

C. A. TEAL.
FIRE EXTINGUISHING APPARATUS.
APPLICATION FILED SEPT. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

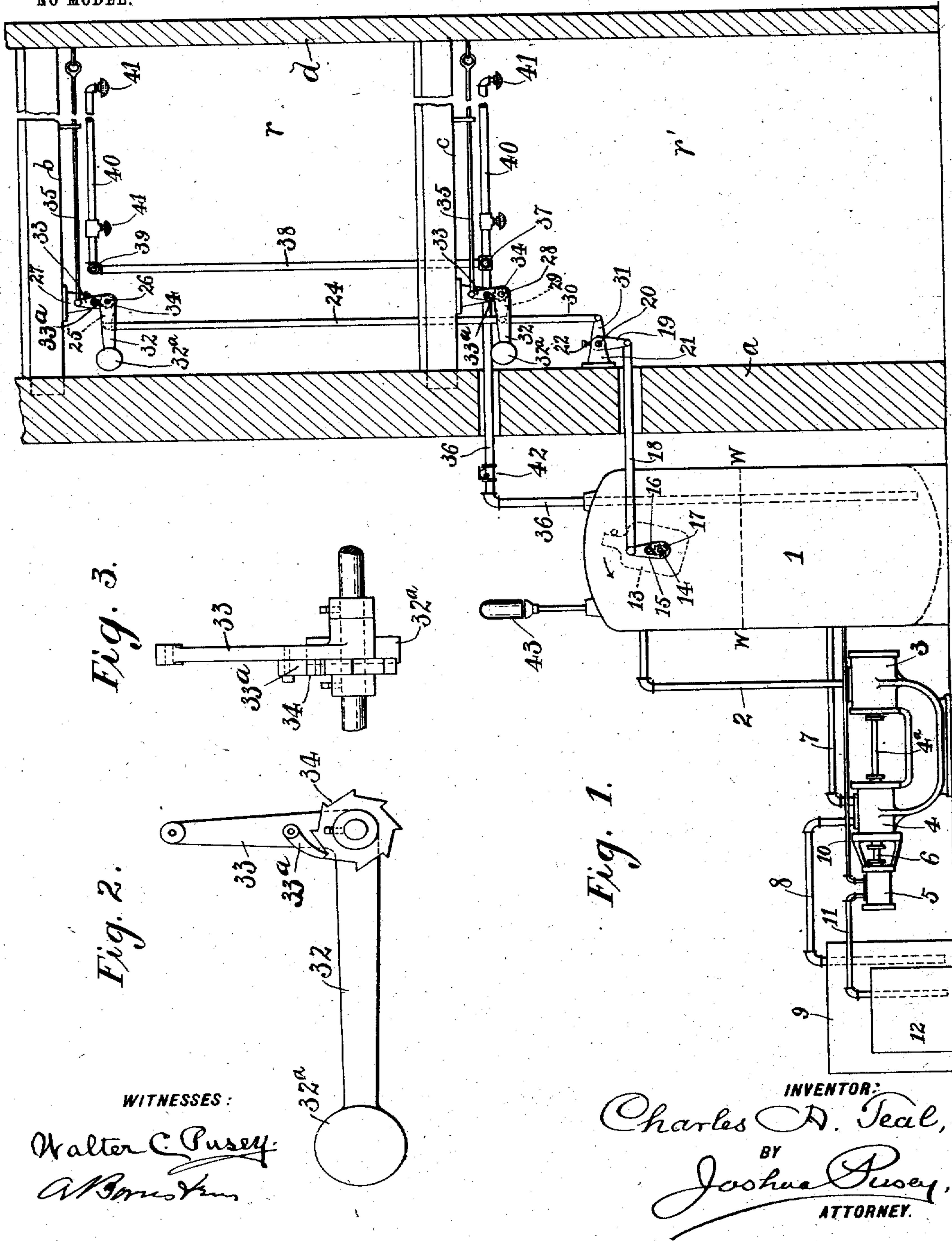


Fig. 3.

