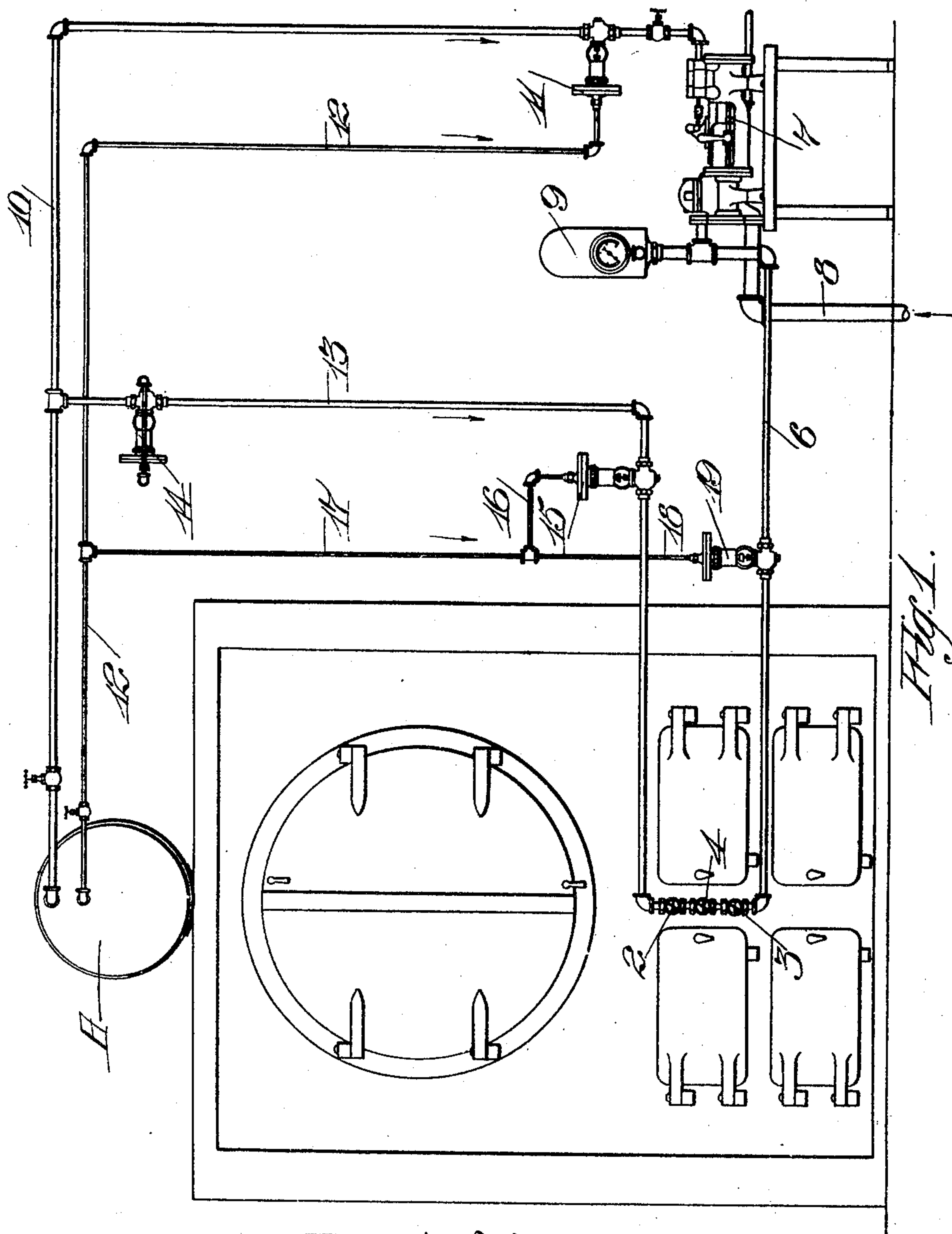
