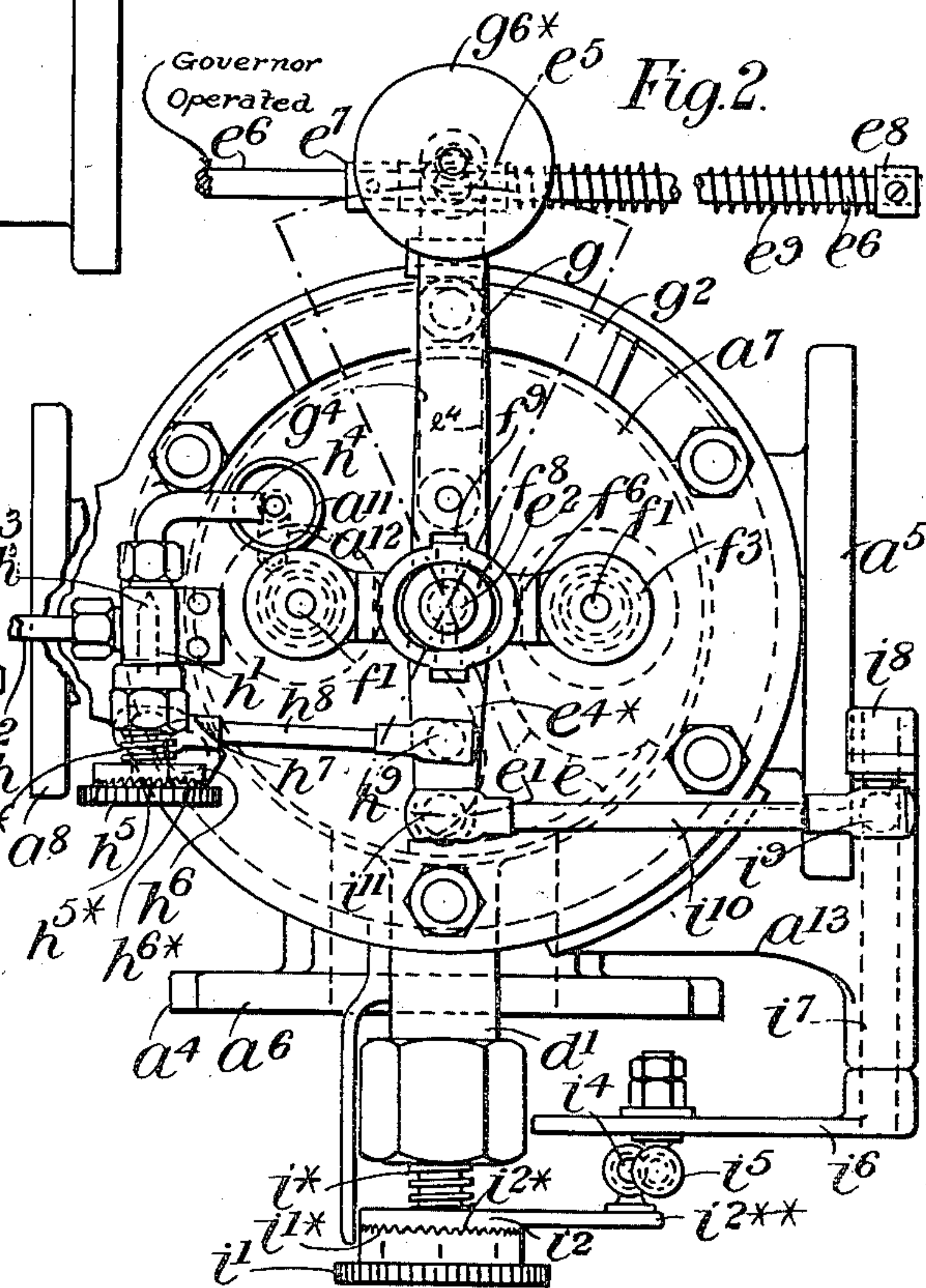
