No. 832,265. PATENTED OCT. 2, 1906.

C. W. MANZEL.

LUBRICATING DEVICE.

APPLICATION FILED AUG. 19, 1905.

5 SHEETS—SHEET 1.

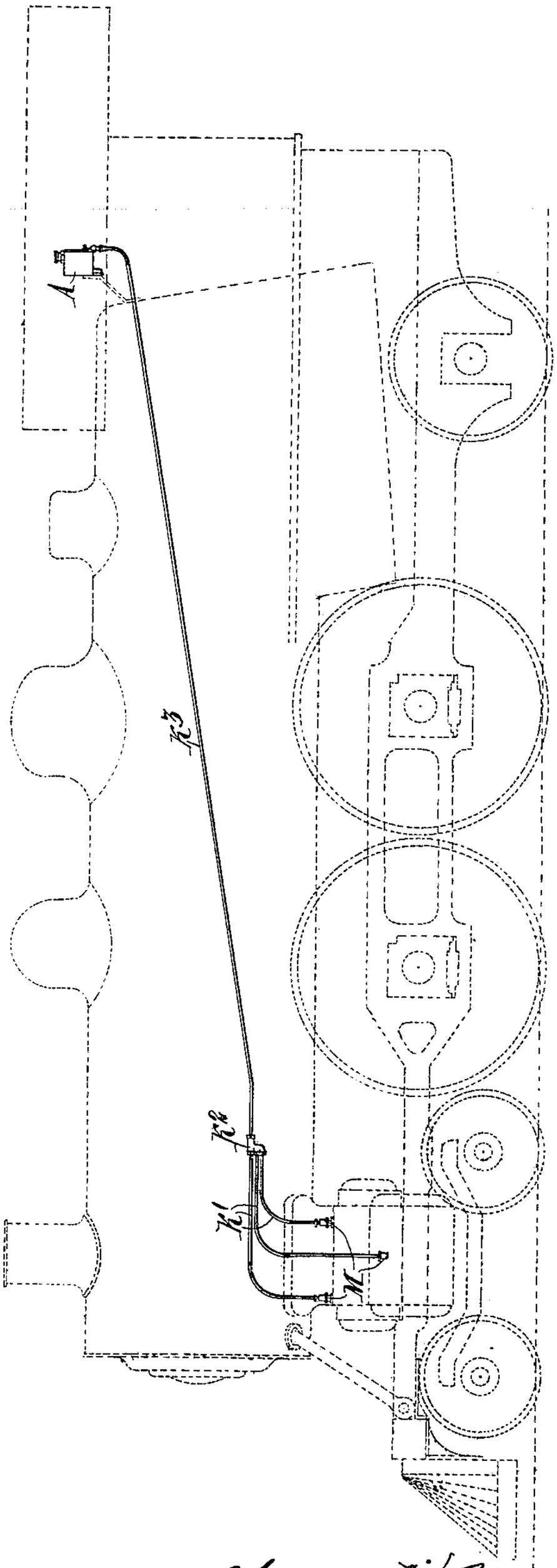

Fig. 1.

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6 SHEETS—SHEET 2.

Fig. 3.