Fig. 2.

Fig. 1.

WITNESSES:

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INVENTOR:

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No. 724,968.

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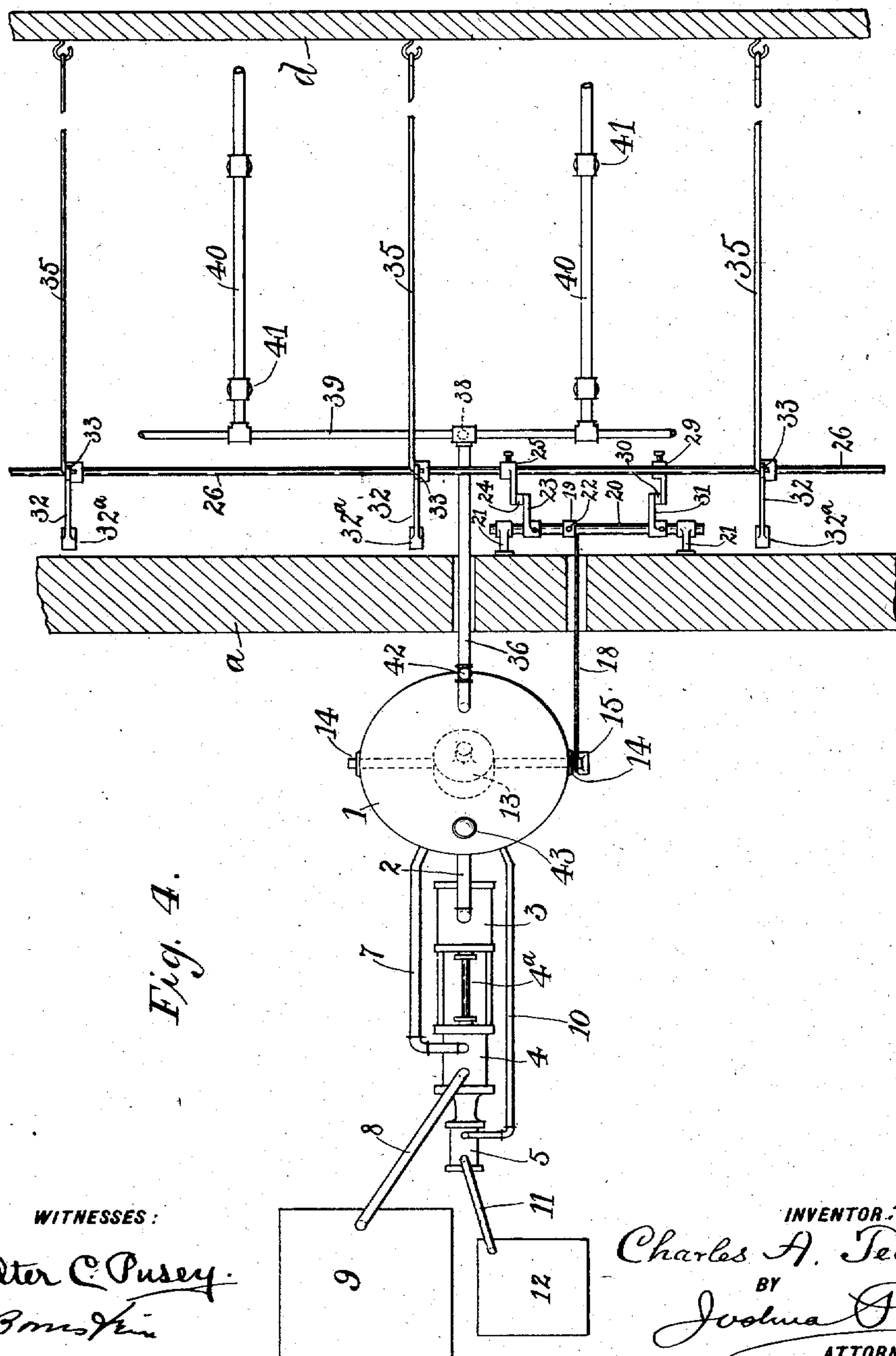
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UNITED STATES PATENT OFFICE

CHARLES A. TEAL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO E. CLINTON ROADS, TRUSTEE, OF PHILADELPHIA, PENNSYLVANIA.

FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 724,968, dated April 7, 1903.

Application filed September 11, 1902. Serial No. 122,949. (No model.)

To all whom it may concern.

Be it known that I, CHARLES A. TEAL, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Fire-Extinguishing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

Figure 1 is an elevation of the apparatus applied to a building. Fig. 2 is a side elevation, enlarged, of one of the gravity bell-crank levers. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is a plan view of Fig. 1, disregarding the floors of the building.

The nature of this invention, broadly stated, is an apparatus designed for the extinguishment of fires in buildings by means of water charged with a suitable gas under pressure which is caused to be supplied automatically and to escape from a vessel constituting part of the apparatus into the building through the usual sprinkler-pipes by means adapted to be set in operation by the melting of a fusible connection by a fire occurring in the building.

The invention comprises the combination of a vessel capable of containing gas under considerable pressure, in which vessel is contained a chemical capable when brought into contact with another suitable chemical of generating a fire-extinguishing gas—such, for example, as carbon dioxide—a receptacle containing a chemical similar to the first chemical and adapted to communicate with the interior of said vessel, a fusible connection adapted to be melted by the heat of a fire within the building, means intervening between said connection and said receptacle whereby the latter is caused to discharge its contents into said vessel, means adapted to be actuated by the pressure of the gas generated by the contact of the contents of said receptacle for forcing into said vessel water and a chemical capable of generating a fire-extinguishing gas when brought into contact with the chemical within said vessel, together with a sprinkling pipe or pipes leading from the said vessel into the building, the gas generated through the discharge of the contents of said

receptacle serving to start the actuation of said forcing means and a portion of the gas resulting from the chemical forced into said vessel serving to maintain said forcing means in operation, the remainder of the gas mingled with the water escaping by way of said sprinkler-pipes.

The invention also comprises various combinations and details of mechanism herein-after described and duly pointed out.

Referring to the accompanying drawings, 1 denotes a vessel capable of withstanding considerable internal pressure and whose upper portion communicates by a pipe 2 with a cylinder 3, having a piston and suitable valve and exhaust-outlet similar to an ordinary steam-engine.

4 is a suction and force pump whose piston is connected by a rod 4^a with the piston within the cylinder 3. 5 is a second suction and force pump whose piston is connected by a rod 6 with the piston of pump 4. A pipe 7 leads from the pump 4 into the lower part of vessel 1, and a pipe 8 leads from a water-containing tank 9 into said pump. A pipe 10 leads from pump 5 into the lower part of said vessel 1 and a pipe 11 from a tank containing sulfuric acid into the last-mentioned pump.

Within the upper part of vessel 1 is a receptacle 13—such, for example, as a carboy—holding sulfuric acid and mounted on trunnions 14, whose bearings are in the wall of said vessel. The center of gravity of the receptacle is above the trunnions, so that when its neck or open end is directed upwardly, as in Fig. 1, it (the receptacle) tends to invert itself, but is prevented from so doing until permitted by mechanism adapted to act automatically when released through the heat of a fire occurring in the building. This mechanism is as follows: 15 is an arm loosely mounted on the end of one of the trunnions 14 and has a pawl 16, that engages a ratchet-disk 17, fixed to the trunnion. A rod 18 connects the said arm with a crank 19 on horizontal shaft 20, that is journaled in brackets 21, projecting from the inner side of a wall *a* of the building. This crank is preferably rotatably adjustable on the shaft and secured in position by a usual set-screw 22. Mounted