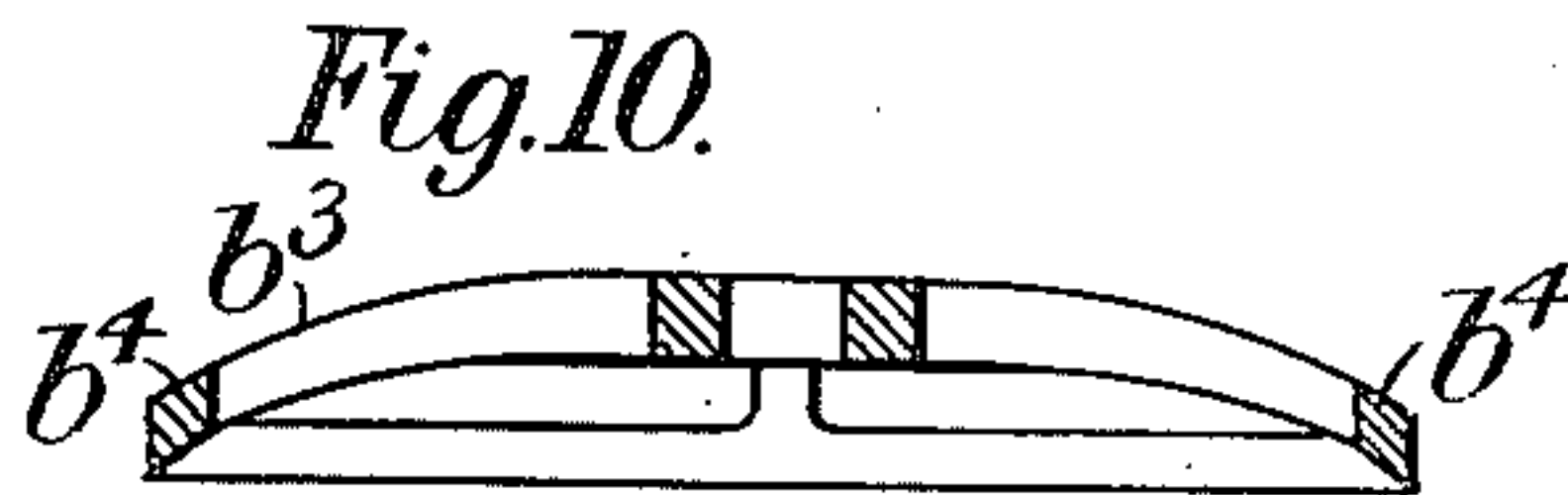
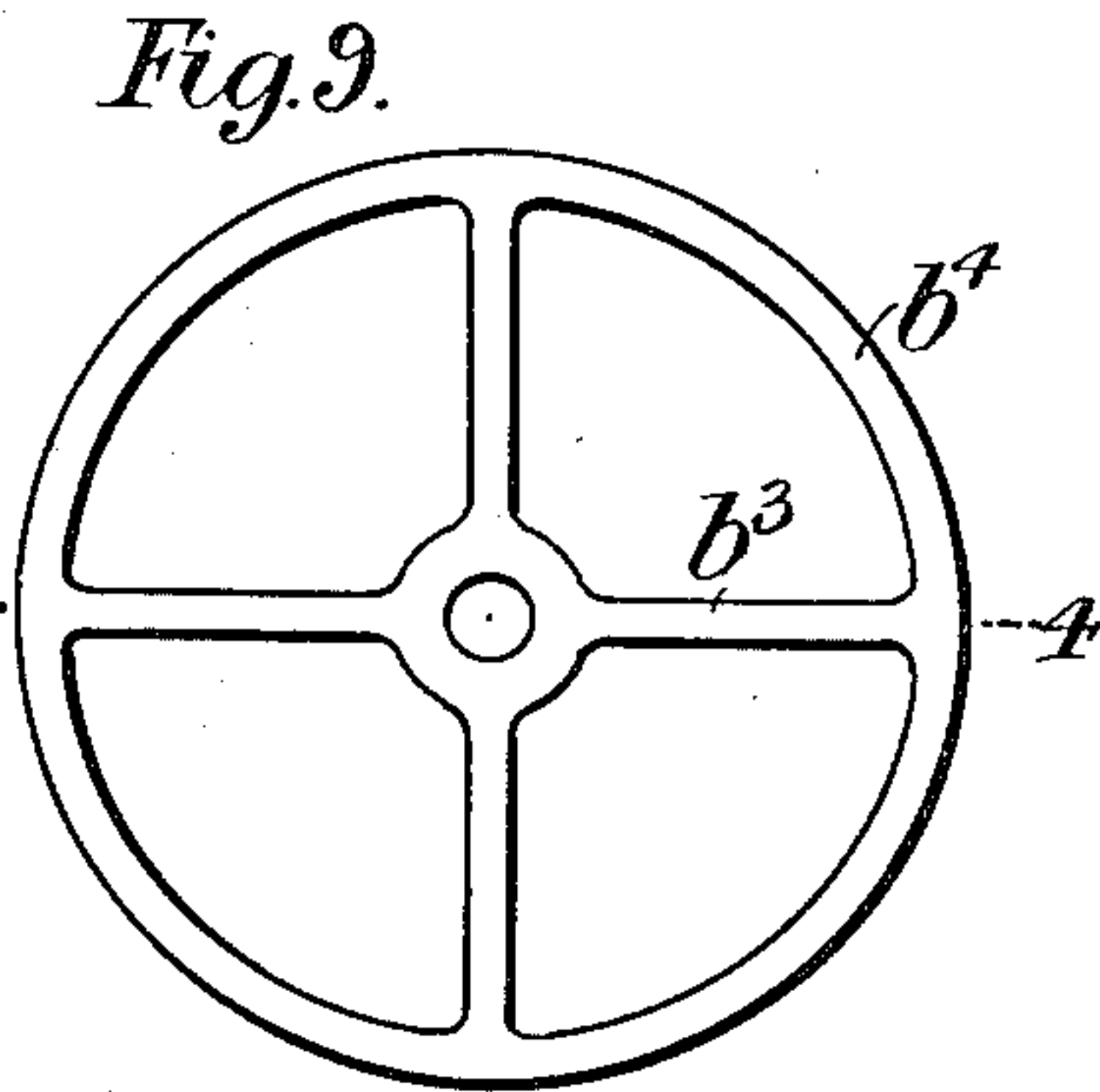