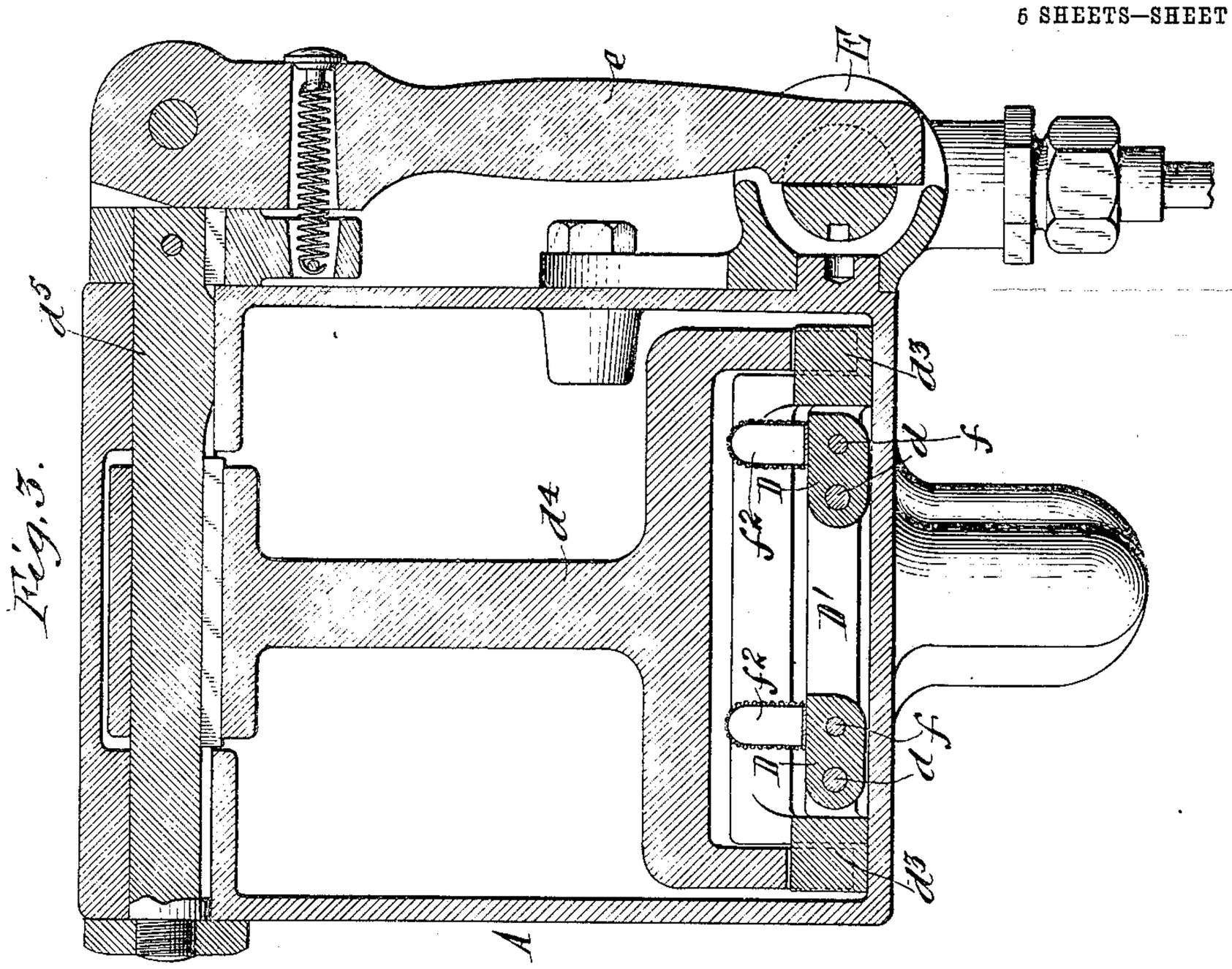
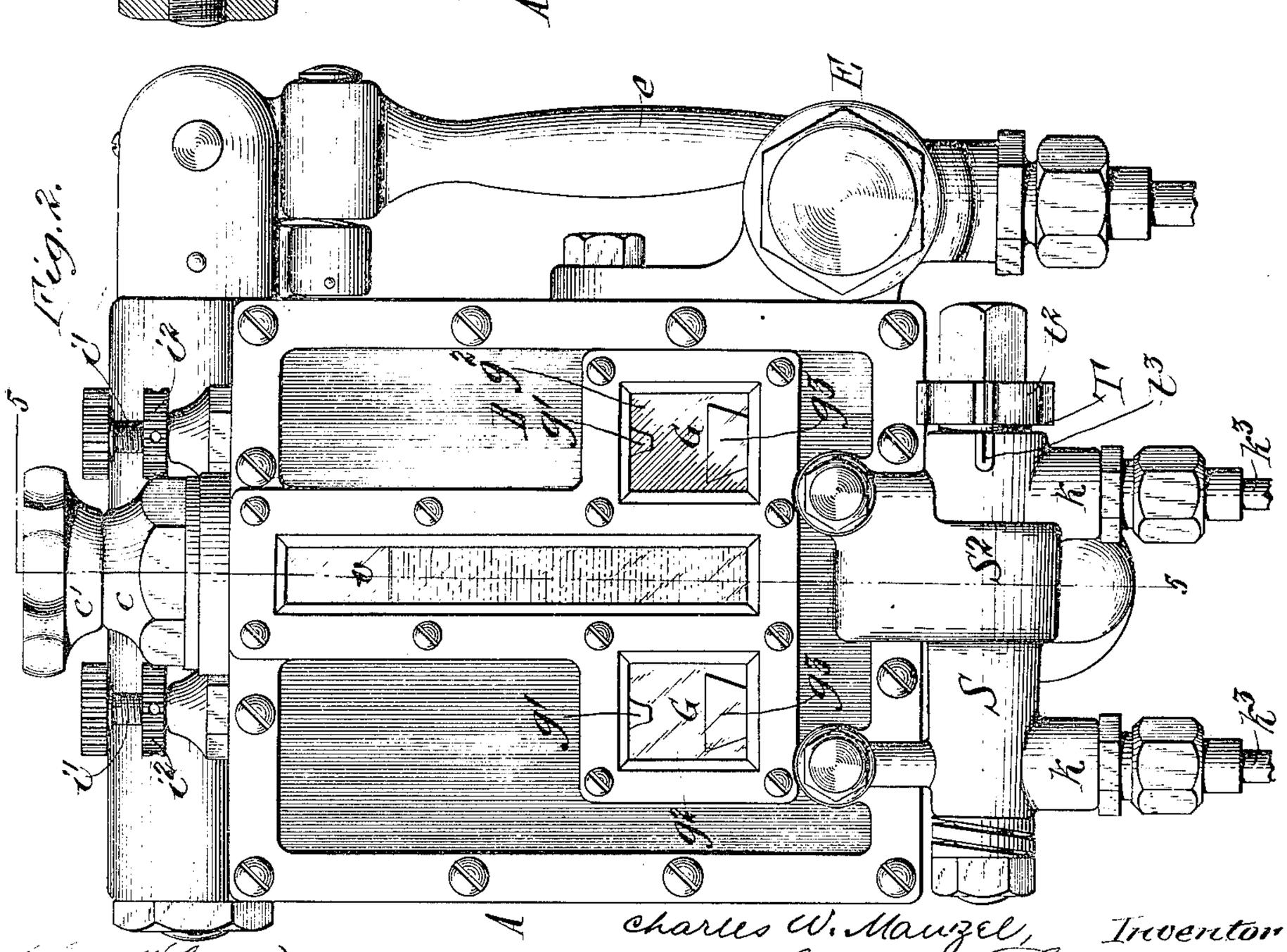


Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

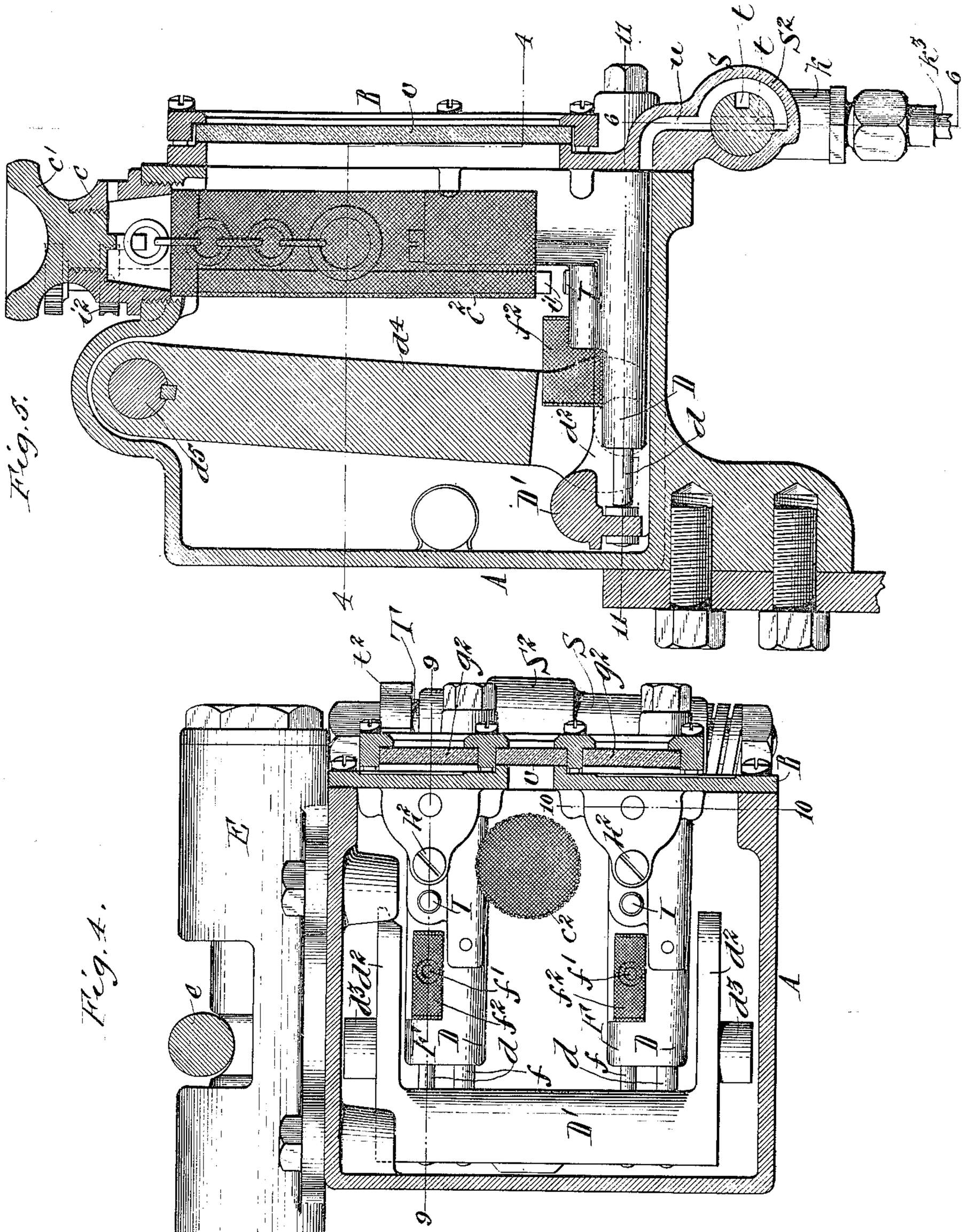

Fig. 4.

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5 SHEETS—SHEET 4.

Fig. 6.

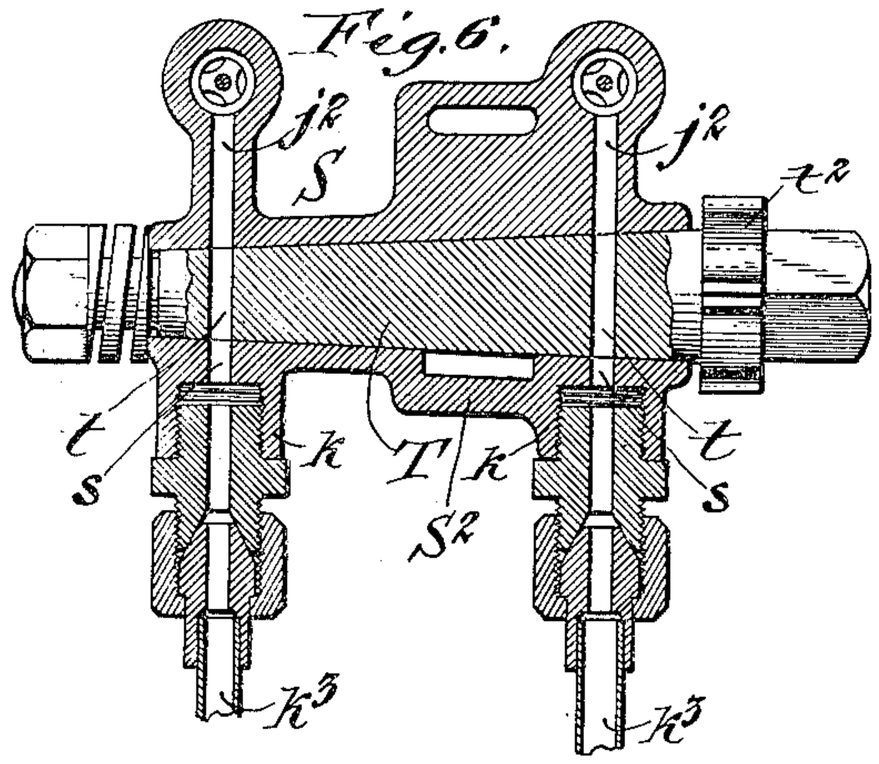

Fig. 7.

