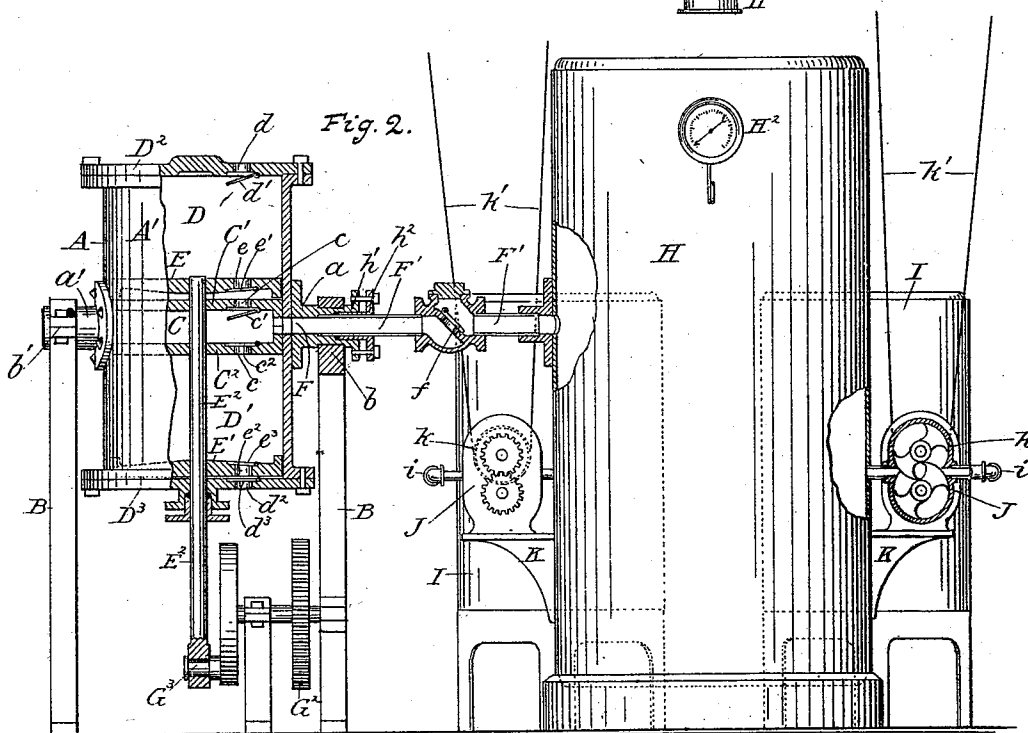
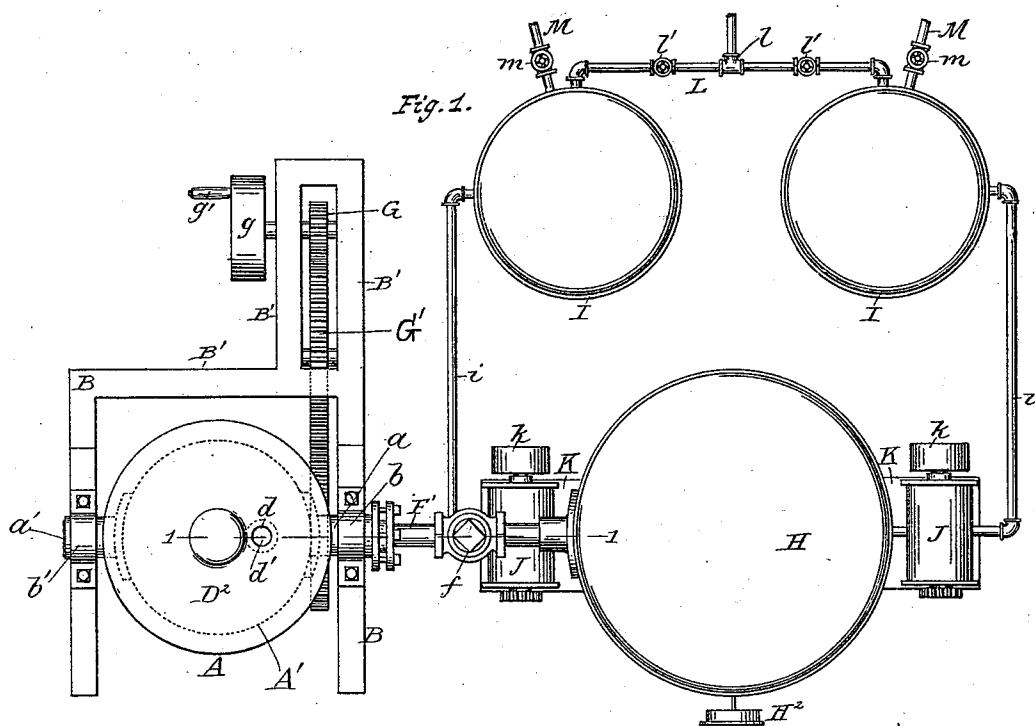