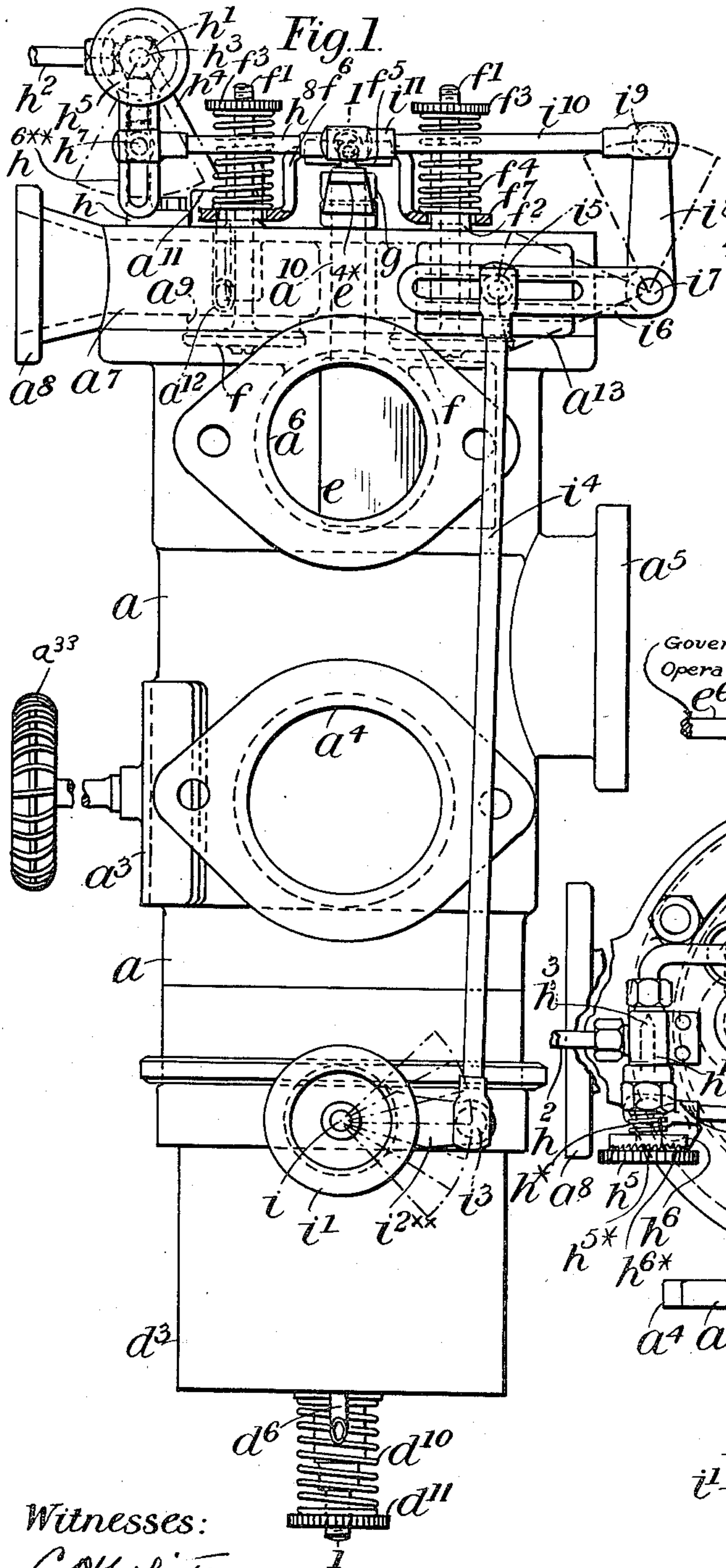