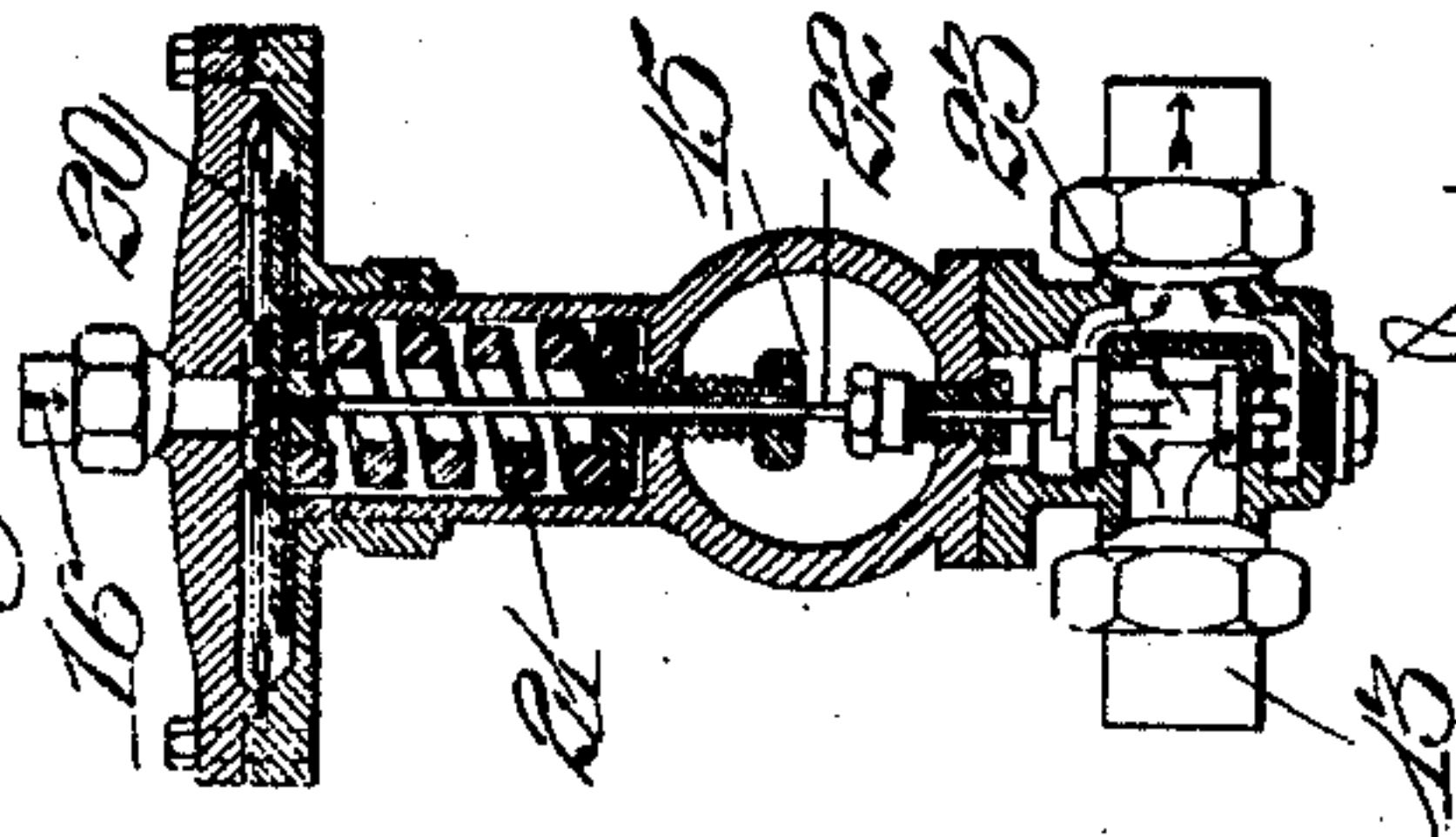


