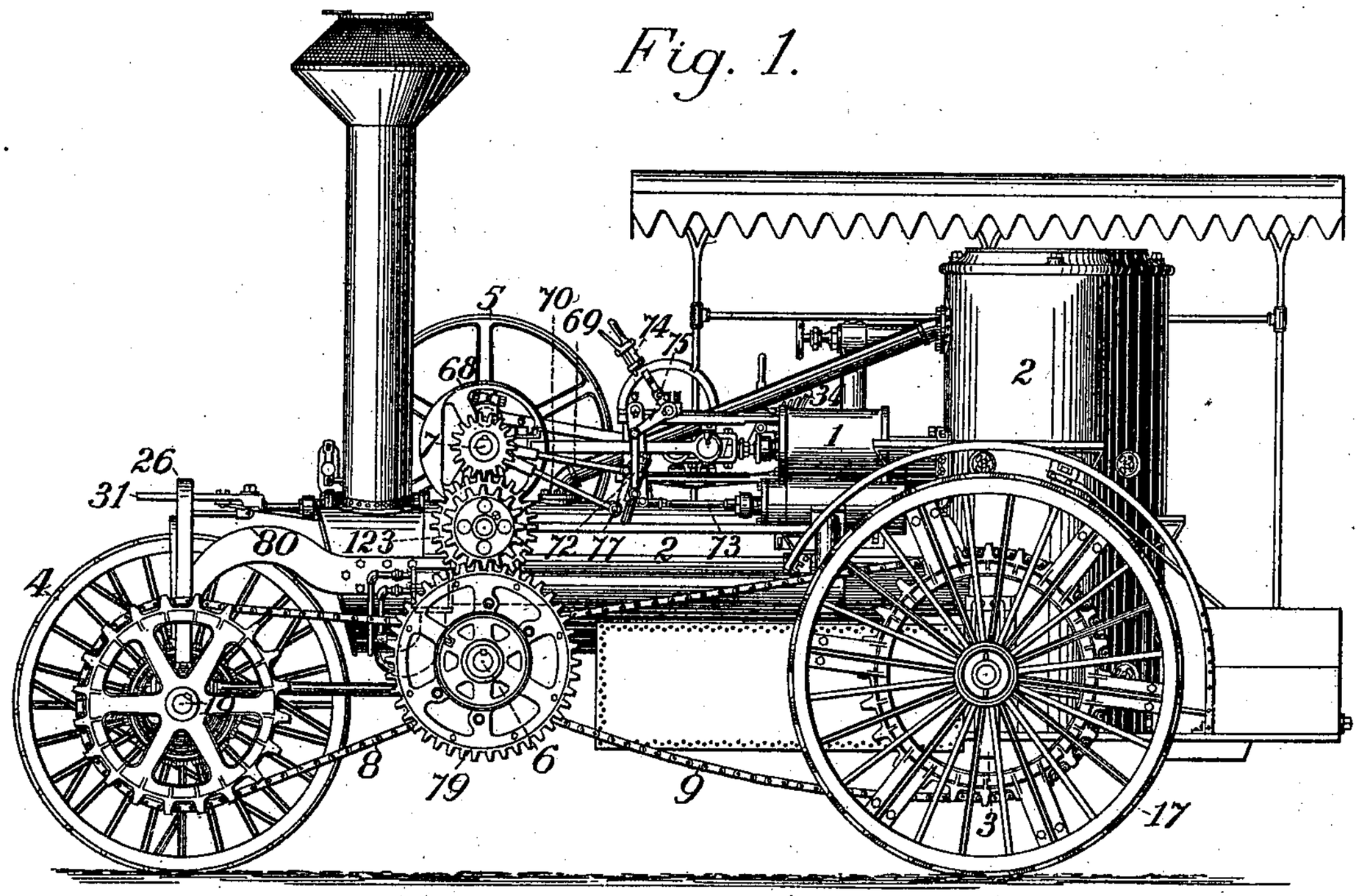

Fig. 2.

