WASc 1995

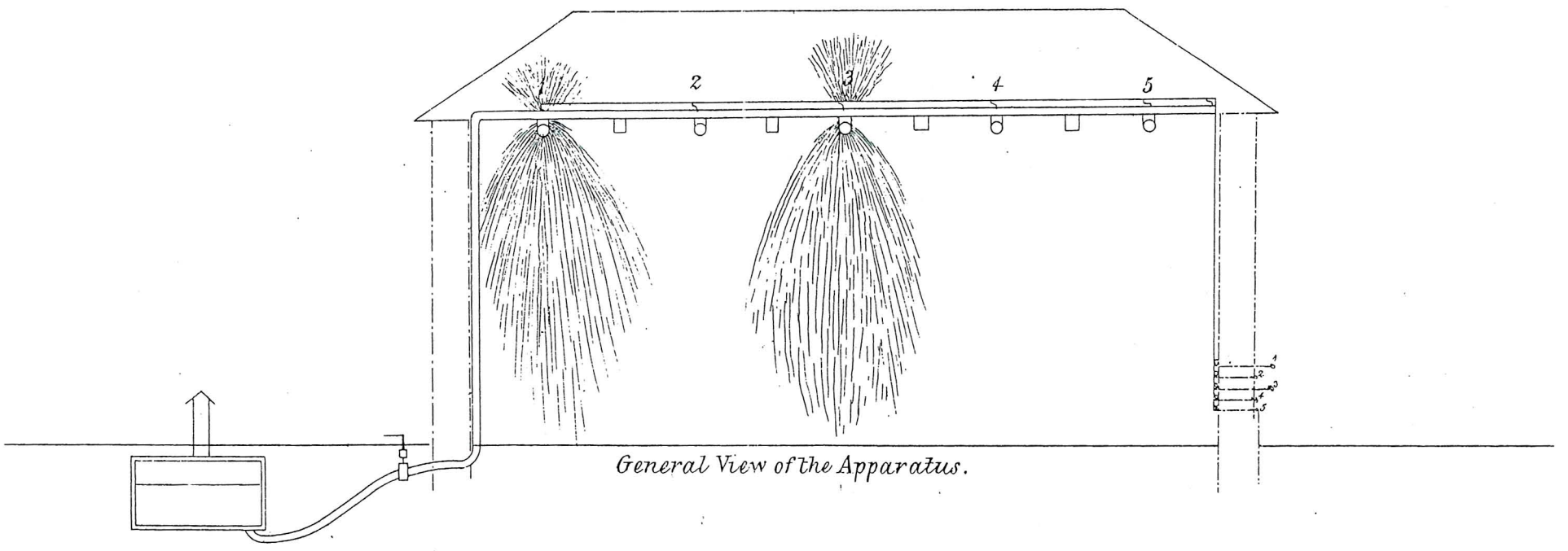
1812
Wm Congreve
Patent No. 3606
for 'Improved System
of securing Buildings, Towns,
Dockyards and Ships from
Fire and for the raising
of water to the Tops of
Buildings for General Purposes'

A.D. 1812. Oct. 31 Nº 3,606.
CONGREVE'S SPECIFICATION.

(1 SHEET)

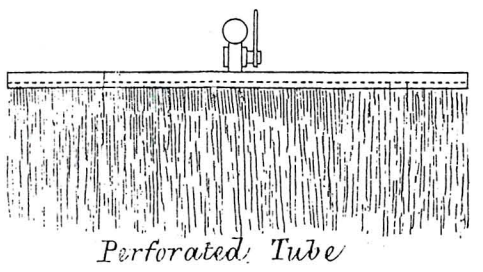
*Securing against Fire &c.ª*

FIG. 1.



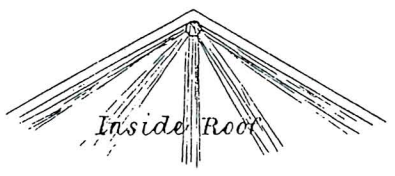

*General View of the Apparatus.*

FIG. 3.



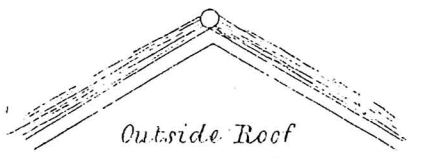
*Perforated Tube*

FIG. 2.