986,791.

Patented Mar. 14, 1911.



Witnessed
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UNITED STATES PATENT OFFICE.

GEORGE E. WITT, OF SAN FRANCISCO, CALIFORNIA.

LIQUID-FUEL GOVERNOR.

986,791.

Specification of Letters Patent.

Patented Mar. 14, 1911.

Application filed April 19, 1910. Serial No. 556,413.

To all whom it may concern.

Be it known that I, GEORGE E. WITT, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Liquid-Fuel Governors, of which the following is a specification.

This invention relates to liquid fuel governors.

10 The object of this invention is to provide a simple, practical, easily installed apparatus for automatically controlling the flow of steam and oil to oil burners for use on steam boilers by means of the steam pressure in
15 the boiler, so that with a predetermined desired steam pressure in the boiler it is possible to automatically and constantly maintain a fire under the boiler which will vary inversely with the variations in steam pressures in the boiler. That is to say, if the
20 boiler pressure goes up, the feed of oil and steam to the burner will be correspondingly cut off, and if the boiler pressure drops down and more heat is needed, the oil and
25 steam to the burner will be correspondingly increased, so as to produce a greater heat, the oil feed being regulated by the control of the oil pump; all as will be more fully described hereinafter.

30 The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

35 Figure 1 is a front elevation of a boiler and furnace showing the invention applied. Fig. 2 is a detail of a governor.

As here illustrated, A represents the steam dome of a boiler of any description which is
40 heated by means of an oil burner employing steam as an atomizing agent. The burner is here sufficiently represented by the steam cock 2 and oil cock 3.

4 is simply a blow-out valve for occasionally turning steam into the oil passage of the burner to clean the same out. Ordinarily this valve 4 is closed and the valves
45 2—3 open. After the valves 2—3 have once been set they are not changed.

50 Oil for the oil burner is delivered under suitable pressure through pipe 6 by means of the oil pump 7, which latter receives its oil supply through the pipe 8.

9 is an air chamber with a suitable gage
55 and intended to maintain an air cushion on the pump.

The steam to run the pump is received in dome A from pipe 10, and the flow of steam through this pipe to the pump is controlled by a governor 11 and pipe 12 also connecting with the steam dome A. The steam for
60 the oil burner is also received from the dome through pipe 10 and a branch pipe 13.

14 is a reducing valve in the branch steam pipe 13 for cutting down the boiler pressure to a suitable working pressure in the pipe, and this working pressure is further controlled by means of the governor 15 and the branch pipes 16—17 leading to the steam
65 pipe 12. Pipe 17 has a continuation 18 to operate a governor 19 which controls the oil flow through pipe 6.

The construction of the governors 11—15—19 and the reducing valve 14 is practically the same in all cases, and is represented in detail in Fig. 2. Thus, for instance, let Fig. 2 represent the governor 15, in which case the governor comprises a casing in which is a flexible diaphragm 20 which has one side subjected to the full steam pressure in pipe 16, and the other side is acted on contrariwise by a spring 21. Connected to diaphragm 20 is a valve stem 22 operating a double-seated balanced valve 23 in pipe 13. The spring 21 would in the case of the three
75 governors be set practically at maximum desired boiler pressure, with the spring of governor 15 controlling the steam flow set, perhaps, a pound or two higher than the desired boiler pressure, and the spring in governor 19 being set at desired maximum boiler pressure, so that if the boiler pressure exceeds the desired maximum, the oil governor will first be operated to shut off the oil in
80 pipe 6, and then if the boiler pressure continues to rise, the steam pressure in pipe 13 will next be cut off; it always being preferred to turn off the oil first in order to prevent explosions. The governor 11 is set so as to maintain a substantially uniform oil
85 pressure (say 65 pounds) indicated on the gage in the air cylinder 9, when the steam pressure is at its desired maximum of say 100 pounds. If the steam pressure goes above that, the governor 11 will act to cut
90 off the steam to the pump, thereby allowing the oil pressure to become reduced, and also to be reduced or possibly cut off by governor 19. If the steam pressure in the boiler falls, then the governor 11 will open up and let
95 more steam feed to the pump, so as to accelerate the action of the latter and boost the

oil pressure even above the pressure under which it may be normally set at 65 pounds; this boosting of the oil pressure giving an enhanced oil feed to the burner synchronously with the additional steam feed thereto due to the opening action of the governor 15.