A. WESTMACOTT.
CARBURETER AND VAPORIZER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED MAY 23, 1908.

976,237.

Patented Nov. 22, 1910.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.



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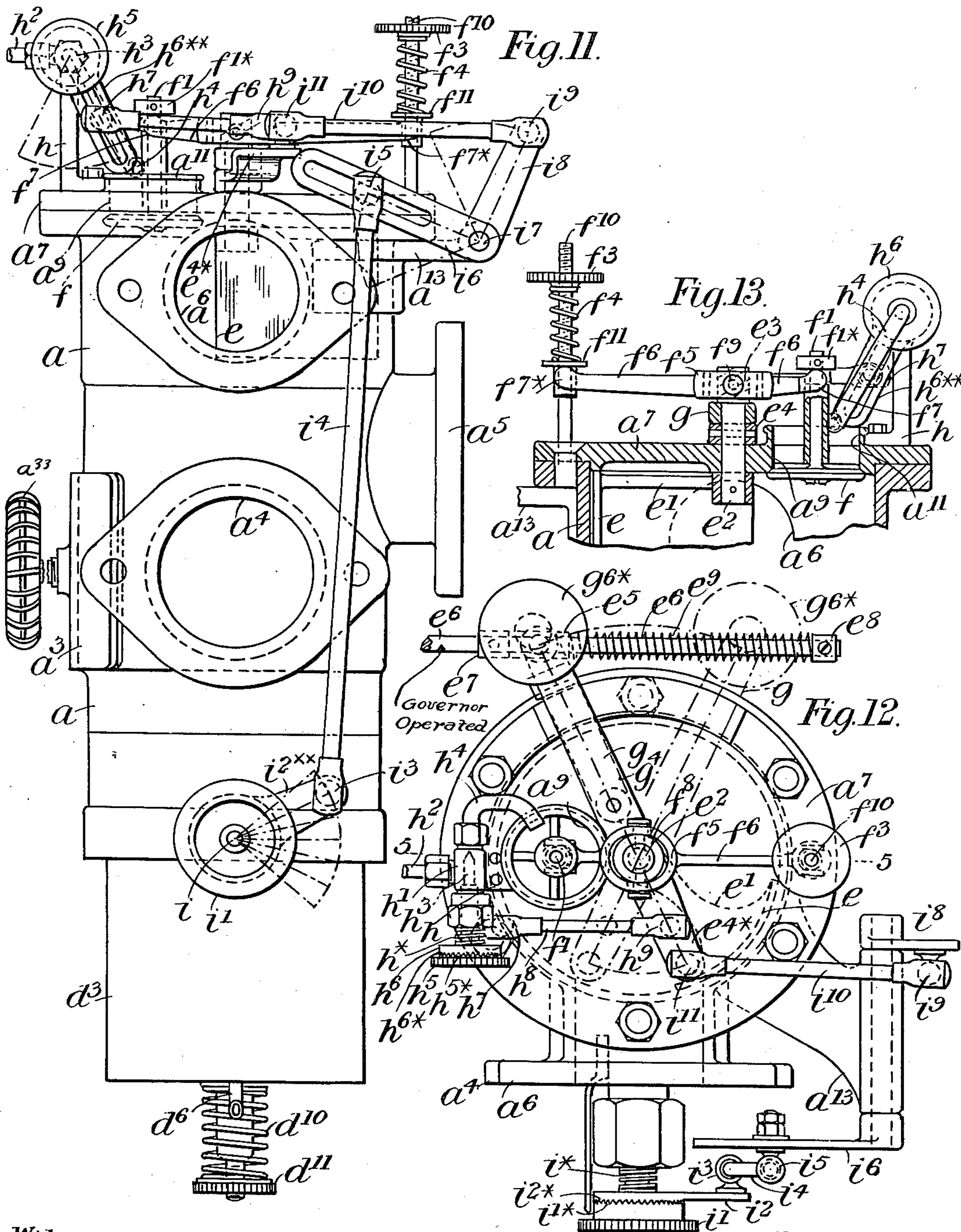
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UNITED STATES PATENT OFFICE.

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CARBURETER AND VAPORIZER FOR INTERNAL-COMBUSTION ENGINES.

976,237.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed May 23, 1908. Serial No. 434,645.

To all whom it may concern:

Be it known that I, ALFRED WESTMACOTT, a subject of the King of Great Britain, residing at St. Helens, in the Isle of Wight, in the county of Hants, England, naval architect, have invented certain new and useful Improvements in or Connected with Carbureters and Vaporizers for Internal-Combustion Engines, of which the following is a specification, reference being had to the drawings hereunto annexed and to the figures and letters marked thereon—that is to say:

The invention relates to improvements upon an invention in respect of which Letters Patent No. 800777 issued 3rd October 1905 the purpose of which was primarily to provide a means of utilizing paraffin oil in the production of an explosive mixture and the object of the present invention is to improve various details of construction of the subject matter of said Letters Patent.

In the accompanying drawings:—Figure 1 is a side elevation of a carbureter and vaporizer for internal combustion engines constructed according to the present invention. Fig. 2 is a plan thereof. Fig. 3 is a vertical transverse section taken on the line 1—1 of Fig. 1. Fig. 4 is a sectional detail view, the section being taken on the line 1—1 of Fig. 1, of the throttle valve levers and some connected parts. Fig. 5 is a vertical transverse section taken on the line 2—2 of Fig. 4. Fig. 6 is a plan partly in section of Fig. 4 with slight additions the part in section being taken on the line 3—3 of Fig. 3. Fig. 7 is a similar view to Fig. 3 of the mixing valve with its seating. Fig. 8 is a plan of the mixing valve separately. Fig. 9 is a plan of the expansion ring separately. Fig. 10 is a transverse section taken on the line 4—4 of Fig. 9. Fig. 11 is a side elevation of a carbureter and vaporizer illustrating the employment of one auxiliary air valve. Fig. 12 is a plan thereof and Fig. 13 is a part vertical transverse section taken on the line 5—5 of Fig. 12.