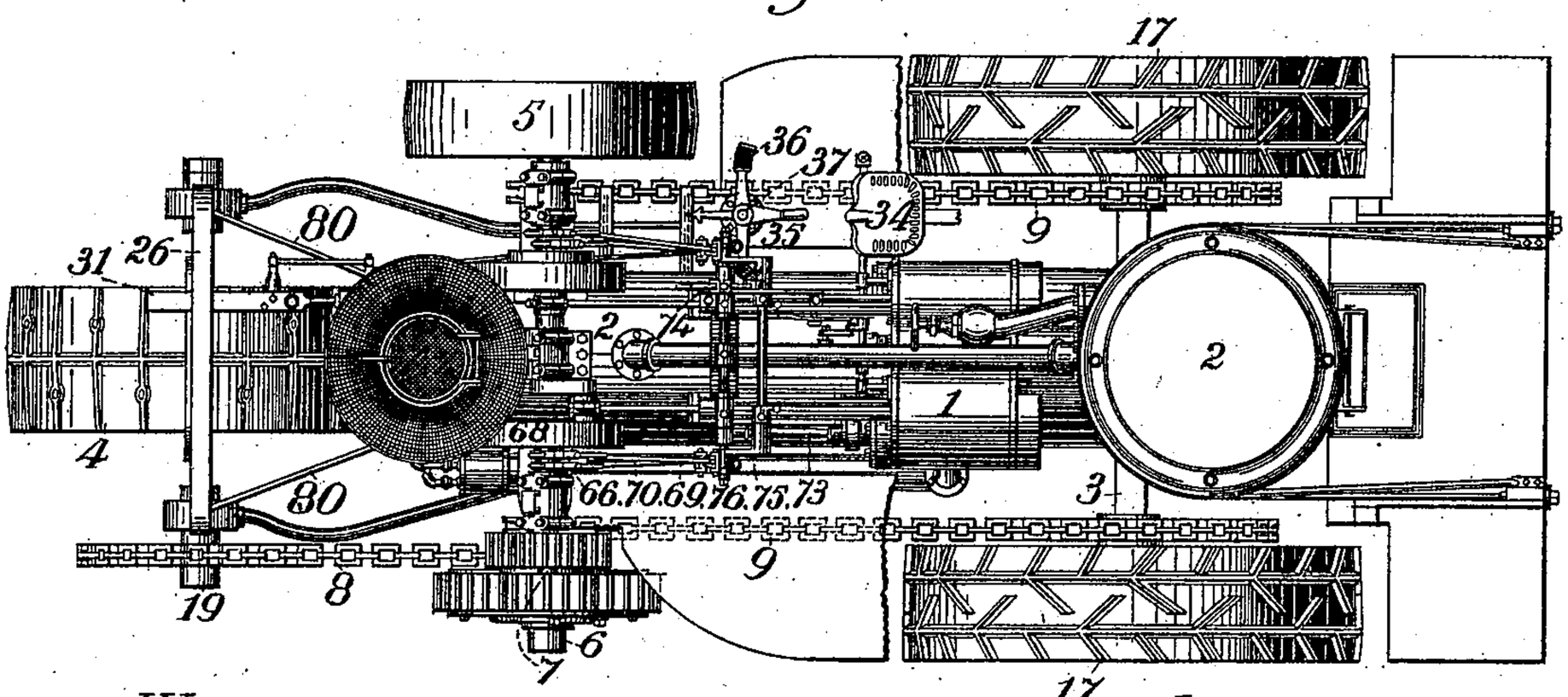

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Fig. 3.

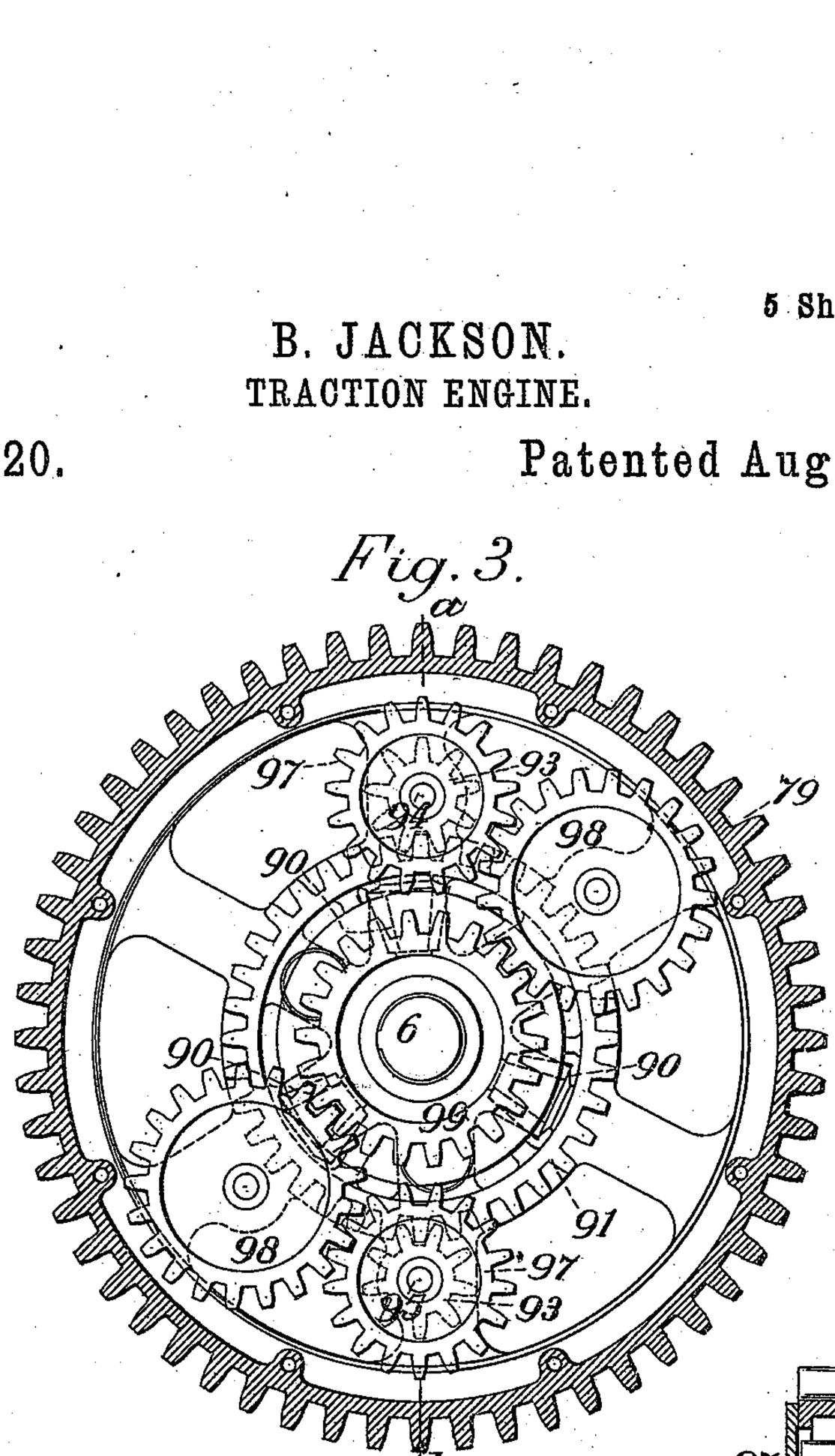

Fig. 4.

