No. 869,739. PATENTED OCT. 29, 1907.

A. SAUER.

AIR COMPRESSING SYSTEM.

APPLICATION FILED FEB. 18, 1907.

4 SHEETS—SHEET 1.

Fig. 2.

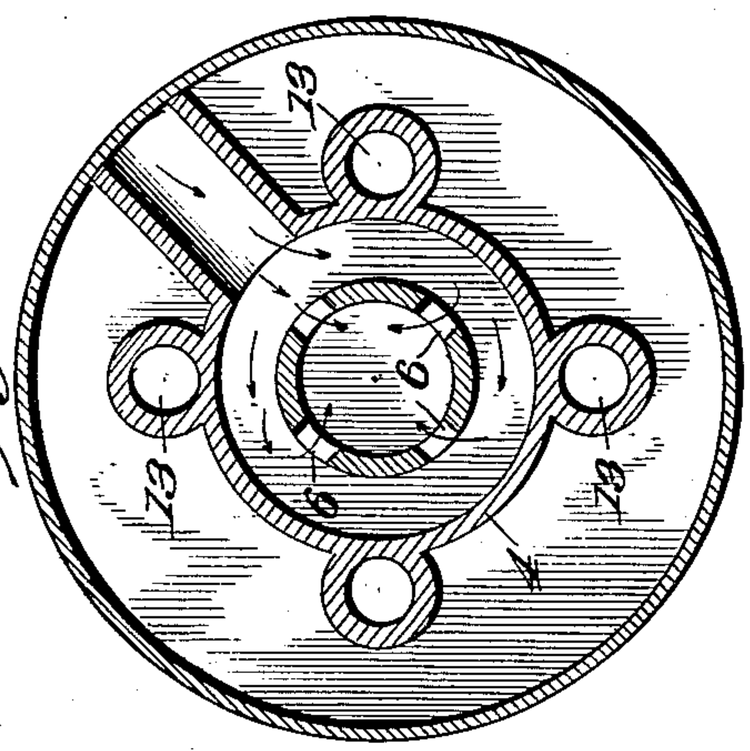


Fig. 3.

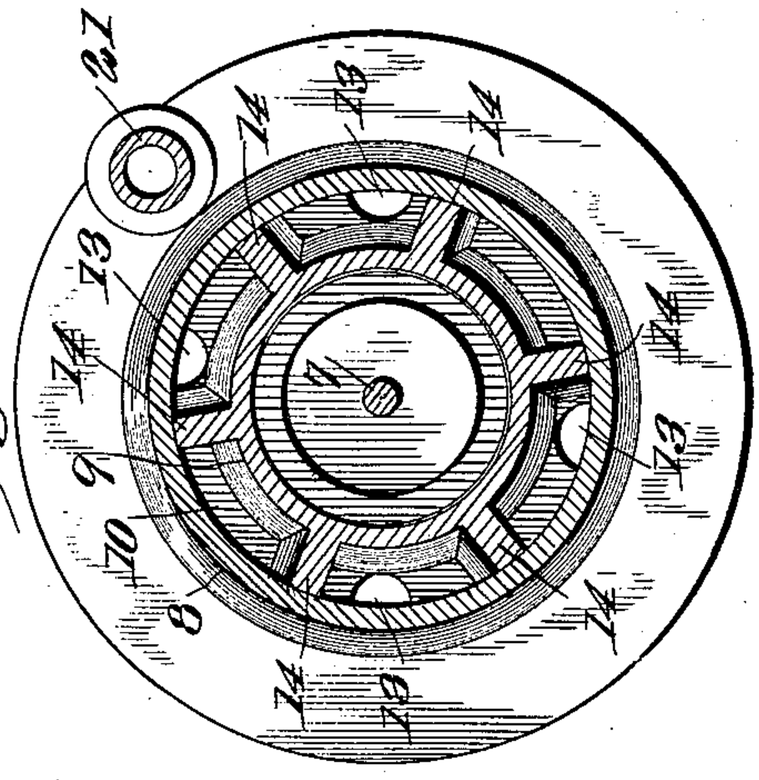
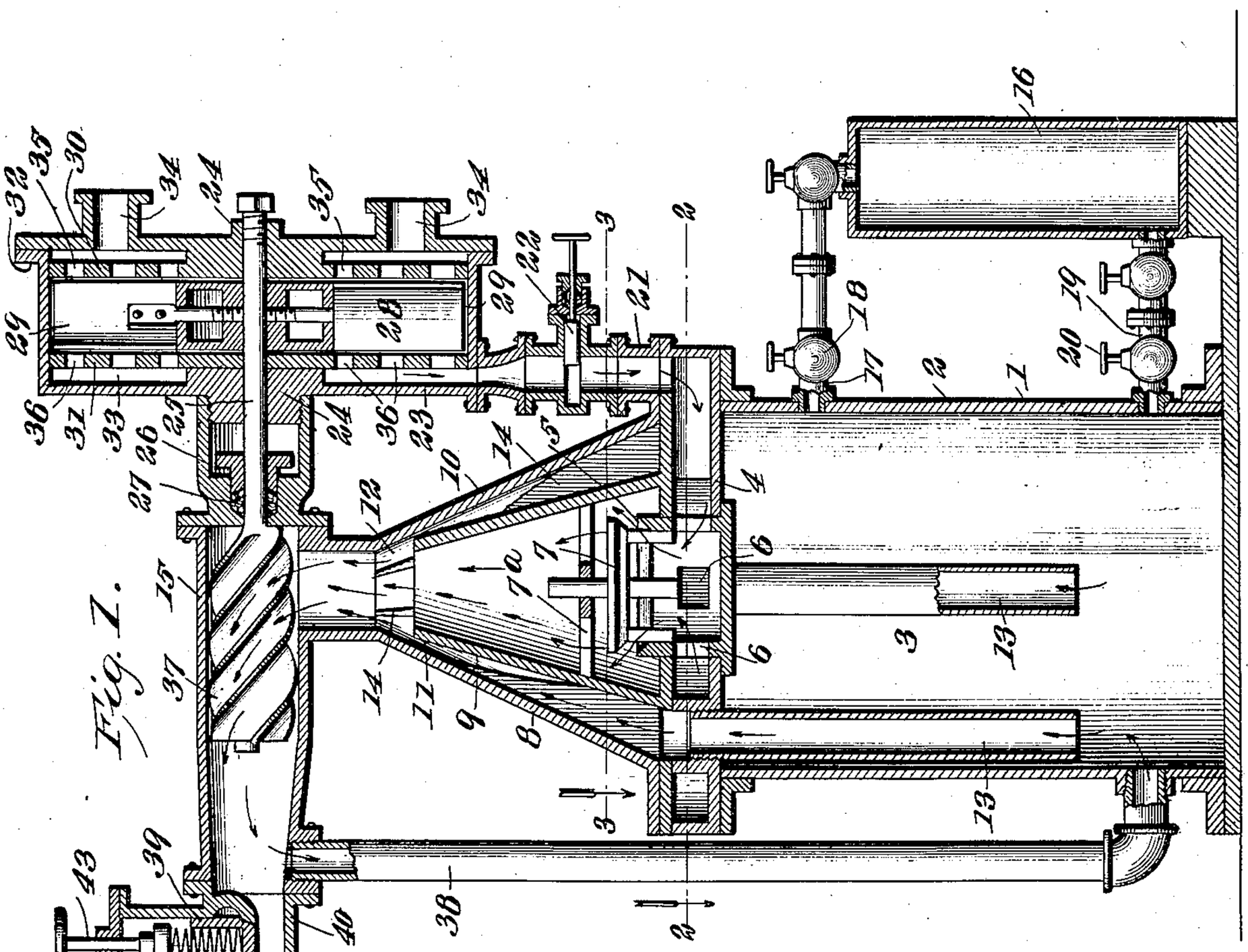