In the several figures like parts are indicated by similar letters of reference and Figs. 7 and 8 are drawn to an increased scale with respect to the other figures of the drawings.

Referring to Figs. 1 to 10:—*a* represents a case or chamber within which is removably fitted, longitudinally of the case *a*, a cluster of tubes *b*, constituting a vaporizer which

tubes at their ends are fixed in tube plates *b*¹ *b*², the lower one *b*¹ of which has a beveled or coned peripheral edge *b*^{1*} which fits against a corresponding shoulder or seat *a*¹ upon the interior of the case or chamber *a*.

The tube plate *b*² at the upper ends of the tubes *b* is formed with a plain or cylindrical periphery which closely fits the case *a* and in order to enable a tight joint to be made between these parts and to provide for the expansion of the tubes under the influence of heat, which provision has been found to be necessary in practice, and at the same time to hold the cluster of tubes securely in place with capability of easy removal the following arrangement of parts is employed.

A skeleton support or spider *c* is exteriorly of its peripheral ring *c*¹, threaded, and said ring is screwed into a corresponding thread formed upon the wall of the case *a* beneath the lower tube plate *b*¹ and the central boss *c*² of this spider is bored and threaded to form a nut while above the upper tube plate *b*² is arranged another spider or skeleton frame *b*³ which is formed with a peripheral ring *b*⁴ and said spider is of dished formation so that said ring *b*⁴ bears upon the upper tube plate *b*² at its edge and also against the case *a*.

Passing through a central or distance tube is a spindle *b*⁵ which near its lower end is formed with a shoulder *b*⁶ which bears upon the lower tube plate *b*¹, and the reduced end *b*⁷ of the spindle *b*⁵ is threaded to receive a nut *b*⁸ which securely fastens the tube plate *b*¹ with the spindle *b*⁵ and at the same time prevents the escape of exhaust gases through the hole in the tube plate *b*¹ through which the reduced end *b*⁷ of the spindle *b*⁵ passes.

The upper end of the spindle *b*⁵ is threaded and passes through a perforation in the boss of the spider *b*³, and immediately above the upper tube plate *b*² it is provided with a nut *b*⁹ which screws down upon the tube plate and makes a gas tight joint, and a nut *b*¹⁰ is screwed upon said threaded upper end and bears upon the boss of the spider *b*³, and the group of tubes *b* and their tube plates *b*¹ *b*² are thus firmly fastened together with capability of easy removal bodily while the natural spring due to the dished formation of the spider *b*³ admits of the natural expansion and contraction of the tubes *b* under varying temperatures.

The cluster of tubes *b* is removably fixed in position in the case *a* by the threaded

lower end of the spindle b^5 which screws into the threaded perforation in the central boss c^2 of the fixed spider c while the spindle at its upper end is provided with a square b^{11} ,
 5 to receive a key by which it may be turned.

As in my former specification hereinbefore referred to, an opening a^2 , closed by a door a^3 , operated by a handle a^{33} is provided at the side of the case a for the passage of the
 10 flame of a blow lamp in order to effect a preliminary heating of the tubes b when starting the apparatus, and the case a between the tube plates b^1 b^2 is by a way a^4 connected with the exhaust port of the engine cylinder
 15 so that the hot gases circulate among the tubes b and after the start maintain said tubes at the required temperature to effectually vaporize the oil and after circulating among the tubes the products pass away by
 20 the outlet a^5 .

The case a above the cluster of tubes b is provided with an outlet a^6 connecting with the induction pipe of the engine and controlled by a throttle valve e . Screwing into
 25 the lower part of the casing a below the cluster of tubes b is a kind of *vena contracta* d provided with a lateral tubular branch d^1 which is connected by a junction d^2 with an oil supply and the tubular branch d^1 is fitted
 30 with the usual needle valve i adjustable by a hand wheel or disk i^1 and automatically operated as hereinafter described for regulating the supply of oil to the *vena contracta* d .

The *vena contracta* d below its junction with the case a is inclosed in a casing d^3 open at the top to admit a supply of air through the space d^4 and the lower part of the *vena contracta* is furnished with perforations d^5
 40 which admit air to the interior thereof while the floor of the casing d^3 is provided with a drainage pipe d^6 for any free oil that may accumulate.

Seating upon the upper part of the *vena contracta* at d^* is a conical valve d^7 which normally closes the oil way d^{1*} from the branch d^1 but is lifted by the suction stroke of the engine so as to admit a supply of air and oil to the mixing chamber a^* . This
 45 valve d^7 is carried by a spindle d^8 which works in a long bearing d^9 carried by the bottom of the casing d^3 and extends to the outside of said casing where it is provided with a spring d^{10} which acts against a
 50 washer supported by a regulating nut d^{11} so that the valve d^7 is constantly forced upon its seat d^* with a pressure capable of regulation. The upper part d^{7*} of the valve d^7 is also formed conical and performs an
 55 important function inasmuch as it permits the mixture to be carried cleanly into the tubes b and prevents any objectionable drip caused by the lodgment of the oil due to air eddies and thereby greatly increases the effi-
 60 ciency of the vaporizer.