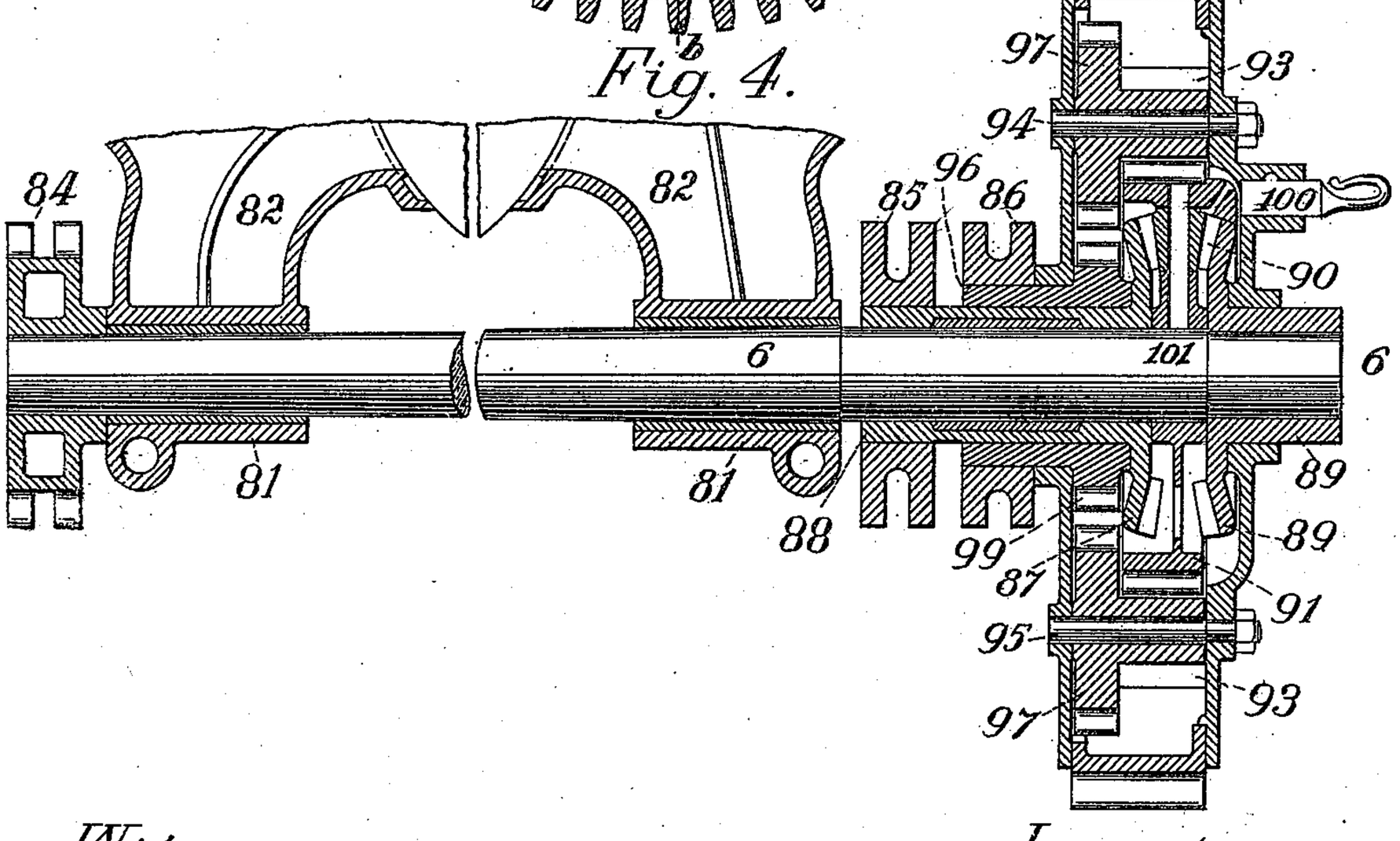

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Fig. 5.