loosely upon said shaft is an arm 23, Fig. 4, having a pawl-and-ratchet connection with the shaft similar to that shown in Fig. 2, hereinafter referred to, and which is a type of all the pawl-and-ratchet connections used in the apparatus. The arm 23 is connected by a vertical rod 24 to a crank 25, Fig. 4, (indicated by dotted lines in Fig. 1,) secured to a shaft 26, that is journaled in brackets 27, depending from the ceiling *b* of the upper one, *r*, of the two rooms of the building. A similar shaft 28, Fig. 1, beneath the ceiling *c* of the lower room *r'* carries a crank 29, that is connected by a rod 30 to an arm 31, similar to arm 23 upon the shaft 20 and having a like pawl-and-ratchet connection with the shaft. Loosely mounted upon the shafts 26 and 28, respectively, are series of bell-crank levers 32, one arm, the longer or heavier, of each of which extends horizontally and the other, 33, vertically when in the normal position, as shown in the drawings. The vertical arm carries a pawl 33^a, adapted to engage a tooth of a ratchet-disk 34, keyed upon the shaft. Each of these bell-crank levers is maintained in said normal position independently of the others by means of a fusible connection 35, one end of which is attached to the vertical arm of the lever and the other end to a wall *d* of the building, as shown. The form or construction of said connection is immaterial, the only essential being that it shall be of suitable strength to maintain the bell-cranks and adjuncts in the normal position and capable of fusing by the heat of a fire occurring in the building or, more especially, that of a fire starting in the room in which the particular fusible connection is located.

A pipe 36, leading from the lower part of vessel 1, passes through the wall *a* and connects to a pipe 37, extending a short distance below the ceiling *c*. The latter pipe connects by a vertical pipe 38 to a horizontal pipe 39, extending beneath the ceiling *b*. A series of horizontal branch pipes 40 extend horizontally across or partly across the rooms, respectively, from the pipes 37 and 39, respectively, each of which branch pipes is provided with sprinkler-heads 41, that are preferably closed by means of fusible solder or the like that is adapted to melt at the same temperature, or thereabout, as the aforesaid connections 35.

42 is a check-valve in the pipe 36.

Having now described the construction of my invention, I proceed to explain its mode of operation, premising that the parts are in the normal position, as shown in the drawings, and vessel 1 is charged with a solution of bicarbonate of soda or other suitable alkali—say up to the level indicated by the dotted lines *ww*, Fig. 1—and the carboy 13, filled with sulfuric acid, occupying the backwardly-tipped position shown, in which it is maintained by means of a suitable stop. Should a fire occur in the building—as, for example, in the upper one, *r*, of the rooms—and the heat

melt any one or more of the fusible connections and also open the sprinkler-heads of the branch pipes in the room, the one of the bell-crank levers to which such connection is attached being released, the gravity of the horizontal arm thereof, which I usually insure sufficient by a weight 32^a on its end, causes it to swing downwardly, rotating the shaft 26, on which it is mounted, without obviously affecting the remaining bell-crank levers 32 on said shaft, by reason of the described pawl-and-ratchet connections of said levers. The downward movement of lever 32, which is also aided by the weight of the connecting-rod 24, causes the shaft 20 to rock, and consequently the crank 19 thereon, which owing to the rod connection of this crank with the arm 15 of the carboy-trunnion rocks the latter, carrying the center of gravity of the carboy forward beyond the trunnions, whereupon it turns on the latter, thus inverting itself and discharging its acid contents into the water and bicarbonate of soda below. Immediately a volume of carbon dioxide is evolved, which, passing over by way of pipe 2 to the engine-cylinder 3, actuates by its pressure the piston of the engine, and the pumps are thereby put in operation, the one drawing water from tank 9 and the other acid from tank 12 and forcing the same simultaneously into vessel 1. This supply of acid maintains the engine in operation by maintaining the evolution of the carbon dioxide, and the supply of water becomes mingled with or is charged with the gas, and the mixture is forced out of the sprinkler-heads 41, that had been opened by the heat of the fire, and extinguishes the fire in the room. I would usually fill the system of pipes in the building which are connected with the pipe 36 with water, and the purpose of the check-valve 42 in said pipe is to prevent the water from passing into the vessel 1, but to permit the escape of the gas-charged water through said pipe from said vessel when a fire occurs, and the pumps are put in operation, as described. If the fire should start in the lower room, operations and results would be effected similar to those described as occurring when a fire happens in the upper rooms of the building. Thus it will be manifest that every room of a building may be equipped with devices and mechanism similar to those described for causing the rocking of shaft 20 when a fire occurs in such room, with the resulting discharge of the acid from the carboy 13 and the escape of the gas-charged water from those sprinkler-heads and those only that had been opened by the heat of the fire, thus greatly limiting the flooding of the building with water.