The head a^7 of the case a consists of a chamber open by a way a^8 to the atmosphere and in the floor of this chamber are provided auxiliary air ways or inlets a^9 controlled by inwardly opening valves f carried
 70 by the lower ends of rods f^1 working in long bearings f^2 supported by the top of the head a^7 of the case a and said rods are at their upper ends threaded and provided
 75 with nuts f^3 and around the rods and their bearings are coiled springs f^4 which at their upper ends bear against the nuts f^3 by which their degree of compression may be regulated and at their lower ends press upon the
 80 spread out extremities f^7 of the arms f^6 of a yoke the central boss f^5 of which is formed as an oval ring within which is a distance collar f^8 and trunnion pins or studs f^9 are
 85 passed through the ring or boss f^5 at its narrowest part and also through the collar f^8 and at their ends engage the thread c^3 , hereinafter referred to, so that the screw will act to raise and lower the yoke while the latter is free to rock to a limited extent thereon.

The throttle valve e is carried by an
 90 arm e^1 fixed with a spindle e^2 revolvably working in a bearing a^{10} in the head of the case a and the upper end of the spindle e^2 is formed with a quick thread e^3 which engages the ends of the studs f^9 as hereinbefore
 95 described, and said parts are so arranged that the rotation of the spindle e^2 to close the throttle valve e will raise the arms f^6 of the yoke and compress the springs f^4 and thereby increase the resistance against opening of the auxiliary air valves f to the suction of the engine proportionately to the extent to which the throttle e is closed so that the introduction of air at the auxiliary
 100 air inlets a^9 is regulated accordingly.

The spindle e^2 of the throttle valve e has fixed thereon an arm or lever e^4 the free end of which carries a swiveling eye e^5 through which passes a rod e^6 provided with a collar e^7 and the end of which rod is connected
 110 with the engine governor.

The governor rod e^6 has a collar e^8 adjustably fixed thereon and around the rod e^6 , between the collar e^8 and the eye e^5 is coiled a spring e^9 so that upon an increase in speed
 115 of the engine the governor rod e^6 is moved toward the right, Fig. 6, and by its collar e^7 engages the eye e^5 of the lever e^4 and exercises a thrust thereon and more or less closes the throttle valve e but upon the slowing of
 120 the engine the governor rod e^6 is moved in the opposite direction to exercise a thrust upon the eye e^5 through the spring e^9 thus more or less opening the throttle valve e . The governor is secured to the left hand end
 125 of the rod shown in Figs. 2 and 6.

Mounted loosely upon the spindle e^2 of the throttle valve e is a hand lever g which near to its free end is provided on one side thereof with a lug g^1 which engages one side of the
 130

arm or lever e^4 and the hand lever g works over a quadrant g^2 while connected at g^3 with the hand lever g by a bolt or rivet is a clamping bar g^4 which occupies a position on the under side of the quadrant g^2 and the clamping bar at its free end is bored and tapped at g^5 to receive the threaded end of a spindle g^6 furnished with a hand wheel g^{6*} and which spindle is revolvably mounted in a hole bored in the extremity of the hand lever g , coincident with the tapped hole g^5 , and is furnished with a flange or collar g^7 which bears upon the hand lever g so that by turning the hand wheel g^{6*} the hand lever g and clamping bar g^4 will nip or clamp the quadrant g^2 between them. The hand lever g may thus be set to any point within a given arc, as shown at Fig. 6, so that its lug will by engaging the lever or arm e^4 prevent the movement of said lever beyond a given point in the direction required to open the throttle valve; the movement of the governor rod e^6 beyond that point simply acting to compress the spring e^9 as shown at Fig. 6 so that the maximum volume of explosive mixture admitted to the induction pipe may be regulated at will and the working of the engine controlled in an effective manner.

On the head a^7 of the case a is a bracket h which supports a valve casing h^1 fitted with a needle valve h^3 and this valve is supplied with water by a pipe h^2 connected with a reservoir (not shown) and leading from the valve casing is an inclined pipe h^4 which terminates over a cup a^{11} from which a pipe a^{12} leads through the top of the head a^7 to a position immediately over one of the valve controlled air inlets a^9 in the bottom of the head or chamber a^7 and the office of which is to supply a water drip to the vaporizer for the purpose of preventing premature ignition and heavy knocking in the cylinders when using paraffin in a motor of high cylinder compression.

The needle valve h^3 of the water drip is fitted with a hand wheel h^5 for purpose of setting the valve and upon the inside face of the hand wheel h^5 is a ring of serrations h^{5*} and loosely mounted upon the valve spindle is a disk h^6 the face of which is provided with a ring of serrations h^{6*} adapted to coact with the serrations h^{5*} of the hand wheel h^5 a spring h^x being provided to keep these parts in contact.