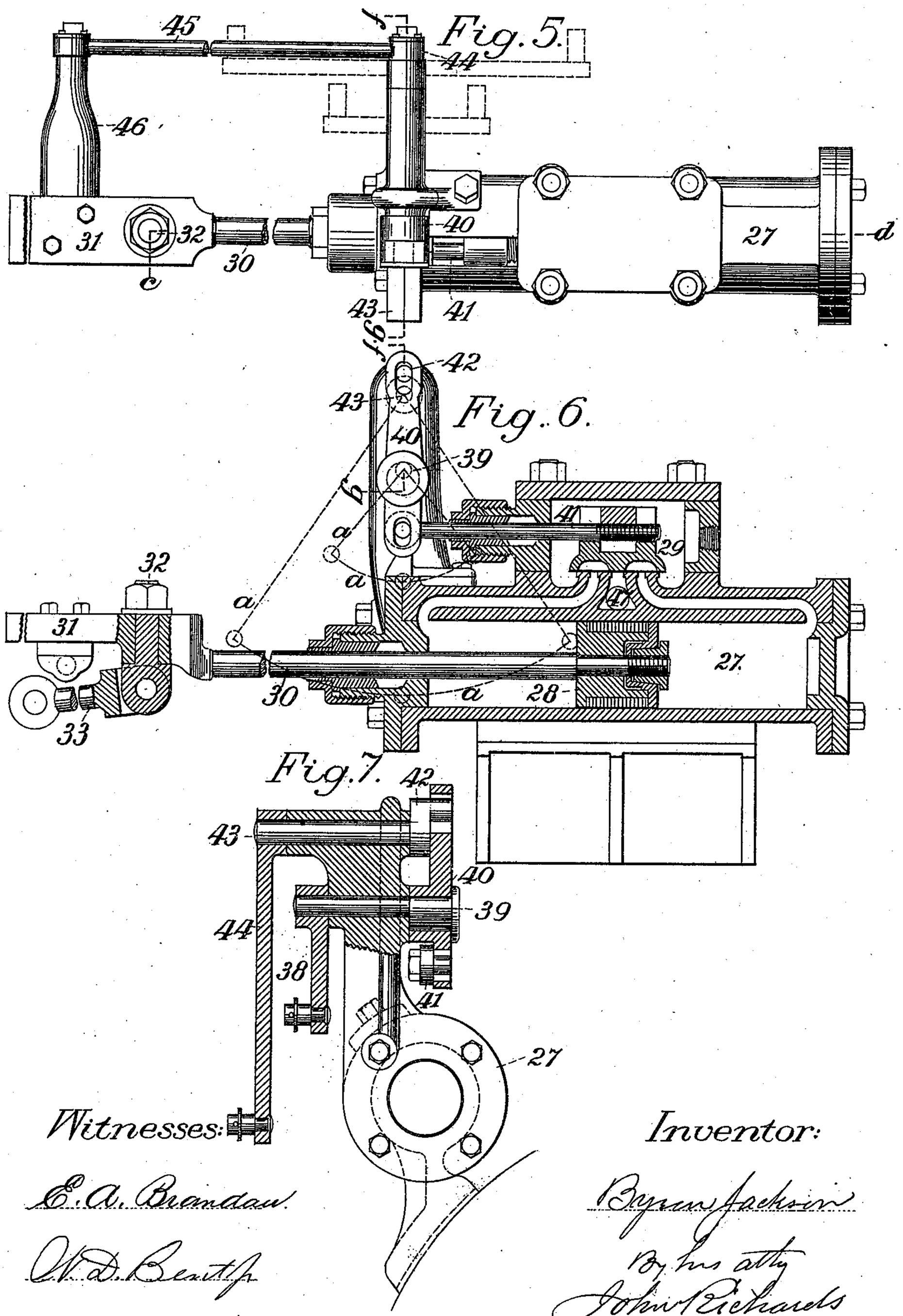

Fig. 6.

Fig. 7.

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Fig. 9.

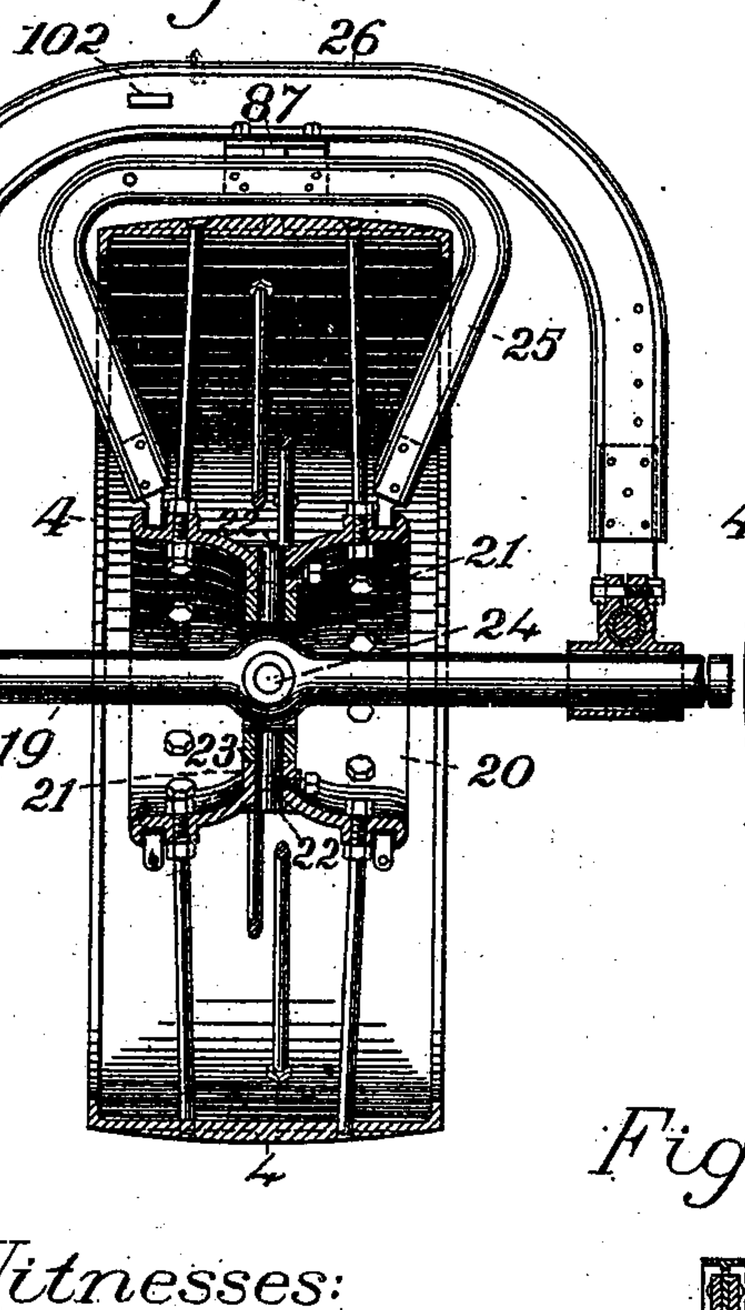

Fig. 8.