Fig. 1.



WITNESSES

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ATTORNEYS

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4 SHEETS—SHEET 2.

Fig. 3.

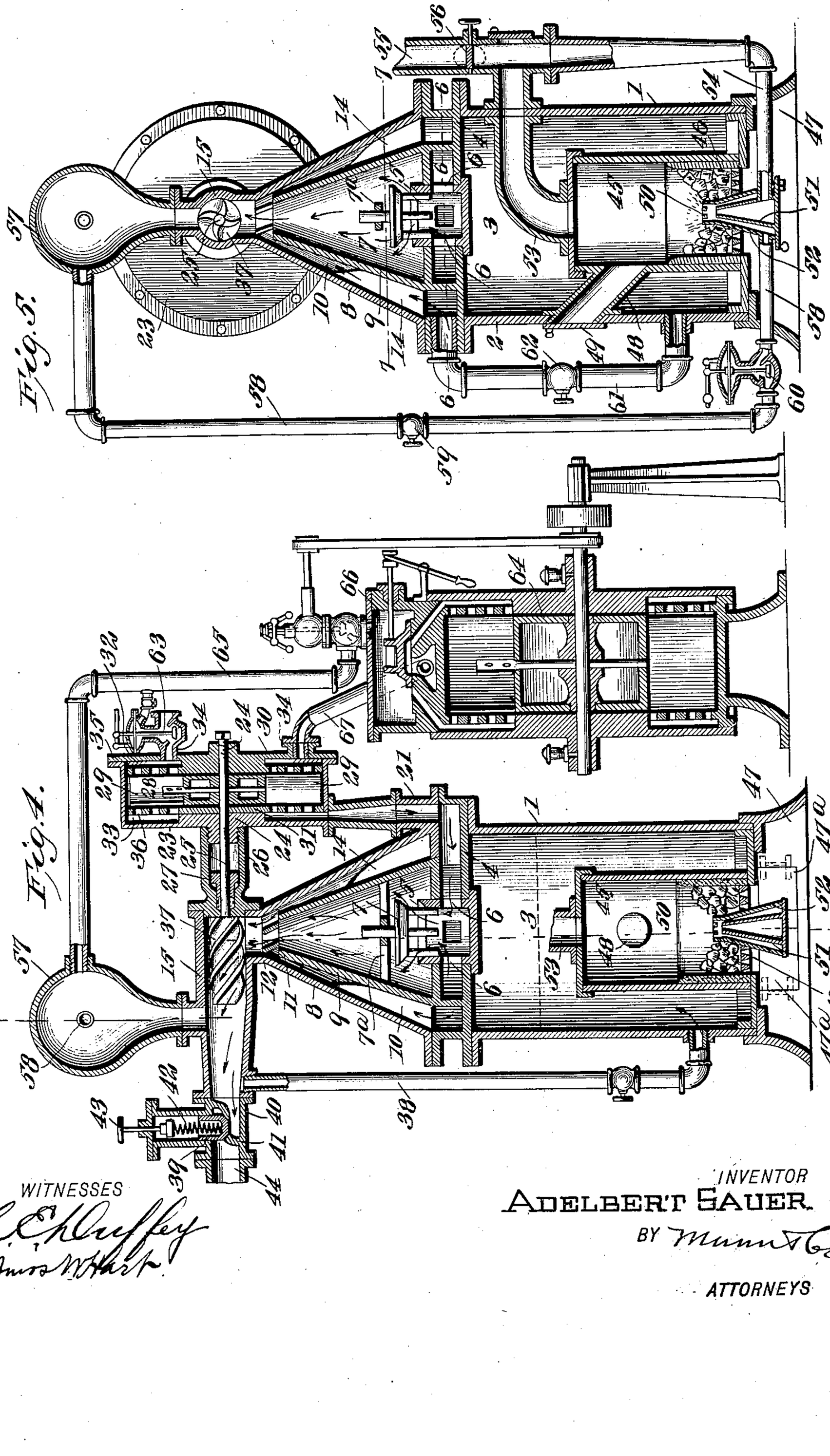

Fig. 4.

WITNESSES

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No. 869,739. PATENTED OCT. 29, 1907.

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4 SHEETS—SHEET 3.