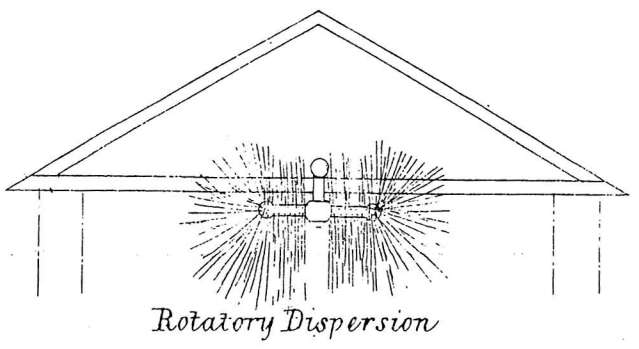
*Inside Roof*

FIG. 4.



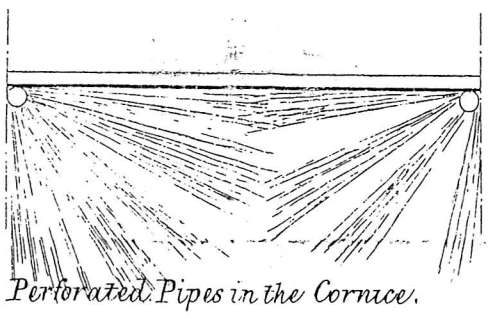
*Outside Roof*

FIG. 5.



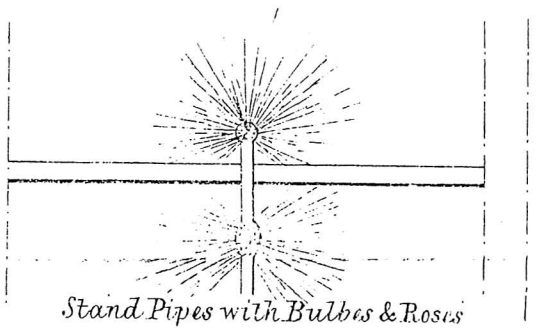
*Rotatory Dispersion*

FIG. 6.



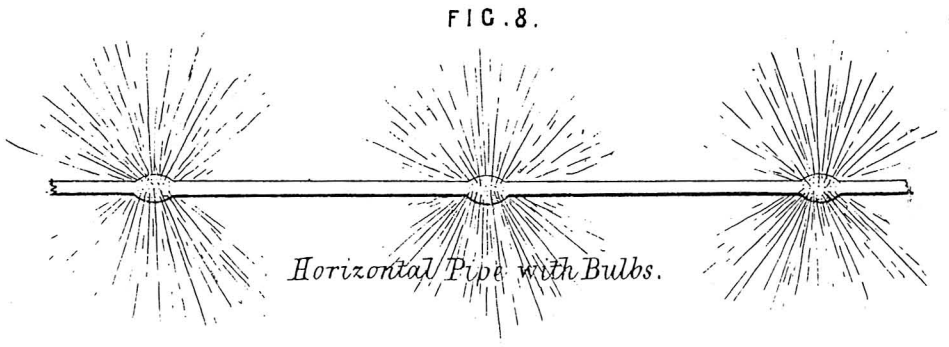
*Perforated Pipes in the Cornice.*

FIG. 7.



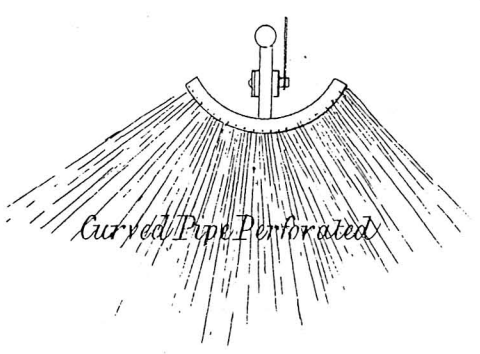
*Stand Pipes with Bulbes & Roses*

FIG. 8.