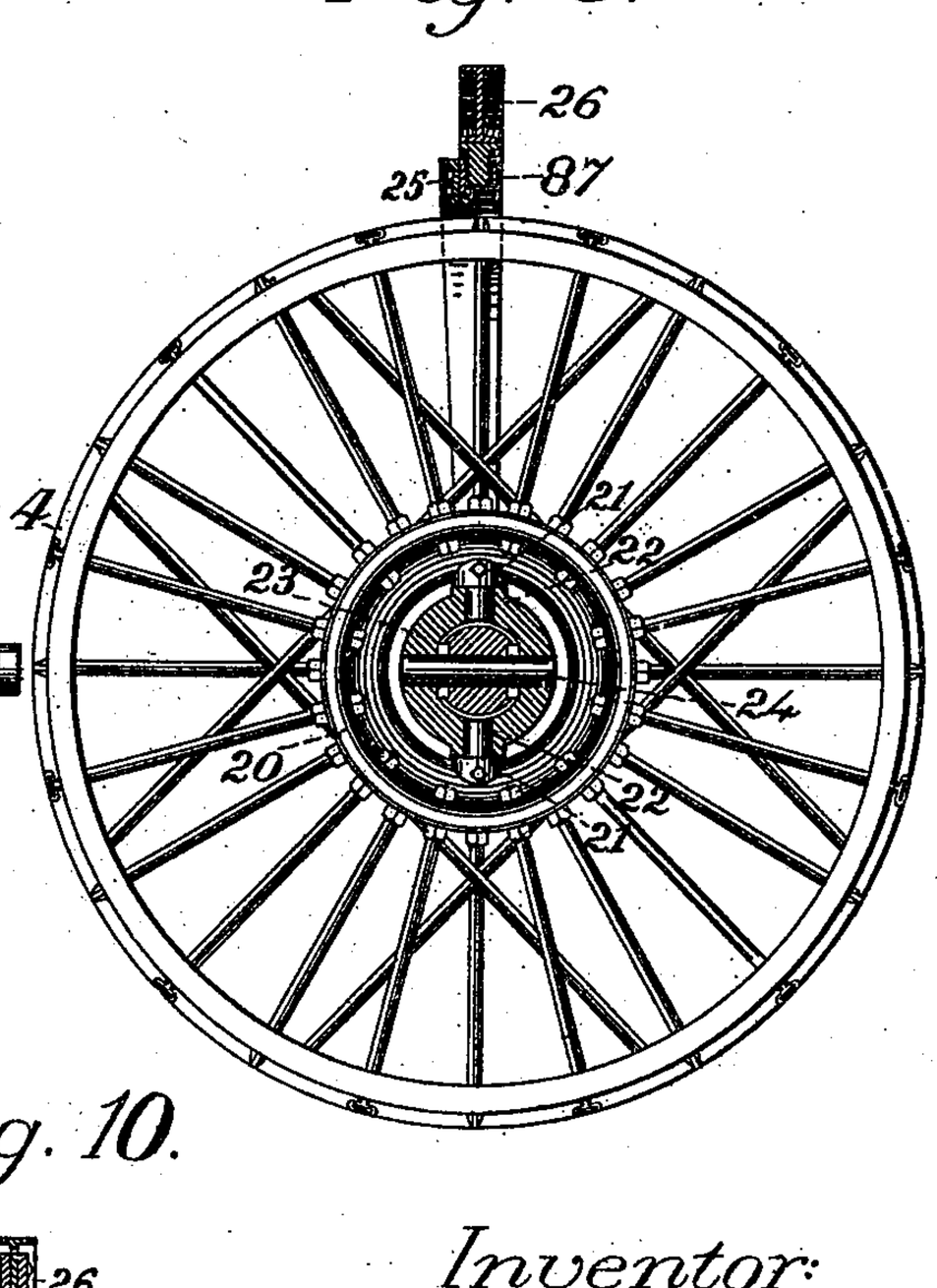

Fig. 10.

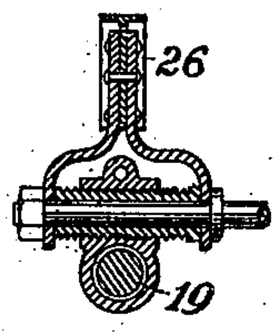

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Fig. 11.