In operation, if the maximum boiler pressure desired were one hundred pounds, the reducing valve 14 would be set so as to reduce the steam pressure in pipe 13 to about 60 pounds; the spring 21 of governor 15 would be set at about 102 pounds, and the spring 21 of governor 19 would be set at 100 pounds; governor 11 which controls the steam to the oil pump being adjusted so that the steam to the pump, while it will not be cut off below 100 pounds, will admit enough steam to the pump so as ordinarily to maintain an oil pressure in the line 6 at about 65 pounds when the steam pressure is at 100 pounds.

In case of any unusual demand on the boiler, so as to cause the steam pressure to drop, the governors 11—15 and 19 will immediately open up correspondingly with the reduced steam pressure in the dome A, so as to cause a bigger fire under the boiler, and as the steam pressure again climbs up in the boiler the fire will be cut down by the gradual closing of the valves of governors 11—19—15 until the maximum desired steam pressure in the boiler is reached; when further flow of oil and steam to the burner will automatically cease.

The use of the supplemental pipe 12, with its branches, is important, for the reason that this pipe and its branches, having no outlets in them, will give absolute boiler pressure on the diaphragms of the several governors which they control. If these diaphragms were acted on by steam coming through pipes which might have other connections through which steam would be drawn from time to time, the true and absolute gage pressure would not be transmitted to the diaphragm, because there would be more or less variation due to drawing steam from these pipes or connections.

It is to be observed that not only is the oil and steam flow controlled direct by the boiler pressure by means of the governors 15 and 19, but the oil feed is further made more sensitive and more closely regulated to the desired boiler pressure by the desired boost given to the oil feed by the pump at the very instant when more oil is most desired; and correspondingly the oil pressure is allowed to drop by stopping or slowing the pump when the steam pressure rises abnormally.

Governor 11 controls the pump, governor 19 controls the oil from the pump, and the reducing valve 14 which is practically of the same construction as the governor and the governor 15 control the steam.

One of the chief features of this invention is the boost given to the pump so as temporarily to raise the oil pressure in the line 6 and so increase the fire when more fire is needed. The amount of this boost is controlled by the governor 11. Of course, as the steam pressure goes up and recovers its normal in the boiler, the necessity for this additional boost will gradually cease, and the oil pressure in the line 6 will drop back to normal and may even drop below normal temporarily if the steam pressure stays up at the maximum for any length of time.

Experience shows that in plants where this system has been installed the oil feed is entirely automatic, and having once set the parts to work for a given normal condition, the burner needs no attention from one week's end to another.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. An oil-burning system having in combination a boiler, an oil pump, a burner having a steam pipe connected with the boiler and also having an oil pipe connected with the pump, governors in the oil and steam pipes controlled by the variations of steam pressure in the boiler, said governors regulating the steam and oil feeds independently by the boiler pressure, and means for operating the oil pump, a governor regulating the oil pump adapted to respond to a decrease of boiler pressure and to admit an increased feed of steam to the oil pump, for causing an accelerated boost to the oil pump to cause it to raise the oil pressure in the oil pipe.

2. An oil-burning system, having in combination a boiler, an oil burner having oil and steam passages, an oil pump, connections between the oil pump and the oil passage of the burner, connections between the steam passage of the burner and the steam dome of the boiler, connections between the steam dome and the steam end of the pump, governors in the steam and oil passages of the burner connected with the steam dome and operable by the steam pressure therein, said governors automatically regulating the steam and oil feeds independently by the boiler pressure, and a governor operable by the steam pressure in the dome for controlling the action of the pump.

3. An oil-burning system, having in combination a boiler, an oil burner, steam and oil pipes leading to the burner, the steam pipe connected with the dome of the boiler, an oil pump connected with said oil pipe, a pipe connecting the steam end of the pump with the steam dome, controlling valves in the steam pipe to the burner and in the steam pipe to the pump and in said oil pipe, and a diaphragm governor controlling the action of each of said valves,

each of said diaphragm governors subject
constantly to the absolute steam pressure in
the dome whereby the said several valves are
opened more or less in unison with the rise
5 and fall of the steam pressure in the boiler,
said governors automatically regulating the
steam and oil feeds independently by the
boiler pressure.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing 10
witnesses.

GEORGE E. WITT.

Witnesses:

CHARLES EDILMAN,
C. C. COOK.