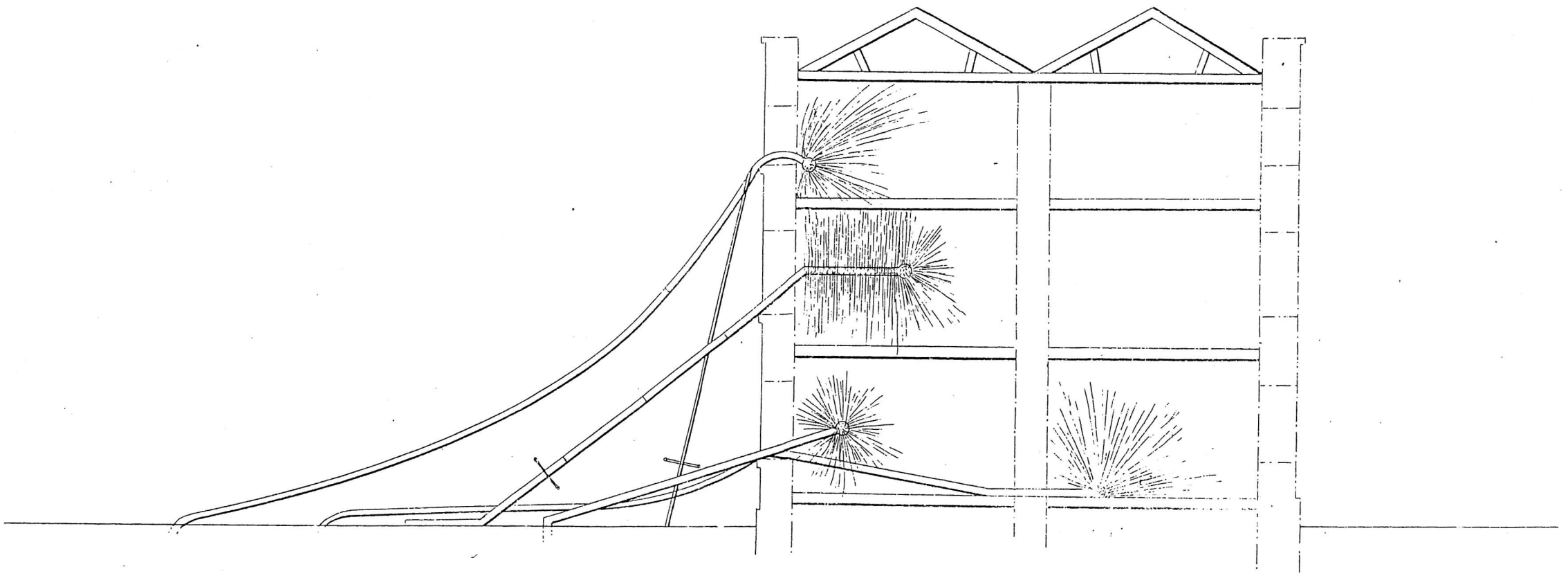
*Horizontal Pipe with Bulbs.*

FIG. 9.



*Curved Pipe Perforated*

FIG. 10.



*General View of the external System as applied either to common Engines or to the Main in the Streets.*

*The enrolled drawing is partly colored.*

Drawn on Stone by Malby & Sons.

# A.D. 1812 . . . . . , N° 3606.

## Securing Buildings, Ships, &c. from Fire, Obtaining Motive Power, &c.

### CONGREVE'S SPECIFICATION.

**TO ALL TO WHOM THESE PRESENTS SHALL COME**, I, Colonel WILLIAM CONGREVE, of Cecil Street, in the City of Westminster and County of Middlesex, send greeting.

**WHEREAS** His most Excellent Majesty King George the Third, did, by His Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Thirty-first day of October, in the fifty-third of his reign, give and grant unto me, the said William Congreve, my exors, admors, and assigns, His especial licence, full power, sole privilege and authority, that I, the said William Congreve, my exors, admors, and assigns, should and lawfully might, during the term of years therein mentioned, make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, my Invention of "AN IMPROVED SYSTEM OF SECURING BUILDINGS, TOWNS, DOCKYARDS, AND SHIPS FROM FIRE, AND FOR THE RAISING OF WATER TO THE TOPS OF BUILDINGS FOR GENERAL PURPOSES;" in which said Letters Patent there is contained a proviso that if I, the said William Congreve, shall not particularly describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, and cause the same to be inrolled in His Majesty's High Court of Chancery within two calendar months next and immediately after the date of the said Letters Patent, that then the said Letters Patent, and all liberties and advantages whatsoever thereby granted, shall utterly cease, determine, and become void, as in and

by the same (relation being thereunto had) may more fully and at large appear.