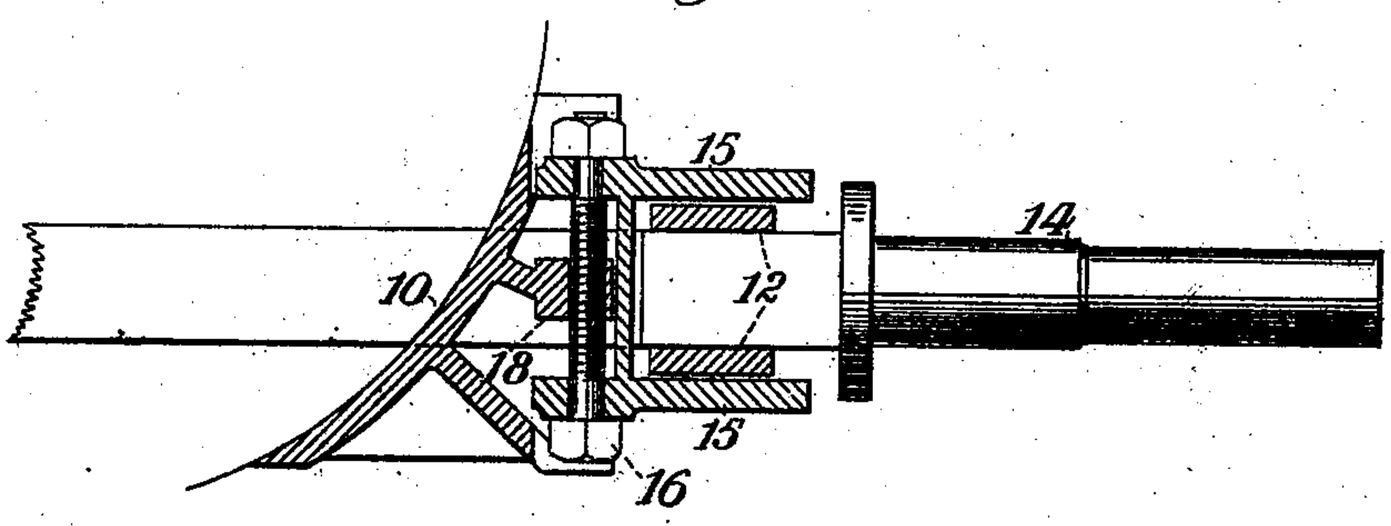
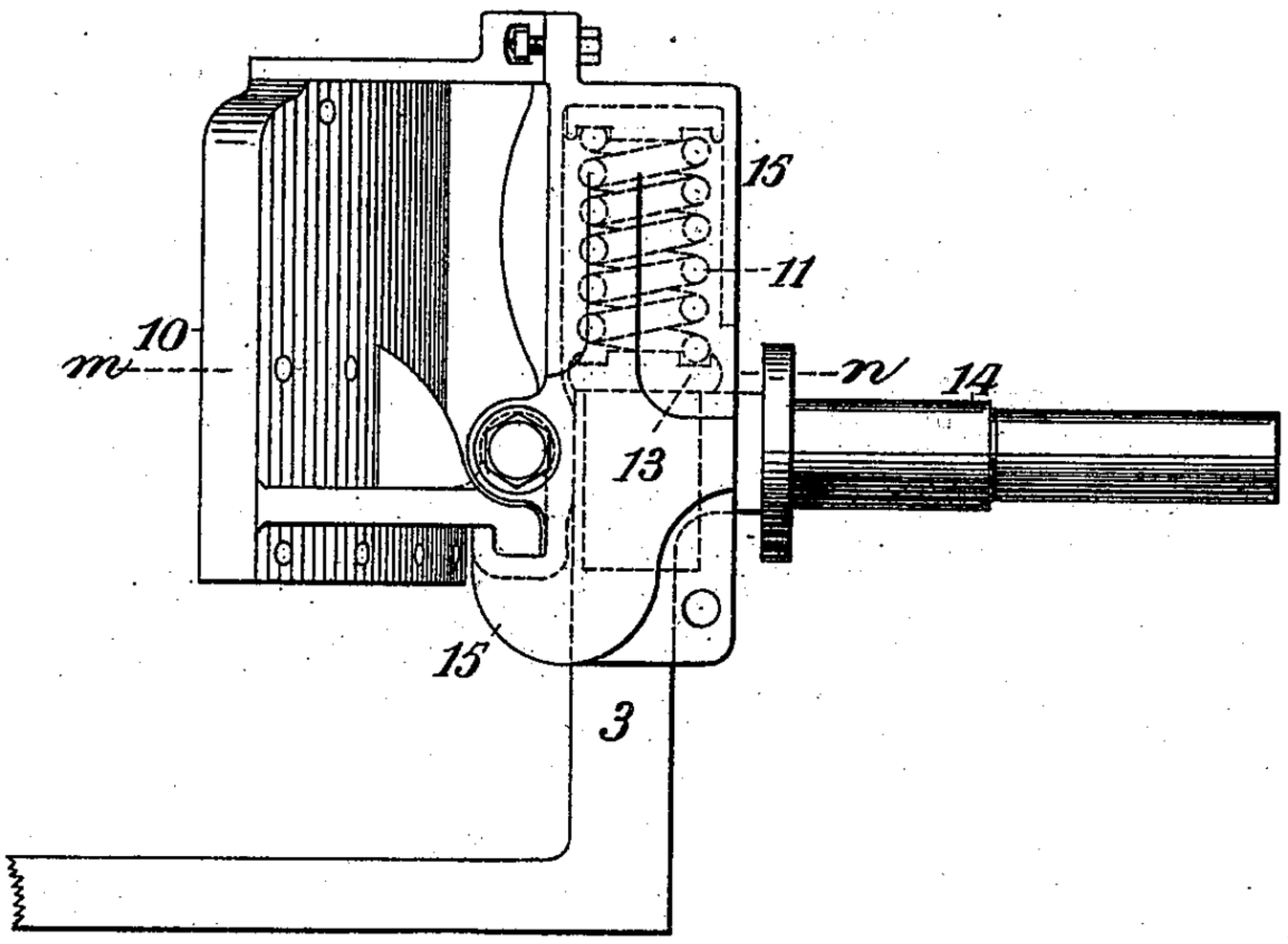


Fig. 12.



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UNITED STATES PATENT OFFICE.

BYRON JACKSON, OF SAN FRANCISCO, CALIFORNIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 502,820, dated August 8, 1893.

Application filed November 6, 1890. Serial No. 370,497. (No model.)

To all whom it may concern:

Be it known that I, BYRON JACKSON, of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Traction-Engines; and I hereby declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the art to make and use the same.

My invention relates to certain improvements in that class of machinery known as traction engines, adapted for hauling and also for motive power to be applied to other machines, and has for its object an increased efficiency and economy in such engines, also a reduction of their weight in proportion to the power they develop.

The invention consists in the construction, combination and arrangement of the several parts substantially as will be hereinafter described and claimed.

In the annexed drawings illustrating my invention: Figure 1 is a side elevation of an engine embodying my improvements. Fig. 2 is a plan of the same showing the position of the various parts in a horizontal plane. Fig. 3 is a side view of the equalizing gearing for distributing power to the traction wheels of the engine. Fig. 4 is a section taken on line *a*, *b*, of Fig. 3. Fig. 5 is a plan of the hydraulic apparatus for controlling the steering gearing of the engine. Fig. 6 is a section taken on line *c*, *d*, through the axis of Fig. 5. Fig. 7 is a partial section taken on line *f*, *g*, of Figs. 5 and 6. Fig. 8 is a side view of the steering wheel of the engine, the central bearing and bow-frame being in section. Fig. 9 is a horizontal section through the steering wheel, and side view of the axis and connections. Fig. 10 is a longitudinal section through the bearings of the axle of the steering wheel. Fig. 12 is a side view of the bracket and springs that support the boiler on the rear axle. Fig. 11 is a section on line *m*, *n*, of Fig. 12, showing the arrangement of the adjusting screws of the bearings of the rear axle for tightening the driving chain.