Fig. 6

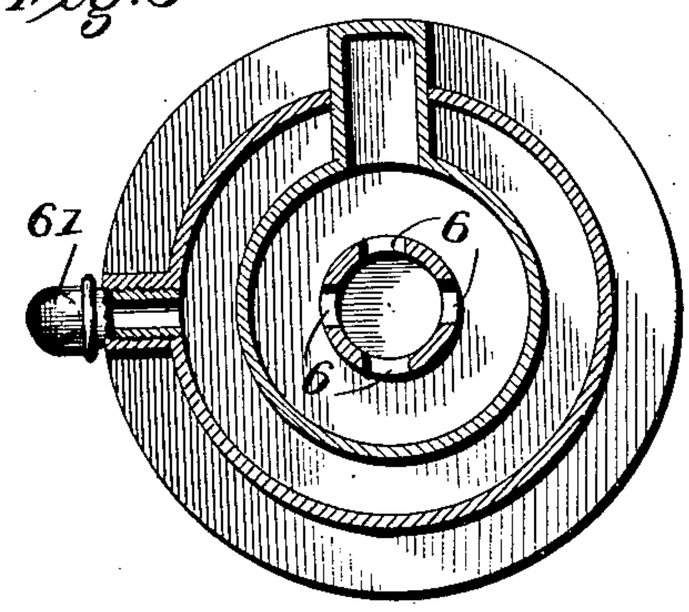


Fig. 7

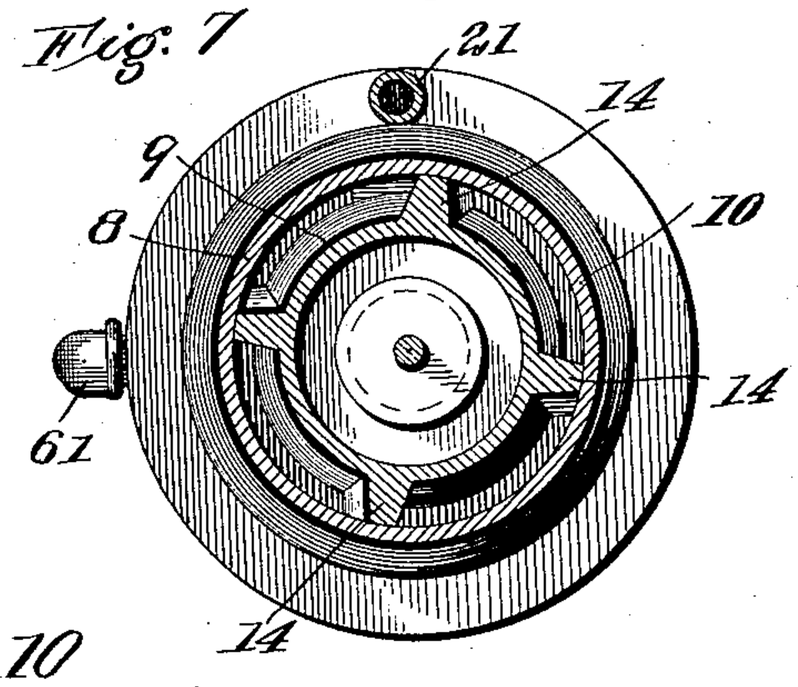


Fig. 10

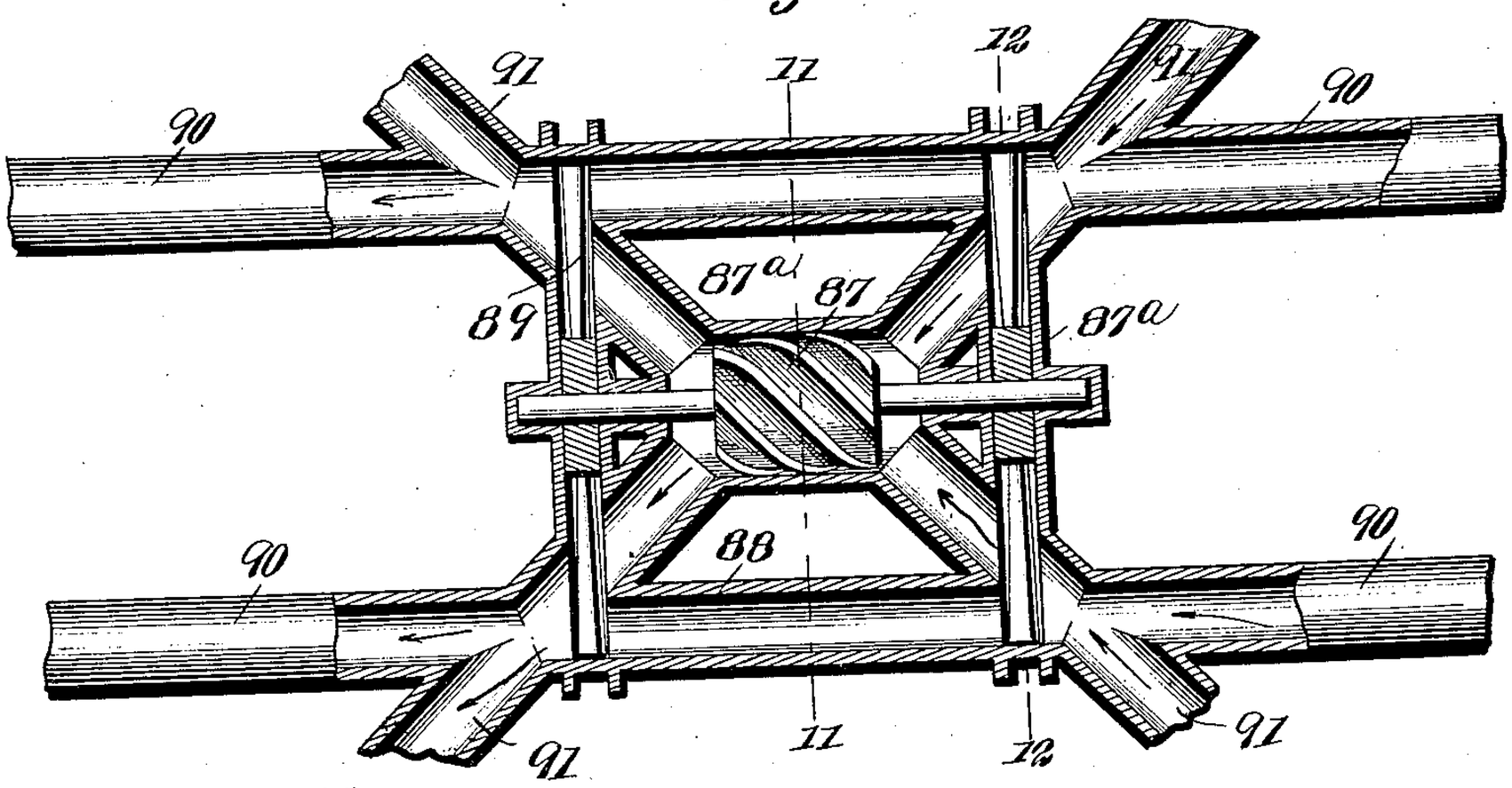


Fig. 11

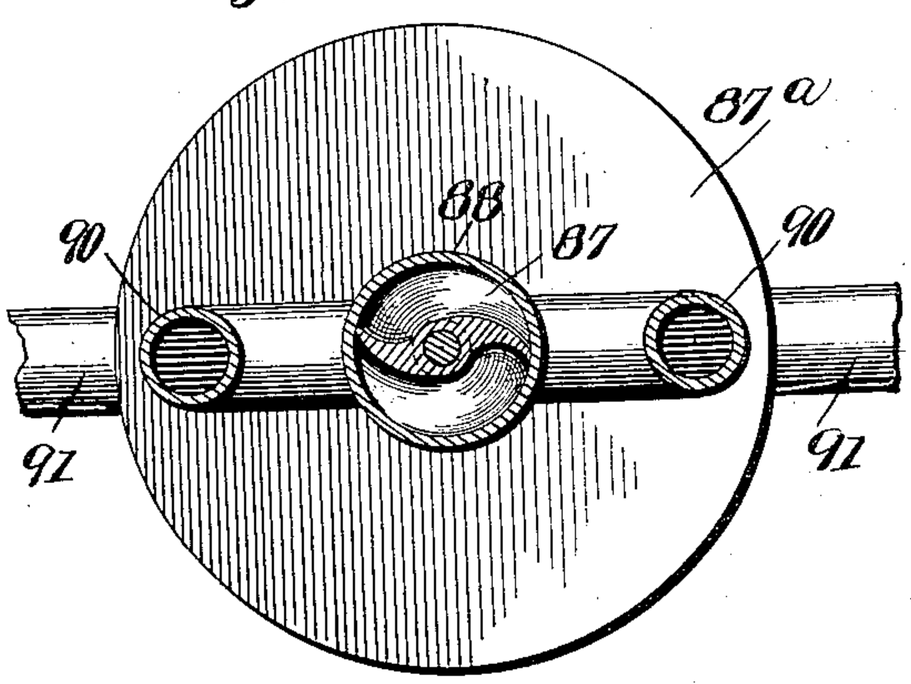
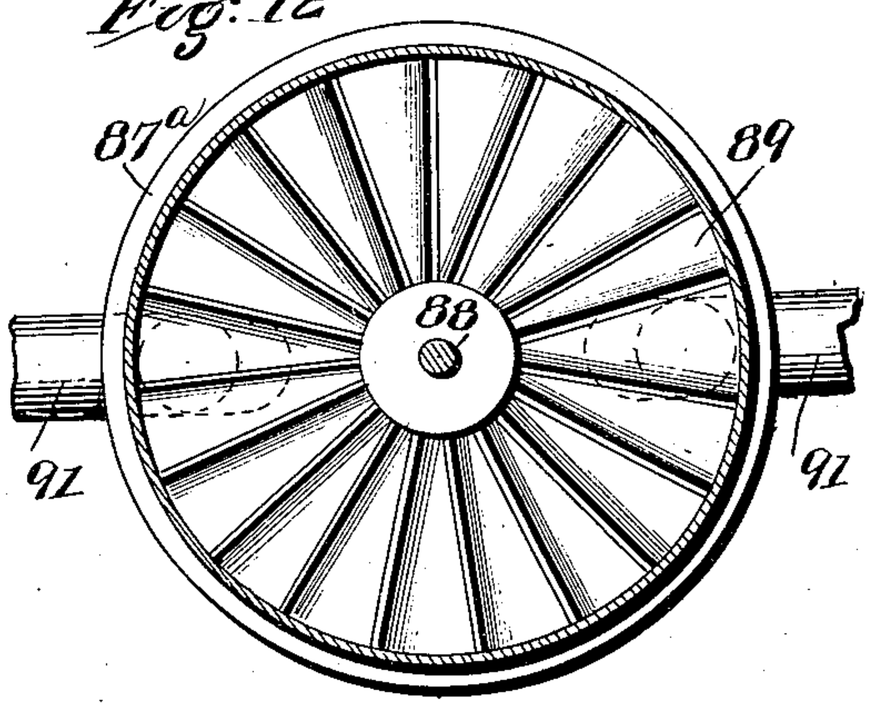


Fig. 12



WITNESSES