Where the system is extended to a number of rooms, I would usually employ a suitable automatic regulator for governing the supply of water and acid injected by the pumps into the vessel 1, so that such supply would be no more than sufficient for the requirements of the particular occasion.

The diameters of the respective pipes leading from the acid and water tanks to the pumps, respectively, are such that the proper proportions of these liquids will be delivered into the vessel 1. I would also connect with the latter an alarm-whistle, as indicated by 43 in the drawings, and I would further provide a suitable safety-valve to prevent liability of explosion from overpressure of the gas within said vessel.

I remark that I do not limit myself to the precise construction of the apparatus hereinbefore described or any part or parts thereof, as the same may be considerably varied by those skilled in the art without departing from the essential features or principle of the invention. For example, it is not essential that the receptacle shall be within the vessel 1 or that it be arranged to discharge its contents into the latter by rotation, as described, as a suitable receptacle communicating with said vessel may be provided with a valve or cock normally closed, but opened by suitable mechanism intervening between it, said valve or cock, and a fusible connection within the building, which mechanism is caused to operate when said connection becomes fused. I further remark that while I prefer to use sulfuric acid and bicarbonate of soda or marble-dust for the production of carbon dioxide within the vessel 1 other suitable chemicals may be used or chemicals whose reaction when brought together will evolve other suitable fire-extinguishing gas.

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

1. In an apparatus of the character recited, the combination of the vessel containing a chemical adapted when brought into contact with another suitable chemical to evolve a fire-extinguishing gas, the engine communicating with said vessel, the pumps adapted to be driven by said engine and communicating with said vessel one of which pumps communicates with a supply of water, and the other with a supply of the last-mentioned chemical, the receptacle adapted to communicate with said vessel, and containing a chemical capable of generating gas when brought into contact with the chemical in said vessel, a fusible connection within the building, mechanism intervening between said connection and said receptacle adapted to automatically cause the discharge of the contents of the latter into said vessel when said connection is fused; and a pipe leading from said vessel into the building, and having sprinkler-heads, substantially as and for the purpose set forth.

2. In an apparatus of the character recited, the combination of the vessel containing a solution of bicarbonate of soda or the like, the engine communicating with said vessel and adapted to be driven by gaseous pressure, the pumps adapted to be driven by said engine, and communicating with said vessel and with

a supply of water and sulfuric acid or the like, respectively, the receptacle containing sulfuric acid or the like, and adapted to communicate with said vessel, the fusible connection within the building, mechanism intervening between said connection and said receptacle adapted to automatically cause the discharge of the contents of the latter into said vessel, when said connection is fused, together with a pipe leading from said vessel and having branch pipes within said building, with sprinkler-heads normally closed, but adapted to be opened by the heat of a fire within the building, substantially as and for the purpose set forth.

3. In an apparatus of the character recited, the combination of the vessel, the engine communicating therewith and adapted to be driven by gaseous pressure, the pumps communicating with said vessel, and adapted to be driven by said engine, the open-mouth receptacle within the upper part of said vessel, the fusible connection within the building, mechanism intervening between said connection and said receptacle adapted to maintain said receptacle with its open mouth directed upwardly, and to cause the inversion of the receptacle when said connection is fused by the heat of a fire occurring in the building, together with the pipe leading from said vessel into the building, and having the sprinkler-heads, substantially as and for the purpose set forth.