Referring now to the drawings, Figs. 1 and 2, I mount the engine (1) directly upon the boiler (2), and also attach the rear axle (3) to the boiler, so as to avoid as far as possible frame work of any kind. To avoid a complication of parts, and to facilitate the application of power to all the bearing wheels, I employ but a single wheel (4) in front. This leaves a clear way for belts from the driving wheel (5) when the engine is employed for driving other machinery, such as thrashing machines, pumping machinery, or saw mills.

The front extension (104) of the boiler (2) I make of thicker plates than other parts, so as to provide extra strength for attaching the frames (80) extending from the boiler to the axis of the front wheel (4); also for supporting other parts of the machinery bolted thereto.

The counter shaft (6) is driven from the engine shaft (7) by means of spur gear wheels, as shown in the side elevation, Fig. 1, and power is transmitted from the shaft (6) by means of pitched chains (8 and 9) to the bearing wheels (4 and 17), such chains being lighter than other kinds of gearing, besides, by reason of their flexibility, allow free movement of springs between the boiler (2) and the axles on which it is mounted. They also permit considerable play of the bearings of the main axle and other connected parts. The chains (8 and 9) become longer by reason of wear. This I provide for by means of devices shown in Figs. 11 and 12.

The bracket (10) is bolted to the boiler (2), and connected with a housing (15) to receive a strong coil spring (11) on which the bracket (10) rests. This spring takes its bearing on the axle (3) by means of the cap (13) with extensions (12) planed to fit into the housing (15) as shown in section in Fig. 11. The weight of the boiler thus rests on the journal (14), on which is mounted one of the rear bearing wheels of the engine. This, it may be seen, provides for a free vertical movement of the bracket (10), and of the boiler to which it is bolted. There is also a horizontal adjustment of the axle (3), as shown in the sectional view, Fig. 11, the housing (15) being moved with reference to the bracket (10) by means of the screw (16), which is threaded in the lug (18) of the bracket (10). By turning this screw (16) the housing (15) and axle (3) are moved forward or back, with reference to the bracket (10) lengthening or shortening the driving chains (9) shown in Figs. 1 and 2.

The front bearing or steering wheel (4) is mounted on the front axle (19), as shown in

Figs. 8 and 9, by means of a gimbal bearing composed of members as follows: The shell (20) forms a nave or hub for the wheel (4) to receive the spokes, as shown, and is provided on its interior with strong bosses (21) to receive the studs or pivot pins (22), connecting the pivoted ring (23) to the shell (20).

Passing through the axle (19) and also through the sides of the ring (23), is a strong cross stud or pivot pin (24), connecting the ring (23), and the wheel (4), to the shaft 19. These members form a gimbal or universal bearing for the wheel (4), so that it is free to turn in a horizontal plane while revolving with the axle (19), and thus permitting the engine to be steered or directed, as will be more fully explained hereinafter.

To prevent deviation of the wheel in a vertical plane, I employ a yoke (25) rigidly connected to the shell or nave or hub (20), as shown in the section, Fig. 12. This yoke being supported by a pivoted bearing (87) to the strong bow frame (26), holds the wheel (4) rigidly in a vertical plane, but permits it to turn horizontally, as before explained. The bow frame (26), is journaled on the axle (19), as shown, and sustains the front end of the boiler (2), by means of the brackets (80), as shown in Fig. 1. The yoke (25), besides keeping the wheel (4) in a vertical position, is also employed in connection with other mechanism for turning it in a horizontal plane, to steer or guide the engine, as will be hereinafter explained.

Referring to the hydraulic apparatus employed for steering the engine, and shown in detail, Figs. 5, 6, and 7, the hydraulic cylinder (27) is of the usual construction; the inlet and escape of water to opposite sides of the piston (28) being governed by the slide valve (29). The piston rod (30) has on its end a squared extension (31) that takes its bearing on the bow frame at (102). To this extension (31) is attached by the swivel eye bolt (32), a connecting link (33), which is attached at (103), to yoke (25), and by this means to the wheel (4), so that the course of the engine is directed by the position of the piston (28), and consequently controlled by the valve (29). This valve is moved by an attendant who is seated at (34) Fig. 2, within reach of the hand guide or index pointer (35) or the foot guide lever (36), on the same shaft (37), either or both of which can be used at pleasure. A link or connecting rod extends from the vertical guide shaft (37), Fig. 2, to the crank (38), Fig. 7, and this turning the eccentric pin (39), moves the lever (40), and at the same time the valve rod (41) and valve (29), controlling the movement of the piston (28). As, however, such movement when commenced would continue to the extreme stroke of the piston (28), I provide other gearing to govern the range of this steering movement, as follows: The lever (40) has not a fixed fulcrum at the top, but is supported there by a crank (42) on the end of the shaft (43). To the other end of the shaft (43) is attached a crank (44), and this is again connected to the extension (31) of the hydraulic piston rod (30) by the link (45), and the stud (46), Fig. 5. Now it may be seen that when the valve (29) is moved by the hand apparatus (35, 37, 38, 39) and the piston begins to move accordingly, there is at the same time a reverse closing action by means of the link (45), cranks (44 and 42), moving the top of the lever (40), so that a given amount of movement of the hand gearing produces a corresponding amount of movement of the piston (28), and no more. The dotted lines *a*, *a*, *a*, *a*, Fig. 6, show the extreme range of the cranks (38 and 44). In this way the operator or steersman can set the wheel (4) at any required angle with reference to the engine, and thus direct its course. To determine the angle of the wheel (4) and the course of the engine, I provide a hand guide or index pointer (35), Fig. 2, the line of which in all positions will correspond to the course the front wheel is traveling. The water to propel the piston (28) I take from the boiler feed pump, and if that supply is insufficient in quick turning, connection is made with the bottom of the boiler, so that the supply of water under pressure is at all times ample. The water after being used is exhausted at (47) Fig. 6, and returned to the feed-water supply tank, so that but little heat is lost in thus employing the steam water supply for steering the engine. Although I have described herein this hydraulic arrangement for steering, yet I do not specifically claim the same.