**NOW KNOW YE**, that in compliance with the said proviso, I, the said William Congreve, do declare that my said Invention of an Improved System of Securing Buildings, Towns, Dockyards, and Ships from Fire, combining also a Power for Raising of Water to the Tops of Buildings, and for other general Purposes, is described as follows, that is to say:—

The general principle of power which I make use of for the different purposes to be here specified is obtained from the compression of air, and its first application for the security of buildings, &c. from fire is thus arranged:—A large reservoir of cast iron or other metal or substance is provided that shall be capable of being made perfectly air and water tight, and that will continue so. This reservoir, which may be placed at the bottom of the house, or at a distance from it, and which may be either cylindrical or globular or any other more convenient form, is to be filled in part with water and in part with air condensed by means of a powerful air pump, forming a part of the apparatus, a general view of the whole of which is given, Figure 1. The water being pumped in or laid on from the main of any established waterworks where such are at hand, and the quantity of it being calculated to be sufficient for the required security, for instance, 1, 2, 3, or more hundred hogsheads, according to the extent of the building. By this arrangement the reservoir therefore not only contains the requisite supply of water, but, by means of the quantity of air compressed into it, it has within itself also a power that will at any time when allowed to act force this water to any height required. Thus, if the reservoir be half filled with water and half with air six times compressed, in addition to its natural atmosphere, the power thus obtained will force every drop of the contained water to a mean height of about 135 feet, on the mere opening of a cock to allow it to issue, and so on to any greater or less height due to the number of atmospheres compressed and the proportion of the reservoir occupied by the compressed air. Now such being the principle for the supply both of power and water, the reservoir is made to communicate with the different parts of the building by means of a cast iron or other main, to which are attached smaller branches for dispersing the water in particular apartments or divisions of appartments when required, in modes that will be separately detailed. The main is filled from the reservoir on opening a principal or main sluice or cock; and in like manner the branches are filled from the main by the opening of particular valves or cocks connected with them individually. There need not, therefore, be a single drop of water even in the main until the alarm is given, when by first turning on the main any

particular part, by the opening the particular cock belonging to that part, may instantly be inundated without in the least degree wetting any other; so that there is no useless waste of water, nor any inconvenience incured by the dispersion of it where it is not required. The modes of dispersion are various, and are delineated in Figures 2, 3, 4, 5, 6, 7, 8, and 9.

The first I shall describe is that through a length of perforated pipe, which may be straight (as Fig. 3), or curved (as in Fig. 9), in either case filled from the main on the opening of a particular cock. This pipe may be of any suitable diameter, and must be perforated with tiers of holes proportioned in size and number to the bore and length of the pipe, the position of these tiers of holes being determined by the nature of the room, space, or object required to be protected, as explained by Figs. 2, 3, 4, &c. It is to be remarked, that these pipes being pierced with holes sufficient to allow for the easy escape of the water forced into them, they are but little acted on by the pressure of the air in the reservoir, and may therefore be made of much slighter material than the mains, and yet will be sufficient to deliver any quantity of water.

Another mode of dispersion, Fig. 5, is by a pipe of 3 or 4 feet in length, or more or less, according to circumstances, and of any bore, according to the quantity of water to be delivered, fixed at the end of a branch pipe connected with the main; and this short pipe, with holes in its sides and ends, being constructed to revolve on its centre by the rushing of the water from the main through these holes, when the valve is opened; in this way the rotatory disperser not only delivers all the water laid on from the main, but scatters it round in all directions, and will throw it to various distances according to the length of the revolving pipe.

Another mode is by large bulbs or roses, Fig. 7 and 8, in the middle and at the ends of branch pipes communicating with the main, and applied either as stand pipes, Fig. 7, or as horizontal ones, Fig. 8, according to circumstances. In short, it is obvious that an almost endless variety of modes of dispersion may be arranged on these principles.