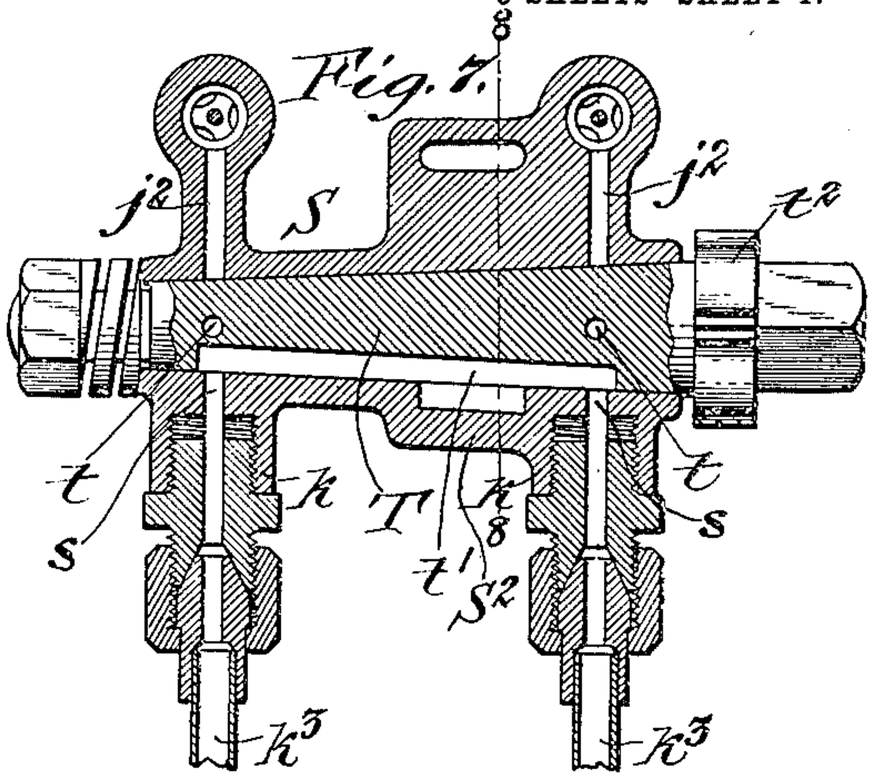

Fig. 8.

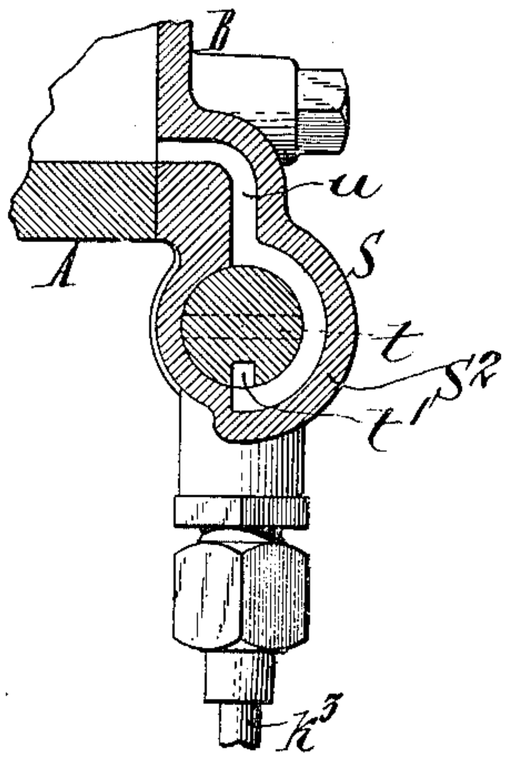

Fig. 9.

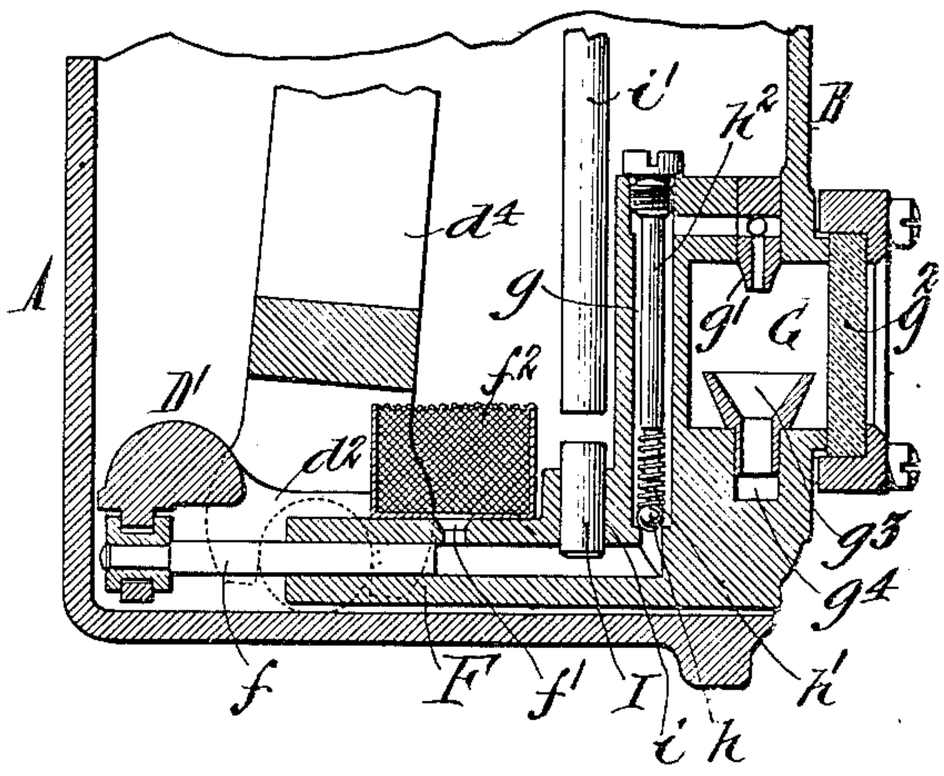

Fig. 10.