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No. 869,739. PATENTED OCT. 29, 1907.

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AIR COMPRESSING SYSTEM.

APPLICATION FILED FEB. 18, 1907.

4 SHEETS—SHEET 4.

Fig. 8.

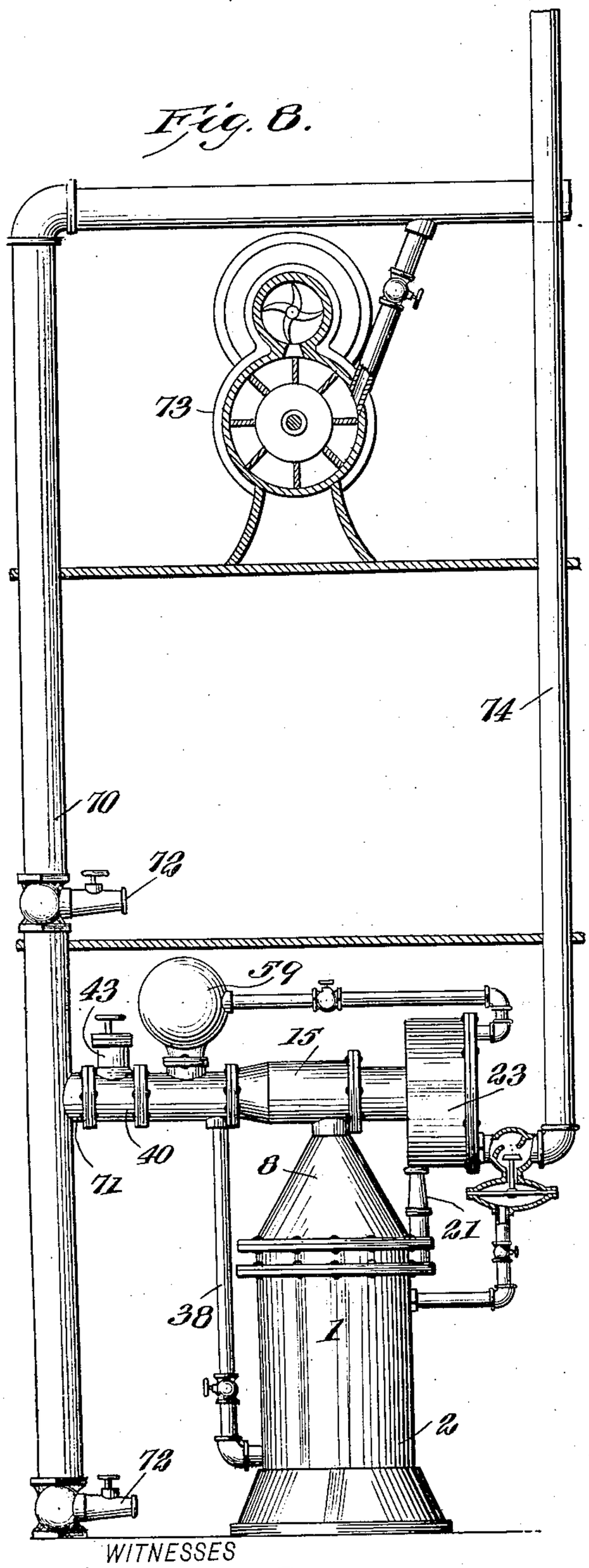
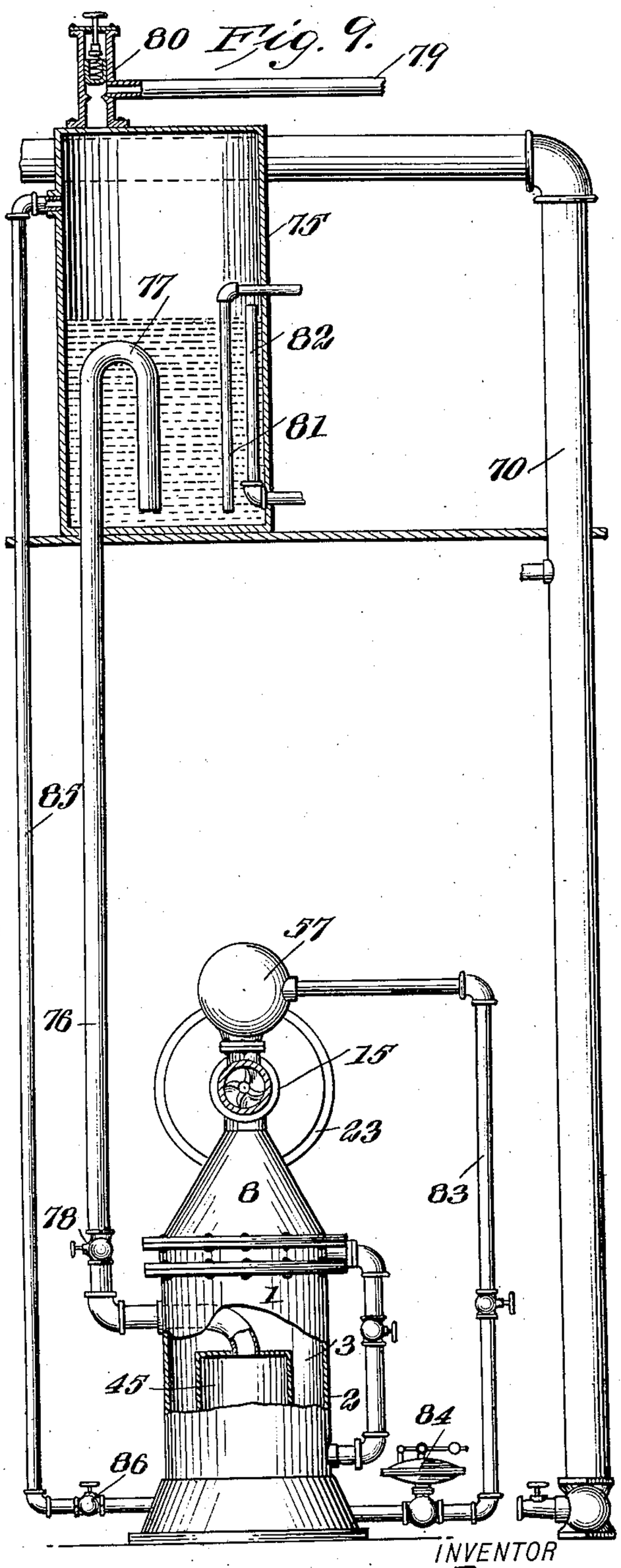