M. FLOOD.
AIR COMPRESSING APPARATUS.

No. 519,383.

Patented May 8, 1894.



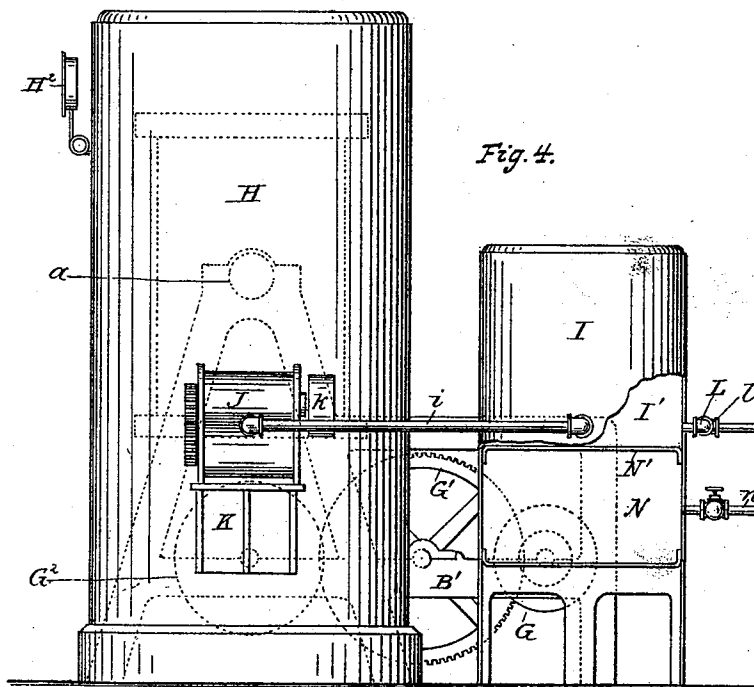
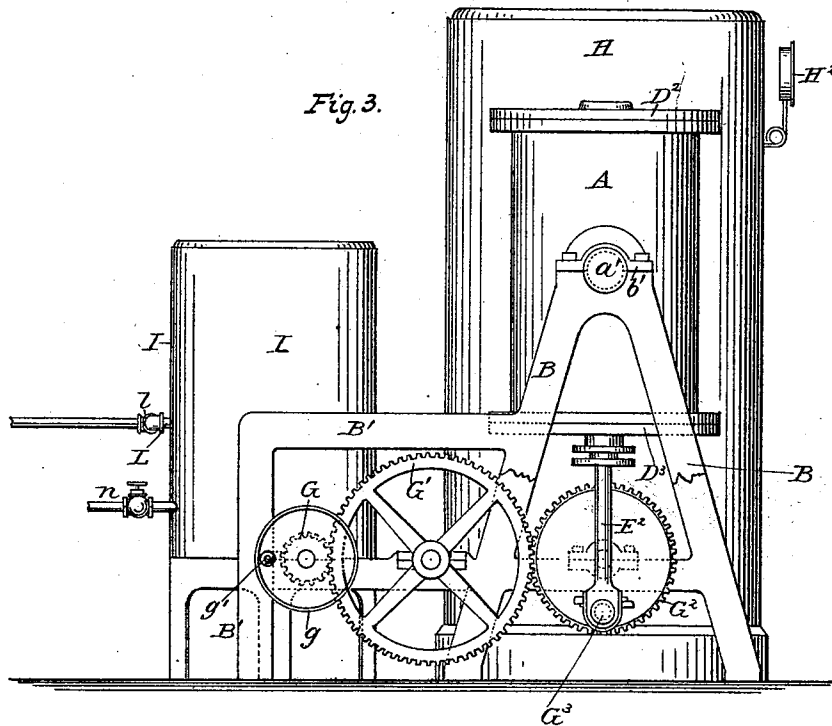
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UNITED STATES PATENT OFFICE.