Fig. 11.

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APPLICATION FILED AUG. 19, 1905.

5 SHEETS—SHEET 5.

Fig. 12.

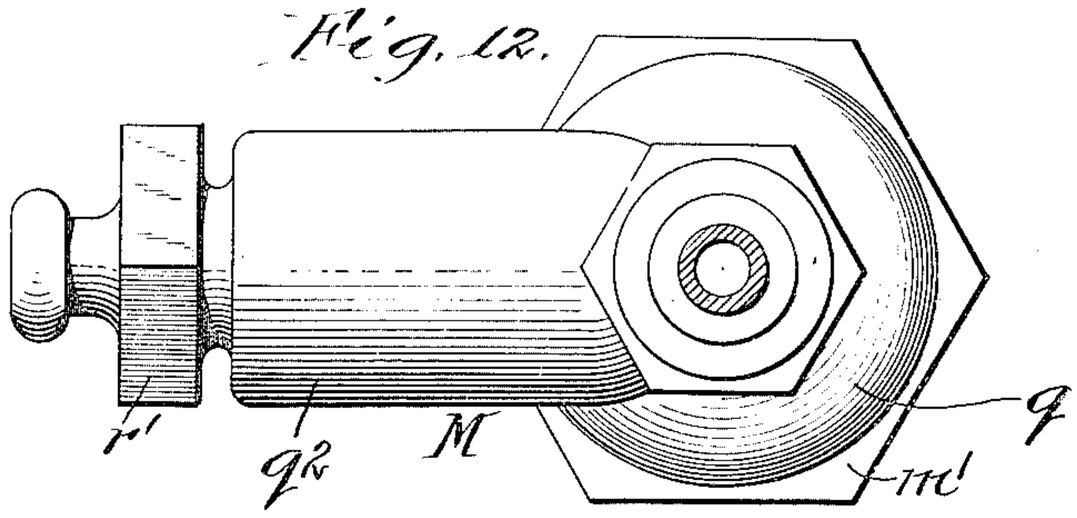


Fig. 14.

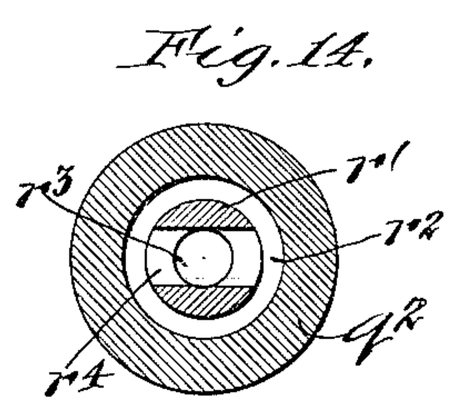


Fig. 13.