These means, therefore, being varied as occasion may require, and the different valves or cocks supplying and bringing them into action being constructed to be opened and shut from a place of security outside the building by means of iron rods and cranks, Fig. 1, and the handles working them outside being labelled so as to indicate without the possibility of mistake the particular parts they secure, the supply of water moreover being provided on a sufficient scale, and the power of compression in the cylinder being always kept to a degree of intensity adequate to the height and distance to which the water is

to be thrown, it cannot be doubted that the system amounts to a moral certainty of perfect security, not only from the concentrated force, action, and quantity of water applied, but from the easy and instantaneous application of which it is capable even by the agency of a single person. And here it must be remarked, that altho' this description has hitherto considered the limit of the supply of water to be that contained in the reservoir, still where this supply is derived from any established waterworks, as in the plan for securing the Theatre Royal, Drury Lane, there it may be rendered not only immediate but permanent also; immediate by means of the reservoir, whether the engine of the waterworks is acting or not, and permanent by giving time to set that engine to work, so as to throw into the reservoir a continued supply when the intensity of the pressure in the reservoir comes down by the exhaustion of a part of its contents to a level with the working powers of the waterwork, engine, or head of water, however created. Now, by combining, the above principle on a great scale, with the different waterworks diffused of late thro' out London and many other towns, this security may in fact be extended to whole towns, including dockyards, warehouses, &c., at a much less proportionate rate of expence than where the operation, as above, is supposed to be confined to a single building; for in this case only one large reservoir would be required for a parish, or at least a considerable district, which could give the power of immediate action to the mains of that district on the opening a particular sluice, and would continue in them the full supply until the steam engine or other moving power of these works could be laid on; whereas without such reservoir there could not exist a supply constantly ready for immediate application (which is indispensible in any security against fire) inasmuch as the waterworks' steam engines are seldom kept at work more than twelve hours out of the twenty-four, and generally not at all during the night, when the danger of fire is greatest. Without this combination, therefore, it is evident that notwithstanding the great extent of waterworks now existing in the principal towns of England, still their application under present circumstances as a security against fire is very limited, while, on the other hand, with a reservoir of sufficient magnitude, not only would the supply be certain and instantaneous, but it would last until the engine itself co$^{d}$ be got into action. Nor is this, in fact, the whole advantage derivable from this combination, because by increasing the condensation of the air in the first instance beyond the power of the steam engine itself, a vast energy is given to the first operations of this system beyond that which they otherwise would possess even if the engine were always to be in action. And here it should be remarked, that the force

and quantity of the first supply of water in all cases of fire breaking out is in fact even of much more importance than any prolonged duration of the supply. The identical mains at present existing in the streets would be found fully sufficient to extend the security to all parts, by giving them communication with the grand reservoir in each particular district, so that the full force of its contents might be turned on to any particular main at a moment's notice; and the application of this water in particular houses might be arranged at the choice of the possessor, and either on the internal principles of dispersion above described, with the power of being worked on the outside, or by the external application either of the common hose and branch, or of a new construction of branches here to be specified as a part of this extended system of security. For either of these modes it is necessary that fire plugs should be provided on the main or rider in every street, so near together that 4, 5, 6, or more of these plugs may by leather hoses be brought to bear at any one point, where they may be applied, as at present, with the common branch or mouth-piece,

The following new system of branches or dispersers for this purpose will, however, be found much more powerful and effectual, as carrying the water more into the heart of the fire although applied externally, and as acting very much upon the principle of the fixed and internal mode of dispersion already described, instead of playing a small stream at a distance like the common branch and hose.

The first of these new branches which I propose to specify is a metal tube, capable of being extended to a considerable length by screwing on additional joints, and of equal bore with the fire plug. This branch is ttached to the end of the hose fixed into the fire plug, and being long enough to be actually forced thro' the windows of the room on fire (Fig. 10), the end thus protruded into the appartment being furnished with a rose or bulb, the water cannot fail to be thrown into every part of it at once, without the smallest waste, and in vast quantities, as the whole supply of the main may be thus concentrated. The termination of this pipe may be varied according to circumstances; thus, it may be armed with a length of perforated pipe, or even with one of the rotatory dispersers for the more distant scattering of the water in particular cases. A further variation of this plan may be effected by fixing these different terminations at once on a long length of leather hose, which by its flexibility may be carried into places that could not be got at by in inflexible tube from the street, and which may be thrust through the windows of the highest stories by means of appropriate fire hooks, Fig. 10.