MATTHEW FLOOD, OF ALBANY, NEW YORK.

AIR-COMPRESSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 519,383, dated May 8, 1894.

Application filed September 22, 1893. Serial No. 486,161. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW FLOOD, a citizen of the United States, residing at Albany, in the county of Albany, State of New York, have invented certain new and useful Improvements in Air-Compressing Apparatus, of which the following is a full, clear, and exact description.

My invention relates to air compressing apparatus, and consists of the devices and parts, and combination of devices and parts herein-after particularly described and specifically set forth in the claims.

The objects of my invention are to provide an air compressing apparatus which will be simple in construction, and be capable of compressing air for use for supplying air to motors, pneumatic tubes, operating hammers, drills, raising water, and for other purposes for which compressed air is used; and also to provide specific combination of devices and elements by which my invention may be embodied in air compressing apparatus. I attain these objects by the means illustrated in the accompanying drawings forming a part of this specification, in which—

Figure 1 is a plan view of an air compressing apparatus embodying improvements in my invention. Fig. 2 is an elevation, partly in section, taken at line 1—1 in Fig. 1. Fig. 3 is a view at the primary compressor side of the apparatus. Fig. 4 is a view of the opposite side of the apparatus.

The same letters of reference refer to similar parts throughout the several views.

In the drawings A represents the primary air compressor consisting of the cylinder A', which may be supported by any suitable means, and preferably by means of trunnions *a a'*, secured to the cylinder A', and working in bearings *b b'* mounted on a suitable frame B. There is provided in the chamber of the cylinder A', about at the middle of its length, the air receiving chamber C which is formed between the horizontal diaphragms C' C², which are securely fixed from moving within said cylinder by any suitable bolts, rivets or other known means. This air receiving chamber is central between the pump chambers D and D', and the outer ends of these pump chambers are closed by heads D² and D³. Within the

pump chambers D and D' are the pistons E E', suitably secured to the piston rod E², with piston E working within the pump chamber D, and piston E' working within the pump chamber D'. Suitable openings, provided with valves, for inlet of air into the respective pump chambers are provided; which inlet openings are preferably made in the said heads, and the valves may be of any suitable known construction. In the drawings *d* is an inlet opening provided in the head D², and leading to the pump chamber D, and is provided with valve *d'* working inwardly; and in the opposite end head D³ is an air inlet opening *d²*, leading to the pump chamber D', and provided with valve *d³*, which also opens inwardly. The piston E working within the pump chamber D is provided with an air intake opening *e*, provided with valve *e'* opening toward the air receiving chamber C; and piston E' working within pump chamber D', is provided with intake opening *e²*, provided with valve *e³* also opening toward the said air receiving chamber C. The diaphragms C' C² are respectively provided with intake openings as *c* and *c*, each provided with a suitable valve as *c'*, *c²*.

F is the air outlet from the air receiving chamber C, of the primary air compressor A, which outlet, when the said compressor is supported by trunnions, may be made through one of the trunnions, as trunnion *a*, and be connected with a suitable compressed air receiver, by a conduit F' having a suitable check valve *f* provided in the course of the said pipe. The pumps of this primary air compressor may be operated by any suitable mechanism actuated by any known and convenient power. In the drawings the mechanism is shown to consist of the driving pinion G driving gear G', which actuates a gear G² to which is connected the crank G³, for actuating the piston rod E² to which the pistons E E' are secured. These several gears are suitably mounted on shafts which revolve in suitable bearings, secured to the frame work B', which is preferably secured to frame B. The pinion G may be revolved by a band wheel *g*, driven by any suitable power such as steam, water or electricity, or animal power, by means of a belt not shown, or it may be re-

volved by the handle g' secured to wheel g and operating as a crank handle for revolving the same.

H is the compressed air receiver preferably made in the form of a cylindrical vessel which is suitably supported, and is connected with the air receiving chamber C, of the primary air compressor A, by a pipe F' which is connected with the trunnion a and made air tight, in its joint with said trunnion, by stuffing box h' and gland h^2 . The check valve f is provided, in the course of the pipe F' , for preventing back pressure of the air in the receiver H, into the air receiving chamber C.