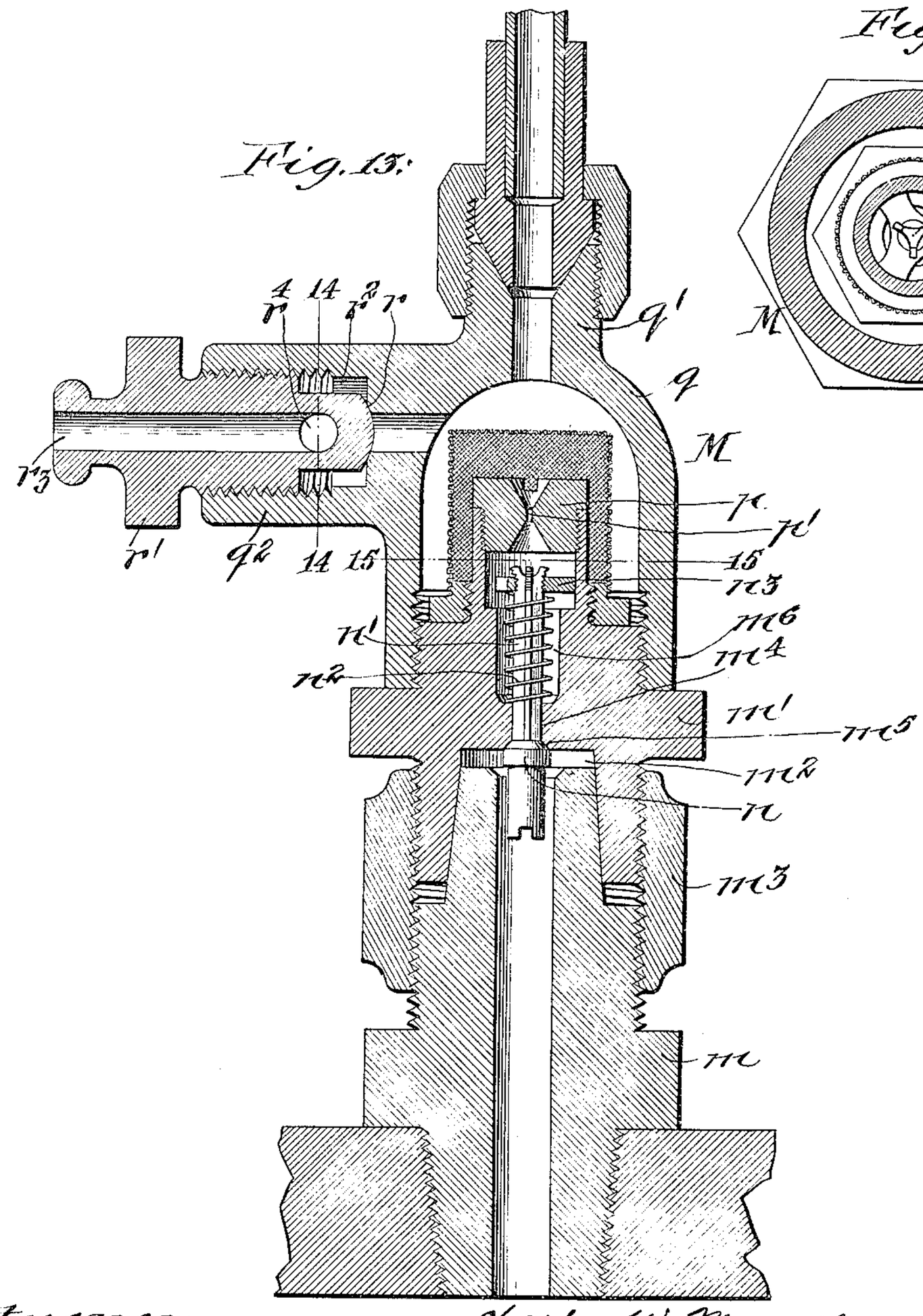
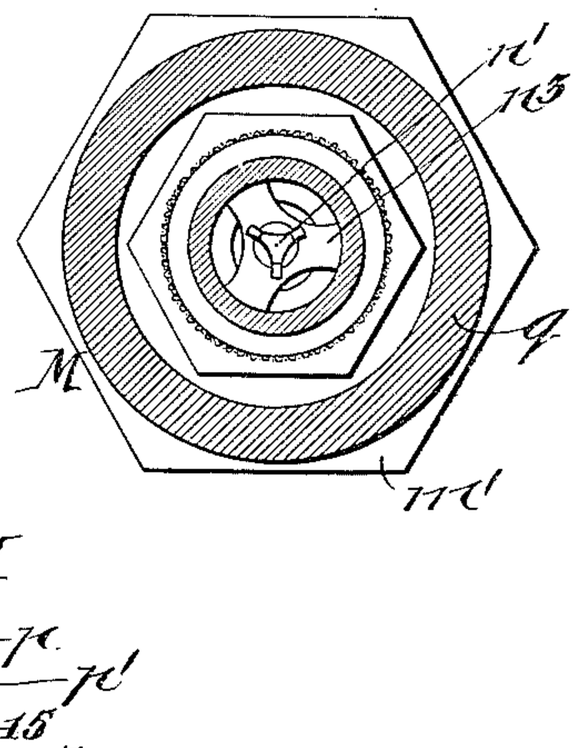


Fig. 15.



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UNITED STATES PATENT OFFICE.

CHARLES W. MANZEL, OF BUFFALO, NEW YORK.

LUBRICATING DEVICE.

No. 832,265. Specification of Letters Patent. Patented Oct. 2, 1906.

Application filed August 19, 1905. Serial No. 274,832.

To all whom it may concern:

Be it known that I, CHARLES W. MANZEL, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Lubricating Devices, of which the following is a specification.

This invention relates to a force-feed lubricating device designed more especially for supplying oil to the steam-cylinders and other parts of locomotives.

When air is present in the pipes or conduits leading from the pump of the lubricator to the usual chest-plugs, it interferes with the regular feeding of the oil, causing a deficient quantity to be supplied at one time and an excessive and wasteful quantity at another.

It is the object of my invention to provide an improved lubricating device by which the air can be readily expelled from such pipes or conduits and the chest-plugs, so as to avoid interference with the delivery of the oil and insure a positive, regular, and uniform feed to the parts to be lubricated.

In the accompanying drawings, consisting of five sheets, Figure 1 is a side elevation of the improved apparatus applied to a locomotive, which latter is shown by dotted lines. Fig. 2 is a front elevation, on an enlarged scale, of the lubricator. Fig. 3 is a vertical section thereof at right angles to the oil-pumps. Fig. 4 is a horizontal section in line 4 4, Fig. 5. Fig. 5 is a vertical section in line 5 5, Fig. 2. Figs. 6 and 7 are longtiudinal sections of the controlling-valve in line 6 6, Fig. 5, showing the same in different positions. Fig. 8 is a transverse section in line 8 8, Fig. 7. Figs. 9 and 10 are vertical sections in lines 9 9 and 10 10, Fig. 4. Fig. 11 is a fragmentary horizontal section in line 11 11, Fig. 5. Fig. 12 is a top plan view of one of the chest-plugs. Fig. 13 is a vertical central section thereof. Fig. 14 is a transverse section of its vent-nipple in line 14 14, Fig. 13. Fig. 15 is a horizontal section in line 15 15, Fig. 13.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates a force-feed lubricator which is located in the cab of the locomotive when the improved device is used in that connection. This lubricator may be of any suitable construction; but I prefer to employ the one shown in the drawings, which is constructed as follows: The body or reservoir of the lubricator is rectangular and provided with a removable front plate B. In its top the reservoir is provided with a filling-tube *c*, closed by a screw-plug *c'*, said tube carrying a depending tubular strainer c^2 for intercepting any foreign substances in the oil, as shown in Figs. 4 and 5. In the lower portion of the reservoir are arranged a pair of horizontal force-pumps or delivery-cylinders D D, one for each cylinder of the locomotive, although a greater or less number may be employed, if desired, according to the number of parts to be lubricated. *d d* indicate the plungers of these cylinders, the projecting rear ends of which are secured to a cross-head D', having forwardly-extending arms d^2, provided with trunnions d^3. This cross-head is reciprocated by a depending arm d^4, secured at its upper end to a transverse rock-shaft d^5, journaled in the upper portion of the reservoir, as shown in Fig. 3, said arms having forked lower ends which straddle said trunnions, as shown by full lines in Fig. 11 and by dotted lines in Figs. 5 and 9. This rock-shaft may be actuated by any suitable means. In the preferred construction shown it is operated by an air-motor E, supplied with compressed air from the main reservoir of the air-brake system, the shaft being provided at its projecting end with a depending arm *e*, which engages with the piston of said motor.