Another variety is by providing short branches somewhat similar to those at

present use by hand, but larger in proportion to the supply and force of water thus laid on immediately from the main. Some of these might be constructed to throw a number of streams instead of one, so concentrated as to fill the whole space of a large window; others, on the contrary, to project a number of diverging streams, which may embrace a considerable portion of the front of the building, these being principally applicable where such front is of wood. This new system of jets or dispersers may also be applied to the present fire engines. Now it must be obvious not only that the quantity and force of water thrown by these different means into a burning house from the immediate action of the main under a high pressure in the reservoir must infinitely exceed any supply that could ever be given by hand engines, independant of its being a spontaneous action, always ready, and requiring very few persons to give it full effect, independent also of the more immediate application of the water to the burning parts, and of there being no waste in this application, all the contents of the main being at once thrown in, whereas by the present system, tho' the main does not deliver one quarter of what it would do under the increased pressure of the reservoir, not one-tenth even of what it does deliver is actually thrown into the fire, the far greater part being wasted down the kennel. It is obvious also that the bringing the subbordinate instruments (such as the hoses and branches above described) to any spot is a work of much less labour and time than the bringing engines as at present. But should any situation exist where the reservoir above described might be difficult of application, its operation, as combined with the waterworks, might in some degree be produced by the immediate application of the power of men or horses. For this purpose a large central engine, connecting with the mains of any district, must be erected to admit as many men as possible to be applied in working it; or where a number of horses might be kept in constant readiness to give the first action to the mains, as above, should the steam engines not be at work. Altho' this substitute must fall far short of the powers of the reservoir, there is no doubt that the application of the same number of horses and men required for the present system of fire engines would thus have a much greater effect towards the security of the town, than as they are now applied in dragging and working the small moveable engines. And here I must state my confidence that were the fire insurance companies to combine with the waterwork companies for the general establishment of this system, they would not only add infinitely to the security of lives and property, but by that very preservation of property, and other savings, these companies would be able, from the great reduction of loss, to afford the first expenditure necessary to institute such an establishment, and might even eventually reduce the premium of insurances.

The same substitution of the reservoir as above stated might of course also be applied to the security of any detached or single building, tho' unquestionably in all cases where there is no local objection to the reservoir, and previously accumulated power of condensed air (and it is difficult to see any), this system is by far the most preferable, on account of its instantaneous and unlimited operation. The mode of filling the reservoir with condensed air has hitherto only been described to be done by an air pump, which pump, it is evident, may be worked either by wind, water, or any other power, and being provided with guages and safety valves it may be made to keep up a constant pressure or quantity of power. But it is necessary now to state that other modes of filling the reservoir with condensed air may also be resorted to, and are here therefore to be specified. Thus, the operation may be performed by the combustion of saltpetre, or other substances, in a close retort connected with the reservoir, and any quantity of gas thus generated may be passed into the reservoir, so as to raise the condensation to any required degree of intensity. In fact, various other modes may be adopted on this principle, for obtaining power by the condensation of gasses. It is here, therefore, to be understood generally, that whatever power may be obtained, either from the condensation of atmospheric air by whatever mode produced, or by the condensation of any gas, either at the time of its generation or by subsequent operation, that power and that principle of action connected with or arising from such condensation, however applied, is an essential part of this my Invention. I shall conclude this Specification, therefore, by enumerating some of the further uses to which this mode of accumulating and storing of power is applicable.

In the first place, if a moderately sized reservoir, containing but a few hogsheads, at the bottom of a dwelling house, be connected with a good forcing pump, which may serve both to inject the air and the water; or if this reservoir be filled by any other process, as, for instance, first with water, by the exhaustion of the air contained in the reservoir by the internal combustion of a lamp inclosed in it, and thereby forming a vacuum for the indraft of water as the oxygen is consumed, and subsequently with compressed air, on the foregoing principle, by the combustion of saltpetre, or by any other process producing the same effect; then, in either of these ways, (and in the latter, without labour,) an accumulation of water is obtained, and combined with the power of throwing it to every part of the dwelling house, not only for the purpose of a security against fire on a small scale, but also for every other domestic use. And it is to be observed, that where the mode of filling the reservoir by hand is adopted no greater power is expended than if the water had been itself at once pumped to the height given by the condensation; whereas a very great advantage is derived by having the reservoir at the bottom of the house, instead

of the ordinary mode of placing it at top, where it is necessarily a great burthen, and constantly liable to cause mischief by leaking or otherwise.