Referring now to the means for distributing propelling power to the front and rear wheels of the engine, I employ equalizing or compensating gearing as shown in detail in Figs. 3 and 4. The intermediate spur wheels (123) connecting the engine shaft (7) to the wheel (79) being only to transmit power and permit arrangement of speed relatively between the engine shaft (7) and the propelling or counter shaft (6), no description of these is necessary. The object of the devices shown in Figs. 3 and 4 is to transmit an equal amount of power to all the bearing wheels or an unequal amount between them, also to change their speed relatively, so that the front wheel (4), can be driven at an increased speed in making curves, or for any other purpose.

The construction and operation of the gearing are as follows: The strong shaft (6) is mounted in bearings (81) formed in the frame or bracket (82) which is bolted to the shell of the boiler. On this shaft (6) is keyed the bevel wheel (89) and also the chain or sprocket wheel (84); all other wheels are loose as respects the shaft (6). The driving chains (9) connecting to the rear bearing wheels pass round the two chain sprocket wheels (84 and 85) and the driving chain to the front driving wheel (4) passes around the chain sprocket wheel (86). The bevel wheel (87) is connected to the chain sprocket pulley (85) by

means of the sleeve (88) and the bevel wheel (89) is connected to the chain pulley (84) by means of the shaft (6), driving the rear bearing wheels (17) as shown in Fig. 2. The two bevel wheels (87 and 89) are driven by the bevel pinions (90) which have their bearings in the spur wheel (91). The wheel (91) has bearings at (101) on the shaft (6) and is driven by the spur pinions (93) made solid with the two larger spur pinions (97) running loosely on the studs (94 and 95) fitted into and through the main wheel (79). Into the two larger spur pinions (97) meshes the spur wheel (98), and these two into spur wheel (99), attached to the chain sprocket wheel (86), from which the driving chain leads to the front bearing and steering wheel (4), and the two pinions (93) mesh into the spur wheel (91), from which power is conveyed to the two rear bearing wheels (17). In this arrangement of gearing, when all the wheels are free, power applied to the main wheel will be transmitted to the front bearing wheel (4) and to the rear wheels (17) in the ratio of the spur wheels (91, 93, 97, 99) and with the proportions shown, about as three to one, that is, one third to the front wheel (4) and two thirds to the two rear driving wheels (17). If however a like amount of force and speed is to be transmitted to all the bearing wheels, then a stop pin (100), shown in Fig. 4, is pushed in, and locks the bevel (90) so that the whole train of wheels, with the main wheel (79) and shaft (6), revolve together. It will be understood that the relative changes in speed and power, between the rear and front bearing wheels, can be varied by the proportions of the spur pinions (93 and 97) and the wheels (91 and 99).

The engines when not employed for traction purposes, can be applied to driving machinery of any kind, and require no change other than disconnecting the traction gearing from the engine shaft (5) and placing a driving belt on the wheel (7).

Having thus described the mode of constructing and applying my improvements to traction engines, what I claim as new, and desire to secure by Letters Patent, is—

1. In a traction engine, driving chains connecting both the rear bearing and the front bearing and steering wheels to the driving power, so that all the wheels of the engine may be driven when required, said rear wheels being mounted upon movable bearings so that they can be adjusted to compensate for the wear of the driving chains, together with the steering yoke, arranged in connection with the front wheel, substantially as described.

2. In a traction engine, driving chains connecting front and rear driving wheels to the power so that the front bearing and rear steering wheels can be driven faster than the rear wheels when all are connected so as to turn the engine quickly in a curve, the said rear wheels being mounted upon movable bearings so that they can be adjusted to compensate for the wear of the driving chains, and said front wheel being mounted on the front axle by means of a gimbal bearing free to turn in any direction in a horizontal plane, substantially as specified.

3. In a traction engine, connecting chains for driving both the front and rear bearing wheels so that they may be driven at the same or at different times and speeds, said rear wheels being mounted upon movable bearings so that they can be adjusted to compensate for the wear of the driving chains, substantially as described.

4. In a traction engine, the front bearing or steering wheel mounted on front axle by means of a gimbal bearing, free to turn in any direction in a horizontal plane or held in a vertical plane by means of a steering yoke connected to the gimbal by a universal bearing, the said yoke being supported at its top by a bow-frame bearing on the front main axle, substantially as described.

5. In a traction engine, a front bearing and steering wheel connected with the driving power mounted on the front axle in the manner described, a pivoted yoke frame spanning the rim of the wheel at the top and attached by a swivel bearing to a second bow frame hinged on the main axle, a wheel connected with the steering gear and capable of turning in any direction in a horizontal plane, substantially as described.

6. In a traction engine, a front bearing and steering wheel, connected with the driving power and mounted on the front axle by means of a gimbal bearing, a pivoted yoke frame supporting the rim of the wheel at the top and attached by a swivel bearing to a second bow frame hinged on the main axle and a hydraulic piston connected to the yoke frame so as to turn the wheel about its vertical axis and thus steer the engine, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

BYRON JACKSON.

Witnesses:
ALFRED A. ENQUIST,
W. D. BENT, Jr.