With each pump or delivery-cylinder D is combined a regulating pump or cylinder F, arranged at one side thereof and adapted to supply a predetermined quantity of oil to the same. This regulating-cylinder contains a plunger *f*, which is secured to and actuated by the cross-head D' and receives the oil from the reservoir through an inlet-opening *f'* in its upper side, as shown in Fig. 9, a suitable strainer f^2 being applied to this opening. The delivery end of this regulating-cylinder is connected with a sight-chamber G by a passage *g*, ascending from its rear end and extending thence horizontally above said chamber, the horizontal portion of the passage terminating in a drip-nozzle *g'*, which depends into the chamber and from which the oil falls in drops. This sight-chamber is located at the front of the lubricator and provided in its outer wall with a transparent pane g^2, of glass or other suitable material, through which the engineer may observe the quantity and rapidity of the drop-feed. In the bottom of the sight-chamber below each drip-nozzle is located a receiving-funnel g^3,

whence the oil passes through a transverse passage g^4, a longitudinal passage g^5, and a descending passage g^6 into the corresponding delivery-cylinder, as shown in Fig. 10.

In the ascending passage g is arranged a check-valve h, which closes toward the delivery-cylinder and is yieldingly held against its seat by a spring h', as shown in Fig. 9. This spring is backed by a stop or rod h^2, screwed into the upper end of the passage g.

I, Figs. 4, 5, and 9, represents a regulating piston or follower fitted in an enlargement or lateral chamber i of the regulating-cylinder, which enlargement communicates with said cylinder near its delivery end and is preferably arranged on the upper side thereof, as shown. The outward movement of the piston is limited by a stop or screw-threaded rod i', passing through a threaded opening in the top of the oil-reservoir and locked in position by a jam-nut i^2. The spring is so regulated that the resistance of the check-valve is greater than the weight or resistance of the regulating-piston.

Upon the forward stroke of the plunger of the regulating-cylinder the regulating-piston I is raised by the pressure in the cylinder until it strikes its stop i', the oil in the cylinder entering the portion of the enlargement left vacant by the displaced piston. As soon as the regulating-piston is thus arrested the continued pressure in the cylinder overcomes the spring of the check-valve, opening the latter and delivering a greater or less charge of oil through the drip-nozzle g' into the funnel of the sight-feed chamber G, according to the extent of travel of the regulating-piston permitted by its stop. The piston of the regulating-cylinder has a uniform predetermined stroke, and the capacity of this cylinder is augmented, more or less, by its enlargement, according as the piston is allowed to recede, more or less, by its stop. It follows that by increasing the capacity of the cylinder a smaller quantity of oil will be pumped into the sight-chamber and supplied to the delivery-cylinder. Thus if it is desired to supply the maximum quantity of oil to the delivery-cylinder the stop is adjusted to its lowest position, and if a smaller quantity is to be supplied the stop is raised to a greater or less extent.

As shown in Fig. 11, each delivery-cylinder is provided in its discharge-passage with one or more check-valves j j' of any ordinary construction. These discharge-passages communicate by descending passages j^2 with delivery-nipples k, which depend from the front plate of the oil-reservoir and to which are attached the pipes or conduits leading to the chest-plugs M of the steam-cylinders or other parts to be lubricated. In the drawings a set of three chest-plugs is shown for each cylinder, these plugs being connected by individual pipes k' with a manifold or union k^2, which in turn is connected with one of the delivery-nipples k by a pipe k^3. The chest-plugs, which form part of my improved apparatus, are shown in detail in Figs. 12, 15 and preferably constructed as follows: m indicates the hollow stem or post of the chest-plug, which is screwed into an opening of the steam-chest, and m' is a head surmounting the post and provided in its lower end with a tapering socket m^2, which receives the correspondingly-shaped upper end of the post. The post and the head are united by a screw-threaded collar or union m^3. The head has an axial oil-passage m^4, provided at its lower end with a seat m^5, against which a check-valve n is adapted to close. This valve has a grooved or winged stem n', which extends upwardly through an enlargement m^6 of the oil-passage m^4, and the same is held against its seat by a spring n^2 applied to said stem and bearing at its lower end against the bottom of said enlargement and at its upper end against a nut or collar n^3, secured to the stem. p indicates a choke-plug applied to the upper end of the head m' and provided with a constricted central passage p', which is gradually contracted from the upper end to about the middle of the plug and then flared toward the lower end thereof, as shown in Fig. 13. q indicates a hood or inlet-chamber surmounting the head m' and inclosing the choke-plug p. This chamber is provided at its upper end with an inlet branch q', to which the front end of the feed-pipe k' is connected, and at one side thereof with a vent or vent nipple q^2 for the escape of the air in said feed-pipe and the chest-plug. The outer portion of the bore of this vent-nipple is enlarged to form an internal seat or shoulder r, against which the inner end of a screw-plug r' bears, which normally closes the outer end of the reduced portion of said bore. This plug is reduced at its inner end to leave an annular space r^2 between the same and the wall of the nipple and is provided with a longitudinal passage r^3, which extends from its outer end nearly to its inner end and communicates with said annular space by a transverse passage r^4, intersecting the inner end of the longitudinal passage. By this construction upon partly unscrewing the hollow plug r' any air in the chest-plug and the feed-pipe connected therewith is allowed to escape through the hollow plug.