After the detailed descriptions that have been given of the modes of securing different buildings by means of the condensing reservoir and its apparatus, the application of it to the security of ships from fire is too obvious to need particularizing. It is obvious, also, that this same mode of accumulating power may be applied for the working of fountains, or for the watering of hothouses. The shower being produced in various quantities, and in drops of various sizes, according to different occasions, by filling different dispersing pipes, similar to those already described, the perforation of each pipe being different, so that a heavy shower may be produced for the destruction of animalcula, or the finest and most imperceptible dew may be created for the luxuriance of vegetation.

An hydraulic engine upon this principle is also applicable to canals wanting a sufficient head. In this instance it may be employed for throwing back the water consumed in working the locks, and for this operation the condensed air and water may be collected in a large reservoir by wind or otherwise, which by a due proportion of quantity may be made sufficient to supply the waste, or in this instance the production of power by the generation of gas may be most advantageously applied.

But there is another and still more general and important application of this system of accumulating power by the condensation of air, namely, the provision of some substitute for animal exertion in the draught of burthens or other purposes and operations to which animal power is at present applied; for by this means it will be practicable within a convenient space and with apparatus of a convenient weight to obtain the power of any number of horses required for the draught of a carriage, which may, by machinery sufficiently simple, be made to act upon the wheels for a given distance, inasmuch as the power of one horse for one mile may be compressed into a cylinder 2 feet 6 in. long by 9 in diameter, and so on, therefore, in proportion for a greater number of horses and an increase of distance. To apply this extensively on a line of road, stations must be formed at certain distances, where either by the aid of steam or other power, or by the generation of gas, the cylinders containing the powers may be charged; the operation may therefore thus be carried on from station to station by replacing the exhausted cylinders with others that have been previously charged. The action of this power upon the wheels is performed by the vibrations of a piston rod driven backwards and forwards between two charged cylinders by the alternate pressure of a small quantity of the compressed air allowed to escape by turns from each cylinder. From what is here specified any person conversant in

mechanism and the doctrine of forces will at once perceive the prodigious extent to which this application of the system may be carried, so as if not wholly to do away the necessity of horses for drawing burthens, &c. or at all events greatly to diminish their numbers.

I shall here specify only one further application of this principle of power by condensation; which is, that as it is applicable for the production of motion for various purposes on the surface of the globe, so also in like manner may the ascending power of hydrogen be collected by condensation in a small space, and thus be made applicable to the replenishing of the power of a balloon in its flight, or to give a vast facility for the first filling of it by the immediate operation of allowing the gas to expand from the vessels in which it is condensed, through a cock to which the tube of the balloon may be applied when it is required to inflate it for ascension. Various uses of no mean importance will be found immediately attainable by thus facilitating and rendering momentary the operation of charging the balloon, such as the communication of intelligence, the making signals, and even the conveyance of inflamible matter for the destruction of towns, harbours, &c., for which purpose small balloons may be sent on board ship, with a proportionate quantity of ascending power, or hydrogen gas condensed into a very small space, where it will remain for any length of time in store, and from whence it may at any moment be applied for any of these ends by the most simple processes.

In witness whereof, I, the said William Congreve, have hereunto set my hand and seal, this Thirtieth day of December, in the year of our Lord One thousand eight hundred and twelve.

WILLIAM CONGREVE. (L.S.)

**AND BE IT REMEMBERED**, that on the Thirtieth day of December, in the year of our Lord 1812, the aforesaid William Congreve came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified in form above written. And also the Specification aforesaid was stampt according to the tenor of the Statute made for that purpose.

STEPHEN.

Inrolled the Thirtieth day of December, in the year of our Lord One thousand eight hundred and twelve.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
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