4. In an apparatus of the character recited, the combination of the vessel, the engine communicating therewith and adapted to be driven by gaseous pressure the pumps adapted to be driven by said engine, the pipe leading from said vessel into the building and having suitable sprinkler-heads, the receptacle within the upper part of the vessel, and mounted on rotatable trunnions, a fusible connection within said building, a gravity-operative device to which said connection is attached, and mechanism connecting said device and the trunnion of said receptacle, whereby the latter is normally maintained in the non-discharging position, and is adapted to be caused to automatically assume the discharging position upon the severance of said fusible connection by the heat of a fire occurring in said building, substantially as described.

5. In an apparatus of the character recited, the combination of the vessel, the pumps communicating therewith and adapted to be actuated by the pressure of gas generated within said vessel, a pipe leading from the latter into the building and having normally closed fusible sprinkler-heads, the receptacle communicating with said vessel, the rotatable shaft, the gravity-levers rotatably mounted thereon, and connected thereto by pawl-and-ratchet devices, the respective fusible connections attached to said levers, respectively and adapted to maintain the latter normally in a substantially horizontal position, together

with mechanism connected with said levers, whereby said receptacle is prevented normally from discharging its contents into said vessel, and is caused to discharge said contents when any one or more of said fusible connections is severed by the heat of a fire occurring in the building, substantially as described.

6. In an apparatus of the character recited, the combination of the vessel, the pumps communicating therewith and adapted to be actuated by the pressure of gas generated in said vessel, a pipe leading from the latter into the building and having branch pipes with fusible sprinkler-heads, the receptacle communicating with said vessel, the rotatable shaft, the gravity bell-crank levers the fusible connection connected to one arm of said levers respectively, the pawl-and-ratchet con-

nection between the latter and said shaft, the crank on said shaft, a second rotatable shaft, the arm on said last-mentioned shaft having the pawl-and-ratchet connection therewith, the crank on said shaft, and the rod connected to said crank, the construction being as described, whereby said receptacle is normally prevented from discharging its contents into said vessel, and is caused to discharge the same when any one or more of said fusible connections is severed by a fire occurring in the building, substantially as described.

In testimony whereof I have hereunto affixed my signature this 26th day of August, A. D. 1902.

CHARLES A. TEAL.

Witnesses:

WALTER C. PUSEY,
JOHN M. CAMPBELL.

Correction in Letters Patent No. 724,968.

It is hereby certified that the name of the assignee in Letters Patent No. 724,968, granted April 7, 1903, upon the application of Charles A. Teal, of Philadelphia, Pennsylvania, for an improvement in "Fire-Extinguishing Apparatus," was erroneously written and printed "E. Clinton Roads," whereas said name should have been written and printed *E. Clinton Rhoads*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of April, A. D., 1903.

[SEAL.]

F. I. ALLEN,
Commissioner of Patents.

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6. In an apparatus of the character recited, the combination of the vessel, the pumps communicating therewith and adapted to be actuated by the pressure of gas generated in said vessel, a pipe leading from the latter into the building and having branch pipes with fusible sprinkler-heads, the receptacle communicating with said vessel, the rotatable shaft, the gravity bell-crank levers the fusible connection connected to one arm of said levers respectively, the pawl-and-ratchet con-

nection between the latter and said shaft, the crank on said shaft, a second rotatable shaft, the arm on said last-mentioned shaft having the pawl-and-ratchet connection therewith, the crank on said shaft, and the rod connected to said crank, the construction being as described, whereby said receptacle is normally prevented from discharging its contents into said vessel, and is caused to discharge the same when any one or more of said fusible connections is severed by a fire occurring in the building, substantially as described.

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