Fig. 9.



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UNITED STATES PATENT OFFICE.

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AIR-COMPRESSING SYSTEM.

No. 869,739. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed February 18, 1907. Serial No. 358,010.

To all whom it may concern:

Be it known that I, ADELBERT SAUER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented an Improved Air-Compressing System, of which the following is a description.

My invention relates to compressing air apparatus designed to produce a pressure of aeriform fluid which may be utilized in the performance of useful work such as running machinery, for ventilating buildings and dwellings and for the production of gas for illuminating purposes.

In my system the pressure of a motive fluid is utilized to create a suction for the generation of an inflowing current of atmospheric air which is combined or mixed intimately with the motive fluid and is stored in a reservoir chamber until such fluid obtains a pressure sufficient to overcome the resistance of a regulating vent valve; and such inflowing current drawn into the apparatus by suction created by injector devices operated under the high pressure of the motive fluid sets in motion a current fan that acts on the commingled motive fluid and air current so that the pressure of the motive fluid is augmented during the passage of said motive fluid from the combining chamber to the reservoir chamber.

My invention also contemplates the provision of heating appliances situated in the reservoir chamber for the motive fluid for the purpose of expanding the latter and increasing the pressure thereof, such heating appliances being adapted for the consumption of carbonaceous fuel and for the gaseous products resulting from the combustion of such fuel; and such gaseous products from the heating appliances are combined with a limited quantity of aeriform motive fluid by an injector burner to produce a gaseous fuel adapted to be injected into the heating appliances to increase the temperature of the heater and promote the efficiency of the apparatus.

I also contemplate the provision of a gasometer or gas holder for the purpose of washing and storing the illuminating gas previous to drawing off the same for consumption at illuminating burners.

The motive fluid in my system may extend its energy in the performance of useful work to drive motors and other machinery and in this adaptation of the invention the motor has its exhaust connected with a member of the circulating system for the return of the partially spent or exhausted motive fluid to such circulatory system to be regenerated by passage through the primary generator and by intermingling with the high pressure motive fluid thereof, thus utilizing the exhaust however its pressure may be reduced in the system.

To enable others to understand the invention I have illustrated the same and different adaptations thereof in the accompanying drawings forming a part of this specification, and in which

Figure 1 is a vertical sectional elevation of the compressor generator with the several elements which are combined with the same. Fig. 2 is a transverse horizontal sectional view on the plane indicated by the dotted line 2—2 of Fig. 1. Fig. 3 is a similar view on the plane indicated by the dotted line 3—3 in Fig. 1. Fig. 4 is a vertical sectional elevation of another embodiment of the invention in which a heater is utilized as the medium for expanding the initial pressure of the motive fluid and illustrating the generator actively combined with a motor. Fig. 5 is a vertical sectional elevation at right angles to Fig. 4 and on the plane indicated by the dotted line 5—5 of said Fig. 4. Figs. 6 and 7 are transverse horizontal sectional views on the planes indicated by dotted lines 6—6, 7—7, respectively of Fig. 5. Fig. 8 is a vertical sectional elevation showing one adaptation of the generator for the purpose of ventilating the building and of driving motors therein. Fig. 9 is another vertical sectional elevation illustrating an adaptation of the primary generator and the heating furnace for the production of an illuminating gas for lighting the building. Fig. 10 is a diagrammatic view of the system in which the energy of the motive fluid from a number of the compressors or generators may be transmitted from a central station to a number of buildings or dwellings to be converted or translated into mechanical energy by motors therein. Figs. 11 and 12 are vertical cross-sectional elevations of the central station apparatus on the planes indicated by the dotted lines 11—11, 12—12, respectively of Fig. 10.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