The passage of the oil from the reservoir of the lubricator A to the chest-plugs M may be controlled by a valve of any suitable construction. The preferred valve shown in the drawings is located at the base of the reservoir and consists of a horizontal case S, formed integral with the front plate B and interposed between the delivery or pump cylinders D and the delivery-nipples k, and a rotary key or tapering plug T, fitted in the case. This key is provided with transverse

ports *t*, arranged to connect the discharge-passages of the delivery-cylinders with said nipples for forcing the oil into and through the feed-pipes *k'*, as shown in Fig. 6. The key is also provided in its periphery with a longitudinal port or channel *t'*, adapted to connect said nipples and pipes with a priming channel or passage *u*, which extends from the lower portion of the oil-reservoir to the lower side of the valve-case S, as shown in Figs. 5 and 8, this channel being formed in an enlargement S^2 of the valve-case S and the front plate of the oil-reservoir, as shown in Fig. 2. The valve-case is provided in its bottom with discharge-ports *s*, arranged in line with the delivery-nipples *k*, and the longitudinal port *t'* of the key is of sufficient length to connect these ports with the priming-channel *u* when the key is turned to the position shown in Figs. 7 and 8, so as to allow oil to flow by gravity from the reservoir through said priming-channel, longitudinal port, and discharge-ports into the nipples *k* and pipes *k'*.

The key has a square end adapted to receive a wrench for turning it, and the same is provided with arms or lugs t^2, which are adapted to be brought into register with a suitable mark or lug t^3 on the adjacent end of the valve-case for readily indicating the different positions of the valve-key.

When it is desired to expel the air from the pipe-lines between the lubricator and the chest-plugs, the controlling-valve T is turned to the position shown in Figs. 7 and 8 and the vents of the chest-plugs are opened by unscrewing the plugs *r'*. The oil now flows through the priming-channel *u*, the controlling-valve, the pipes k^3 *k'*, and the vent-nipples q^2 of the chest-plugs, carrying before it any air in the pipes and the inlet-chambers of said plugs and expelling it through the vent-nipples. After thus priming the pipes the vent-plugs are closed, the key of the controlling-valve is turned to bring its transverse ports *t* in line with the delivery-nipples *k* and the discharge-passages of the delivery-cylinders D, as shown in Figs. 5 and 6, and the oil-pumps are actuated, whereupon oil is pumped from the reservoir through the feed-pipes *k'* and the chest-plugs M in an obvious manner.

The vent-nipple of each chest-plug is connected with the upper portion of the inlet-chamber, as shown, to insure the expulsion of all the air from the chest-plug when the vent-plug *r'* is opened.

By the use of the priming means above described the conduits from the oil-reservoir to the chest-plugs are always filled with a solid column of oil, and a positive and uniform feed of the oil to the steam-cylinders or other parts to be lubricated is therefore insured, and this important advantage is obtained in a convenient manner and by a comparatively simple construction of the parts which contribute to produce the desired result.

By arranging the pump-cylinders in the bottom of the oil-reservoir, as shown, and not allowing the oil-level to fall below the top of the delivery-cylinders the atmosphere is effectually excluded from the feed-pipes and other parts of the apparatus. To enable the engineer to observe this level, the lubricator is provided in its front wall with a transparent panel or sight-glass *v*, the lower end of which terminates above the top of said cylinders.

I do not wish to claim in this application the construction of the lubricator itself herein shown, as the same forms the subject of a separate application filed by me August 24, 1905, Serial No. 275,515, nor the feature of the distributer k^2 in combination with the chest-plugs, as the same forms the subject of another application filed by me August 28, 1905, Serial No. 276,036.

I claim as my invention—

1. A lubricating device, comprising an oil-reservoir, a pump supplied from the reservoir and arranged in the lower portion thereof, a chest-plug or oil-post connected with said pump and having a vent, a feed-conduit leading from the pump to the chest-plug, and manually-controlled means normally closing said vent, substantially as set forth.

2. A lubricating device comprising an oil-reservoir, a chest-plug or oil-post having a vent-opening provided with a seat or shoulder, a plug arranged in said opening and bearing at its inner end against said seat, said vent-plug being provided with a longitudinal passage terminating short of its inner end and opening at the side of the plug, and a conduit connecting the chest-plug with the reservoir, substantially as set forth.

3. A lubricating device comprising an oil-reservoir, a chest-plug or oil-post having a vent-opening provided with an internal enlargement forming a seat or shoulder, a vent-plug arranged in said opening and having a reduced inner end which bears against said seat, said vent-plug being provided with a longitudinal passage terminating short of its inner end and extending laterally through the reduced portion of the plug, and a conduit connecting the chest-plug with the oil-reservoir, substantially as set forth.

4. A lubricating device, comprising an oil-reservoir, a pump supplied from the reservoir and arranged in the lower portion thereof, a chest-plug or oil-post connected with said pump and having a vent, a conduit leading from the pump to the chest-plug, there being a priming-passage leading from the reservoir, and means for connecting said conduit with the pump or said priming-passage at will, substantially as set forth.

5. A lubricating device, comprising an oil-reservoir, a pump supplied from the reser-

voir and arranged in the lower portion thereof, a chest-plug or oil-post connected with said pump and having a vent, a conduit leading from the pump to the chest-plug, a controlling-valve arranged in said conduit, there being a priming-passage leading from the reservoir to the case of said valve, the plug or key of said valve having ports arranged to connect said conduit with said priming-passage in one position of the valve and with the pump in another position thereof, substantially as set forth.

Witness my hand this 17th day of August, 1905.

CHARLES W. MANZEL.

Witnesses:
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