Formed on or fixed with the disk h^6 is a slotted arm or lever h^{6**} and adjustably fixed in the slot of the arm h^{6**} is a stud with which is connected by a ball and socket joint h^7 one end of a link h^8 the other end of which is by a ball and socket joint h^9 connected with an offset e^{4*} from the arm or lever e^4 which as hereinbefore described is connected with the governor rod e^6 so that the governor automatically regulates the water drip. The hand wheel i^1 of the oil

feed valve i upon its face is similarly provided with a ring of serrations i^{1*} and upon the valve spindle is loosely mounted a disk i^2 having a co-acting ring of teeth i^{2*} said disk being kept up to its work by a spring i^x and formed on or fixed to the disk i^2 is an arm or lever i^{2**} the extremity of which is by a ball and socket joint i^3 connected with the lower end of a link or connecting rod i^4 the upper end of which is by a ball and socket joint i^5 connected with a stud adjustably mounted in the slot of a slotted arm i^6 the inner end of which is fixed with one end of a short shaft i^7 mounted in a bearing formed in a bracket a^{13} fixed to the head a^7 of the case a and to the other end of the short shaft i^7 is fixed an arm i^8 the extremity of which is by a ball and socket joint i^9 connected with one end of a link i^{10} the other end of which is by a similar joint i^{11} connected with the offset e^{4*} from the lever e^4 . By this arrangement the normal supply of the water drip valve h^3 and oil supply valve i may be respectively regulated by the hand wheels h^5 and i^1 and the adjustable studs of the ball and socket joints h^7 and i^5 of the slotted arms h^{6**} and i^6 and by reason of the connection of said valves as hereinbefore described with the lever e^4 which controls the throttle valve the fuel and water supplies to the vaporizer will be automatically regulated synchronously with the supply of explosive mixture to the engine.

In the example given at Figs. 11 to 13 is shown a slight modification in which a single auxiliary air valve is employed. In this case a single opening a^9 is provided in the head a^7 of the device closed by an inwardly opening valve f carried by a rod f^1 upon the upper end of which is fixed a collar f^{1*} under which takes one end f^7 of a lever f^6 formed with a boss f^5 having studs f^9 which engage at e^3 the screw of the spindle e^2 of the throttle valve e similarly to the arrangement previously described. The other end of the lever f^6 is forked at f^{7*} and embraces a sleeve provided with a flange f^{11} under which the end f^{7*} of the lever takes and said sleeve slides upon a rod f^{10} fixed with the head a^7 of the device and at its upper end is threaded and provided with a regulating nut f^3 while between the flange f^{11} and nut f^3 is arranged a spring f^4 which tends to keep the valve f up to its seat. The chamber at the head a^7 of the case a is in this example dispensed with and the bracket a^{13} is carried by the case a . The action of this device is similar to that hereinbefore described.

Although the apparatus is primarily intended for the use of paraffin oil it will be understood that it may be employed in connection with any light oil or with petrol or other spirit.

By the means hereinbefore described the working of the vaporizer is much improved and some slight faults which practical experience has shown to exist in apparatus constructed according to my former specification are removed.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed I declare that what I claim is:—

1. In a carbureter and vaporizer, the combination with an air chamber having an air inlet and a valve seat surrounding said air inlet, said valve seat having an oil passage therein, and the walls of the air chamber diverging upwardly and downwardly on each side of the valve seat, a double coned valve having its lower coned part adapted to engage with the seat to close the air inlet and the oil passage, a needle valve controlling the oil passage, and a spring for normally holding the double coned valve on its seat.

2. In a carbureter and vaporizer, the combination with a casing, of tube plates therein, a group of tubes having their ends fastened to said plates, a mixing chamber with which one end of the tubes communicate so as to lead the mixture therefrom, a chamber surrounding the tubes and adapted to receive the heating medium, a rod having threaded ends passing through said plates, nuts on the rod bearing against the plates for holding the tubes therein, a spider below the lower tube plate with which the lower end of the rod engages, a dished upper spider having a central boss having a hole therein through which the rod passes and a ring-like periphery bearing upon the upper tube plate near its edge and impinging against the casing, and a nut screwing upon the rod and bearing upon the boss of the upper spider.

3. In a carbureter and vaporizer of the character referred to, a case, a rotary throttle valve carried by an arm fixed to a rod or spindle passing through the head of the case, a quick thread upon the upper end of said rod, a lever fixed to the valve rod and connected with the engine governor, auxiliary air inlets in the head of the case closed by inwardly opening valves provided with rods, a yoke having a central boss provided with an oval perforation surrounding a collar upon the thread of the throttle valve rod, said collar surrounding the thread and pins passing through the boss of the yoke and the collar and engaging the thread so that the yoke is capable of slightly rocking said yoke having arms perforated at their extremities and working on the rods of the auxiliary valves, regulating nuts on the threaded upper ends of the auxiliary air valves and springs coiled around said rods and seating upon the arms of the yoke and

acting against the nuts of the rods substantially as herein shown and described and for the purpose stated.