The compressor or generator is designated in its entirety by the numeral 1 for the purpose of conveniently referring thereto in the subsequent description of the circulatory system which may include one or a series of generators. This generator has a shell 2 preferably cylindrical in form and closed at its bottom so as to form therein a reservoir chamber 3 designed to combine the high pressure motive fluid. The upper end of the shell 2 is closed substantially by an air inlet shell 4 which is bolted or otherwise united rigidly to the top or open upper end of the generator shell 2. This air inlet shell 4 is provided with a central annular valve seat 5 pierced at intervals by a plurality of radial inlet ports 6 and in this valve seat is slidably fitted a gravity valve 7 which is adapted to fit snugly to the seat and has its stem fitted slidably and loosely in a fixed guide bridge 7^a. An injector cone 8 is flanged and united rigidly to the air inlet shell 4 so as to have its axis in alinement with the longitudinal axis of the generator shell 2 and air inlet shell 4 and within the injector cone is arranged the air inlet cone 9 which may form a part of the chambered air inlet shell 4. The cone 9 communicates with the annular chamber formed

by the annular valve seat 5 and the angle or conicity of the internal cone 9 differs from the angle of the injector cone 8. The inner cone 9 is situated within but free from engagement with the internal injector cone 8 thereby producing an annular passage 10 which tapers from the bases of the cone toward the apices thereof; and this arrangement of the two cones produces a narrow slit or orifice 11 at the apex of the internal cone 9. The external injector cone 8 is extended or prolonged beyond the open upper end of the internal air inlet cone 9 thereby forming a combining chamber 12 within the injector cone and beyond the discharge end of the air inlet cone and into this combining chamber is delivered the high pressure motive fluid which passes through the tapering annular passage 10 and the air current under ordinary atmospheric pressure which is delivered by the chambered inlet shell 4 and the internal cone 9, the current of high pressure motive fluid and the current of atmospheric air under normal atmospheric pressure being intimately combined or intermingled in the chamber 12. The high pressure motive fluid from the reservoir chamber 3 of the generator is conveyed or conducted through the chambered air shell 4 without communicating with the latter by means of the high pressure tubes or pipes 13 which communicate with the reservoir chamber 3 and extend through the chamber of the air inlet shell 4 so as to discharge into the annular tapered passage 10 between the cones 8, 9, and the movement of this current of high pressure fluid through the annular passage between the cones and through the narrow slit or orifice 11 creates a strong suction through the air inlet shell 4, the current of atmospheric air flowing through which shell is of sufficient strength to raise the gravity. valve 7 and thus insure the passage of the air current into the injector devices of the generator.

In the annular tapered passages 10 between the injector cones 8, 9 is provided a series of spiral ribs or fins 14 which serve to properly space the inner cone 9 with relation to the outer cone 8 and these spiral ribs are tapered longitudinally from their lower ends to their upper ends, the upper ends of said ribs being reduced to a thin edge and terminating in the horizontal plane of the open upper end of the inner cone 9. The spiral depression of the ribs 14 between the two cones gives the current of high pressure motive fluid a spiral or whirling motion as said current traverses the annular tapered chamber 10 and the whirling high pressure motive fluid is thus caused to combine more intimately with the air current than would be the case if high pressure current were injected in a plane parallel to the path of air current.

15 denotes a pressure inlet substantially at right-angles to the vertical axis of the generator shell and its cones. This pressure inlet is tapered or conical and it is united to or made integral with the cone 8. In the chamber of the pressure shell is situated a propeller which is driven by an exterior current fan presently described so that the propelling wheel will act upon the current of high pressure motive fluid and air which is delivered to the shell 15 from the generator.

In the embodiment of the invention represented by Fig. 1 the initial supply of the high pressure motive fluid is obtained from a high pressure charging tank 16 which is located exterior to the generator shell 2. This charging tank 16 has an inner pipe connecting it with the generator shell 2 at a point below the chambered air inlet shell 4 and in this pipe connection is stop cock 18 which may be closed to shut off communication through the high pressure tank to the reservoir chamber of the generator. When the pressure in the reservoir chamber of the generator attains a high limit the connection 17 is closed from the high pressure tank and the generator itself supplies the high pressure fluid to the injector devices thus insuring the continuous operation of the apparatus automatically until the pressure in the generator is reduced substantially. During the maintenance of the high pressure motive fluid in the reservoir chamber of the generator the high pressure tank may be stored or recharged with a portion of such high pressure motive fluid from the generator chamber and to this end I provide a return pipe connection 19 between the lower portion of the generator chamber and the high pressure tank such return pipe connection 19 having a stop cock 20 which is open to establish a connection between the generator chamber and the tank. Normally the stop cock 20 is closed so that the high pressure fluid from the tank 16 may pass through the connection 17 to the generator chamber but in recharging the high pressure tank the stop cock 18 in the pipe connection 17 should be closed.

The air is supplied to the chambered inlet shell 4 by a pipe 21 which has its lower end coupled to said shell 4 and in this pipe 21 is a stop cock 22 which normally remains open but which may be closed to stop the operation of the apparatus. This air inlet pipe 21 is operatively connected with a casing 23 of a current fan and said casing is provided with alined shaft bearings 24 which accommodate the fan shaft 25. This fan shaft is prolonged or extended through a shaft bearing 26 and a stuffing box 27 on the enlarged end of the pressure inlet 15 which is adjacent to the fan casing 23 so that one end of the fan inlet 25 extends part way through the pressure inlet 15. Within the fan casing 23 is arranged a current fan 28 having a series of radial blades 29 secured to a hub which is mounted rigidly on the fan shaft 25 at the place where it passes through the fan casing 23 and this current fan is rotated by the impingement of the inflowing air current which is drawn through the fan casing 23 by the suction due to the action of the injector device forming a part of the generator and receiving the high pressure motive fluid from the reservoir chamber 3 of said generator. The fan casing 23 is provided on opposite sides of the chamber which receives the current fan 28 with the partitions 30, 31 which are suitably secured in place within the fan casing parallel to the side walls thereof one of said partitions forming with one wall of the fan casing an air inlet chamber 32 and the other partition forming with the opposite wall of the fan casing an exhaust chamber 33. Atmospheric air is supplied to the chamber 32 by inlets 34 in one wall of the fan casing and the air from the chamber 32 is supplied to the fan chamber by a plurality of ports 35 which are formed in the partition 30 on one side of the rotary current fan. In the partition 31 on the opposite side of the current fan are provided a plurality of ports 36 which establish communication between the fan chamber 33 and the exhaust chamber 33 and with this exhaust chamber 33 communicates the air pipe 21 that conveys the current

of air from the fan casing to the chamber of the air inlet shell 4.

On that portion of the fan shaft 25 which is contained within the pressure shell 15 is secured a propeller fan 37 having its blades arranged spirally on the fan shaft 25 and extending in a general longitudinal direction of said shaft and this propeller fan 37 may be set to lie in a plane with its longitudinal axis at right angles to the plane of the current fan 28 the blades of which are radial to the fan shaft. The propeller fan 37 has its spiral blades extending across a port between the combining chamber 12 and the pressure shell 15 and this propeller fan is rotated by the shaft 25 in the chamber of the pressure shell so as to expel the commingled current of motive fluid and air from the generator and in a measure augment the pressure of the motive fluid.