This receiver H is preferably provided with a suitable pressure gage H^2 , for indicating the pressure of the air in the said receiver. One or more super compressed air receivers may be provided for receiving, storing at will, and supplying air, under great pressure, through a suitable discharge pipe or pipes, to be used in various operations such as for driving air motors, hammers, drills, operating pneumatic tubes, raising water, and for other purposes. The drawings show two such super compressed air receivers I, I suitably connected, each by means of a suitable pipe i , with the compressed air receiver H. In the course of these pipes i , there is provided in each a suitable air force pump J J, preferably of any well known rotary positive force kind with which the public is familiar. These pumps are suitably supported in place, preferably at the sides of the receiver H by suitable brackets K K, and may be operated by a band pulley k secured to a shaft of one of the revolving pistons, and driven by a band k' from any suitable driving band wheel not shown. These super compressed air receivers I I may be located at any desired distance from the air receiver H, and when two or more of said receivers I are used, they may be variously located as the location of the operations to be had, may require. When two or more of these super compressed air receivers are used, they may be connected by suitable pipes L connecting with a ∇ or T form coupling as l , and be provided with suitable valves l' , so that at will the air may be discharged from the two or more receivers I I for operation with the devices or mechanism, not shown, intended to be had. Other pipes as M, provided with valves m , may be employed for conducting streams of compressed air, from the super compressed air receivers I I, to near or remote places for operating mechanism or devices as may be desired.

For increasing the pressure of the air within the super compressed air receivers I by expansion of the same before the discharge of the air from said receivers, the air chamber I' in said receivers is heated to such a degree as may be advantageous; and for the heating of the said chamber I' , fire from burning fuel of any kind, or steam in coils arranged within said chamber may be employed. In the drawings, Fig. 4, there is shown a steam cham-

ber N, situated below the chamber I' of the super compressed air receiver, and separated therefrom by the plate N' , and steam may be supplied to chamber N by any suitable steam pipe n communicating with a steam generator, not shown; and any suitable well known steam trap, not shown, may be employed for carrying off the condensed vapors from said steam chamber as may be required.

When steam is employed for heating the air in the air chamber I, a pressure gage, not shown, may be connected with said air chamber, and another, not shown, with the steam chamber.

The manner in which the above described apparatus operates is as follows: The piston rod of the air compressor A being operated by the mechanism provided for that purpose, will impart to the pistons E E' a reciprocating motion, and when moving in direction from the upper end head of the cylinder A', the valve d' in head D^2 will open so that air from the outside may have free passage into the pump chamber above the piston E, while the valve d^3 will be closed against the opening d^2 in the lower head D^3 , the valve e^3 in the lower piston E' will open for admitting air into pump chamber D'. As the piston E is being moved toward the chamber C, the valve e' will close the opening e in said piston, while the force of the inflowing air will open valve c' of opening c , and close the valve c^2 of opening c in the diaphragm C'. By a reverse movement of the said pistons, reversed actions of the said valves d' d^3 e' e^3 c' c^2 will be had, and under this continued reciprocating movement of the said pistons E E', air will be drawn from the outside of the cylinder A' and forced within the chamber C, and be thence discharged, through pipe F, into the receiver H, and from thence be drawn in its compressed condition and be discharged into the super compressed air receivers I, by the force of the pump J J, and be heated when within said receivers by means provided for increasing the pressure of the air within, until discharged at will from the same through the pipes provided, for the uses to which they may be applied.

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

1. In an air compressing apparatus, the combination with a compressed air receiver, and a primary air compressor supported on trunnions one of which is tubular, a pipe connecting said tubular trunnion with said receiver, a stuffing box and gland making a tight joint between the said trunnion and the said pipe, an air check valve in the course of the said pipe, and mechanism for operating the said primary air compressor, substantially as and for the purposes set forth.

2. In an air compressing apparatus, the combination with a compressed air receiver, of a series of super compressed air receivers, pipes corresponding in number with the num-

ber of said super compressed air receivers and communicating from said compressed air receiver to the respective supercompressed air receivers to be supplied with compressed air, an air force pump in the course of each said pipe, pipes for connection of the one to the other of the latter receivers, valves, under control of an operator, in the course of said connecting pipes, and a discharge pipe from

the said connecting pipes, substantially as set forth and for the purposes set forth.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

MATTHEW FLOOD.

Witnesses:

GEORGE FLOOD,
JOHN COSGROVE.