4. A carbureter and vaporizer comprising a casing, means for supplying oil thereto, said casing having an outlet, a throttle valve for said outlet, an auxiliary air valve, yielding means for holding said auxiliary valve closed, means for supplying water to said auxiliary valve, a valve controlling said water supply means, and means controlled by the governor for simultaneously closing the throttle valve, actuating the oil and water valves and applying increased tension on the yielding means of the auxiliary valve.

5. A carbureter and vaporizer comprising a casing having an outlet, a throttle valve for closing said outlet, an auxiliary air supply valve, a spring for holding said valve closed, a water drip, a valve controlling the same, means for simultaneously actuating the throttle valve and water drip valve and applying increased tension on the spring of the auxiliary valve, said means being controlled by the governor.

6. A carbureter and vaporizer comprising a casing having an outlet, a throttle valve controlling the outlet, an auxiliary air supply valve, a spring normally holding the valve closed, a water drip, a valve controlling the same, a valve controlling the oil supply to the casing, means controlled by the governor for simultaneously operating the throttle valve and the oil supply and water supply valves and for applying increased tension on the spring of the auxiliary valve, and adjustable means for controlling the extent of movement of said means.

7. A carbureter and vaporizer comprising a casing having an outlet therein, a throttle valve controlling said outlet, a spindle passing through the head of the casing, an arm securing the lower end of the spindle to the throttle valve, said spindle having a quick screw thread on its upper end, a lever secured to the upper end of the spindle and connected with the engine governor, an auxiliary air inlet in the head of the casing, an inwardly opening valve closing said inlet, a rod connected with said valve, a yoke having a central boss, pins passing through the boss of the yoke into the screw thread of the spindle, the arm of the yoke having an opening therein through which the rod of the auxiliary valve passes, a regulating nut on the upper end of said rod, and a coiled spring on said rod resting on said nut and the arm of the yoke.

8. A carbureter and vaporizer comprising a casing having an outlet, a throttle valve controlling said outlet, a spindle passing through the casing head and connected with the throttle valve, said spindle having a screw thread at its upper end, a lever con-

5 nected with the upper end of the spindle and
connected with the engine governor, a col-
lar surrounding the screw thread on the
spindle, an auxiliary air supply valve in the
10 head of the casing, a yoke having a cen-
tral boss having an oval opening therein
fitting over the collar, pins passing through
the boss and collar and engaging the screw
thread in the spindle, the arm of said yoke
15 having an opening therein through which
the spindle of the auxiliary valve passes, a
nut on the end of said spindle and a coiled
spring on said spindle between the arm of
the yoke and said nut.

15 9. A carbureter and vaporizer, compris-
ing a casing having an outlet, a throttle
valve controlling said outlet, a spindle con-
nected with the throttle valve, a lever con-
nected with the spindle, a rod connected
20 with the governor and yieldingly connected
with said lever at the free end thereof, a
hand lever loosely mounted upon the throttle
valve spindle, a lug thereon at one side
adapted to engage with the throttle valve
25 lever, a clamping bar, a fixed quadrant be-
tween the hand lever and clamping bar, and
means for forcing the clamping bar and
lever together to clamp the quadrant be-
tween them.

30 10. A carbureter and vaporizer compris-
ing a casing, a water drip in the head of
the casing, a valve controlling the same, a
lever connected with said valve, an oil sup-
ply at the lower part of the casing, a valve
35 controlling the same, a lever connected with
said valve, a throttle valve controlling the
passage of vapor from the casing, a con-
trolling lever for said throttle valve, means
for connecting the levers of the several
40 valves so that they work in unison and con-
nections to the engine governor whereby the
speed of the engine controls said valves.

11. A carbureter and vaporizer compris-

ing a casing, a throttle valve controlling the
flow of vapor therefrom, a lever connected 45
with the engine governor for controlling
said throttle valve, an auxiliary air inlet
valve in the head of the casing, a water drip
in conjunction with said auxiliary air inlet
valve for supplying moisture to the air, a 50
screw valve controlling the said water drip,
a hand wheel connected with said valve, a
part clutch on one face of the hand wheel,
a disk loose upon the valve spindle and hav-
ing a coacting part clutch, a spring for keep- 55
ing said clutches in gear, a slotted lever se-
cured to the disk, a stud adjustable in said
slot, a link, a ball and socket joint con-
necting the link with the stud, a ball and
socket joint connecting the other end of the 60
link with the throttle valve lever, a fuel
supply at the lower part of the casing, a
screw valve controlling the same, a hand
wheel on said valve, a part clutch on one
face of the hand wheel, a disk loose upon the 65
valve spindle and provided with a coacting
part clutch, a spring for keeping said
clutches in gear, a lever fixed to said disk, a
stud on said lever, a link, a ball and socket
joint connecting one end of the link with the 70
said stud, a bell crank lever mounted upon
the head of the casing, and having a slotted
arm, an adjustable stud in the slot in said
arm, a ball and socket joint connecting said
stud with the other end of said link, a sec- 75
ond link, a ball and socket joint connecting
one end of said second link with the other
arm of said bell crank lever and a ball and
socket joint connecting the other end of
said link with the throttle valve lever, and 80
means whereby the speed of the engine con-
trols all of said valves.

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