A pressure pipe 38 extends from the shell 15 to the lower part of the reservoir chamber 3 and this pipe conveys the motive fluid from the generator combining devices to the reservoir chamber for storage in the latter until the pressure of the motive fluid is increased by the combination of the atmospheric air therewith to such an extent as to bring the motive fluid to a point where it may be advantageously employed in the performance of useful work. During the operation of the charging of the reservoir chamber 3 and of augmenting the pressure of the motive fluid to bring the latter up to the point where it may be used advantageously the motive fluid is prevented from passing from the generator by an automatic vent valve 39, the shell 40 of which is coupled or united to the shell 15 at the point beyond the communication of the pressure pipe 38 with said shell 15. This vent valve shell has a valve seat 41 upon which the slidable vent valve 39 is normally pressed by a spring 42, the tension of which may be regulated by a screw 43 and from this vent valve leads a circulating pipe 44 which is adapted to convey the motive fluid to a distributing or circulating system from which the motive fluid may be taken to operate suitable translating machines for ventilating purposes, etc.

In the operation of the apparatus thus far described the high pressure tank 16 is stored with motive fluid under an exceedingly high pressure from any suitable source of supply and to start the apparatus in action the valve 18 is opened to admit the fluid to the chamber 3 of the generator. This motive fluid rushes through the pipes or tubes 13 and the passage 10 the spiral ribs of which impart a whirling motion to the current of the motive fluid and this motive fluid escapes from the orifice or slit 11 into the combining chamber 12 with sufficient energy to create a suction through the air inlet cone 9 which it will be recalled has free communication with the outside atmosphere. This suction creates an inflowing current of air through the fan casing, the pipe 21 and the chambered air inlet 4 and the inflowing current of air rotates the current wheel 28 and elevates the valve 7 from its seat thus permitting the air current to pass through the cone 9 and be combined in the chamber 12 with the high pressure motive fluid. This motive fluid traverses the shell 15 and its passage through the latter is facilitated by the action of the expelling fan 37 and from the shell the current of motive fluid passes through the pipe 38 back to the reservoir chamber 3. This circulation in the generator is maintained until the motive fluid is augmented by the addition of atmospheric air to bring the pressure of such motive fluid up to a point where the motive fluid is sufficient to operate the vent valve 39 and the motive fluid may then pass through the pipe 44 to the translating device by which the pressure of the fluid may be converted into mechanical energy.

In the embodiment of the invention illustrated by Figs. 4 to 7 inclusive, I dispense with the high pressure charging tank 16 and in lieu thereof employ a heating furnace which serves as a medium for expand ng the initial supply of motive fluid obtained from a reserve storage dome forming one of the elements of the generator. The heating furnace embodies a closed chamber 45 which is situated in or contained directly within the reservoir chamber 3 of the generator and this furnace is primarily adapted for the consumption of carbonaceous fuel such as coal. This furnace chamber has an ordinary grate 46 which is supplied with air to support combustion from an air flue 47 having suitable doors 47^a which may be closed when the generator is in service; and with this closed chamber communicates a charging chute 48 adapted normally to be closed by a door 49 such charging chute extending outside of the generator shell 2 so as to provide for the introduction of fuel from time to time into the furnace chamber without permitting the motive fluid to escape from the generator. The furnace chamber is also equipped with an injector burner 50 one type of which consists in the employment of an internal cone 51 and an outer cone 52 adapted to supply respectively the gaseous products of combustion from the furnace chamber and the aeriform motive fluid from the reserve dome. A circulating pipe 53 is connected to the upper end of the closed furnace chamber and extends through the shell of the generator to the outside thereof and from this pipe 53 leads a branch pipe 54 which is connected to the internal cone 51 of the injector burner for the purpose of conveying to the latter the smoke and other gaseous products of combustion resulting from the burning of the carbonaceous fuel on the grate in the closed furnace chamber. The aeriform motive fluid is conveyed from the reserve storage dome 57 to the outer cone 52 of the injector burner by means of a pipe 58 which is suitably attached to the drum 51 and the burner cone 52 and its connecting pipe 58 contains a stop cock 59 and a pressure regulator 60, the latter being situated in the pipe 58 adjacent to the injector burner. The gas pipe 53 between the closed furnace chamber and the injector burner is equipped with a vent pipe 55 which may lead outside of the building if desired and in this vent pipe is a damper or valve 56 which serves normally to prevent the escape of the passage of the products of combustion to the vent pipe and to direct the same into the branch 54 leading to the injector burner 50. The reserve storage dome 57 is connected to or mounted upon the pressure shell 15 so as to communicate therewith and the motive fluid under high pressure is stored or contained partially within this dome thus providing a source of aeriform high pressure motive fluid sufficient to furnish the initial energy for the operation of the furnace in starting up the apparatus. The air contained within the reservoir chamber 3 is expanded by the energy of the furnace situated within said chamber and the motive fluid passes from

the chamber through the connecting pipe 61 which is attached to the generator shell 2 near its lower end so as to communicate with the chamber 3 and the upper end of this pipe 61 is arranged to discharge the motive fluid into the tapered annular chamber 10 between the cones of the injector. The connecting pipe 61 has a suitable stop cock or valve 62. The means for supplying the current of air to the chambered shell 4, the fan casing the current fan and the propeller fan, shown by Figs. 4 and 5 are identically the same in construction as in the apparatus represented by Fig. 1 but in said Figs. 4 and 5 I employ a pressure regulator 63 at one of the air inlets 34 to the air supply chamber of the fan casing.

The compressor or generator represented by Fig. 4 is operatively connected with a motor 64 which is supplied with the compressing motive fluid under high pressure by providing the supply pipe 65 which is attached to the reserve storage drum 57 and connected with the feed inlet 66 of the motor. The exhaust from the motor is not discharged into the atmosphere but in lieu thereof the exhaust pipe 67 is connected to the suction inlet 34 of the fan casing. I do not deem it necessary to specifically describe the construction of the motor 64 because the same forms the subject-matter of a separate application but attention is at this point called to the fact that the exhaust from the motor is returned to the generator by way of the current fan so that the motive fluid notwithstanding the reduction of its pressure may be regenerated by the combustion with the high pressure motive fluid in the generator due to the action of the injector devices therein.

In the adaptation of my invention represented by Fig. 8 the generator is shown as being connected with an out-going or supply main 70 by means of a connecting pipe 71 which is attached to the shell of the vent valve on the pressure shell 15, and this out-going main 70 constitutes one pipe of a circulating system that may be installed in a building or dwelling for the purpose of ventilating the latter and to furnish the energy to operate the translating devices or motors. This circulating system is represented by said Fig. 8 as having a series of discharge nozzles 72 adapted to supply the aeriform fluid to the various rooms or compartments within the building and from this circulating system leads pipe connections by which the compressed motive fluid may be conveyed to one or more motors or other translating devices 73, the exhaust from which is returned to another pipe connection of the circulating system. In lieu of taking the atmospheric air from the room or apartment in which the generator 1 may be located I may provide a fresh air inlet pipe 74 which extends to the outside of the building and is attached to one of the air inlets to the casing of the current fan.

In Fig. 9 of the drawings I have illustrated another adaptation of the invention in which a part of the gaseous products of combustion from the furnace chamber of the apparatus represented by Figs. 4 and 5 may be conveyed to a gas storage tank 75 thus adapting the gaseous products of combustion for the purpose of illuminating the building. The closed furnace chamber 45 has a gas pipe 76 connected to its upper end and this pipe extends to the gas tank 75. The delivery end of the pipe 76 has a goose-neck bend 77 which terminates in the water bath of the tank 75 so as to discharge the gaseous fluid into the tank and as the gas rises through this water bath it is cooled and washed to fit it for service as an illuminating medium. The pipe 76 is provided with a cock or valve 78 to cut off communication between the furnace and the gas tank and such tank has a water inlet pipe 81 and a water overflow pipe 82. The gas for illuminating purposes is conveyed from the storage chamber of the tank 75 by the supply pipe 79 which is suitably attached to the tank and in this off-bearing gas pipe is a valve 80 which is controlled automatically as by a spring to keep the gas under pressure within the tank and prevent its passage to the burner until the pressure attains a limit sufficient to overcome the resistance offered by the spring. The air necessary to support combustion at the injector burner of the furnace is supplied by the pipe 83 connected to the reserve storage dome and the outer cone of the said burner and said pipe 83 is equipped with a pressure regulator 84 that controls the pressure of the aeriform motive fluid which may be admitted to the injector burner. The gaseous fluid supplied to this injector burner is attained by the employment of a gas pipe 85 connected to the storage tank 75 and the inner cone of the injector burner and this pipe 85 has a suitable stop cock 86.

In Figs. 10, 11 and 12 of the drawing I have illustrated a circulating system adapted for use in connection with a force motor at a central station and to this force motor is connected a series of devices which form a part of the circulating system and which are supplied with a motive fluid from a number of generators 1 so that the combined energy of the series of currents from such generators 1 may be exerted upon the central station motor which in turn drives or impels a series of currents into another series of devices which may lead to a number of compartments, in a dwelling or to a number of buildings. The central station motor 87 is housed or contained within a suitable casing 87^a having bearings for a shaft 88 and on the ends of this shaft are propeller wheels 89 which operate in suitable compartments of the shell 87^2. The mains of the circulating system which lead from a series of generators 1 are connected at 90 and discharge to one of the propeller wheels 89 so as to rotate the forcing motor 87 and these currents under pressure are so delivered to the forcing motor 87 which discharges the motor fluid to the other propeller wheel 89 and the offbearing mains 91, said mains 91 leading to a number of buildings so as to supply the high pressure motive fluid thereto and enable said fluid to be utilized in the performance of useful work.

It should be stated that water is supplied to reservoir chamber 3—see Fig. 4—and may be maintained at the height indicated by transverse dotted line by any suitable provision of supply or inlet pipe, escape steam pipe, and regulating valves; also, suitable fire-brick, or other lining is provided in practice for the furnace or combustion chamber.

Having thus described my invention what I claim is—

1. In an air compressing apparatus a generator having a reservoir chamber and an injector member which has free communication with said chamber, an air chamber having a cone situated within the first named injector member and arranged to direct a current of atmospheric air to the current of high pressure motive fluid supplied to said injector member, and a propeller in the chamber

communicating with the injector device in combination with means for establishing an initial pressure of the motive fluid in the generator and a circulating pipe receiving the motive fluid from the propeller and discharging the same to the chamber of the generator, substantially as described.

2. In an air compressing apparatus a generator shell forming a reservoir chamber, a chambered air shell having a check valve, an injector having its members communicating respectively with the chambers of the generator and air shell, a supply pipe to the air shell, a fan casing to which the supply pipe is coupled, and a shaft carrying the current and propeller wheels, substantially as described.

3. In an air compressing apparatus, the combination of a generator shell having a reservoir chamber and a valved air chamber, a combining injector device having its members connected respectively to said reservoir and air chambers, a current fan in the conduit leading through the air chamber and adapted to be rotated by the air current turned by the suction created through the air chamber by the injector device, and a propeller fan situated in the chamber receiving the motive fluid from the injector devices and actuated by the current fan, substantially as described.

4. In an air compressing apparatus a generator having a reservoir chamber and an air chamber and a combining injector device having its members communicating with said chambers combined with a shell which receives the motive fluid from the injector device and a propeller wheel arranged in said shell for the purpose described, substantially as set forth.

5. In an air compressing apparatus the combination with the generator having a reservoir chamber for a motive fluid and an injector device, of an air fan casing provided with an air discharge member of said injector device and provided with perforated partitions forming a series of chambers within said fan casing, a shell receiving the motive fluid from the combining injector device of the generator, and a single fan shaft carrying a current fan and a propeller fan which are located, respectively in the casing and the shell, substantially as described.

6. In an air compressing apparatus the combination of a generator having a reservoir chamber and a combining injector, a furnace situated within the reservoir chamber of the generator, an injector burner discharging to said furnace, and means for supplying gaseous fuel and aeriform fluid to said furnace, substantially as described.

7. In an air compressing apparatus the combination of the generator having a reservoir chamber and a combining injector, a furnace situated in the reservoir chamber of the generator and having an injector burner, a reserve storage dome receiving the motive fluid from the generator and equipped with a pipe connection to the injector burner of the furnace, and means for supplying gaseous fuel to said injector burner, substantially as described.

8. In an air compressing apparatus the combination of a generator having a reservoir chamber and a combining injector, a reserve storage dome communicating with such generator, a furnace within the reservoir chamber of the generator, an injector burner discharging to said furnace, a return pipe connection coupled to the furnace, and to one member of the injector burner to convey the gaseous products of combustion from said furnace to said burner and a pipe connection from the reserve storage dome to the other member of the injector burner, substantially as described.

9. In an air compressing apparatus the combination of a generator having a combining injector and a reserve storage dome, a fan casing communicating with one member of the injector, a motor having its exhaust discharging to a port of the fan casing and a supply pipe connection between the reserve storage dome and the inlet port of the motor, substantially as described.

10. The combination with the generator having a combining injector of a current fan driven by the suction through the injector to create an inflowing current of air thereto and a propeller driven by the current fan and operating in the chamber which receives the motive fluid from the injector, substantially as described.

11. The combination with a generator, of a combining injector adapted to create a suction current of atmospheric air to be supplied to a member of said injector, and a rotary motor supplied with motive fluid from the generator and having its exhaust connected to the suction device of the combining injector, substantially as described.

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