

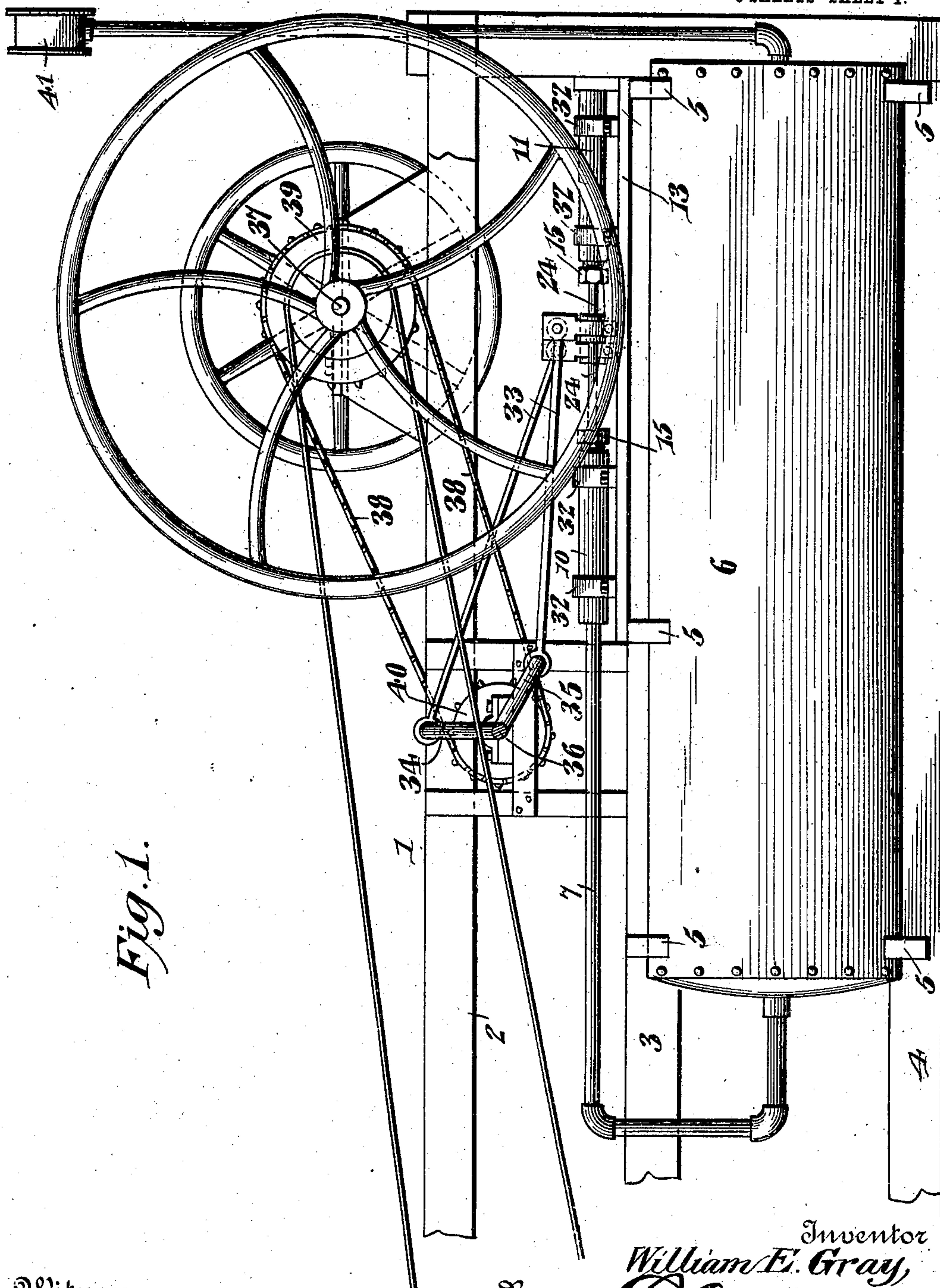
No. 847,470.

PATENTED MAR. 19, 1907.

W. E. GRAY.
AIR COMPRESSOR.

APPLICATION FILED JULY 24, 1906.

3 SHEETS—SHEET 1.



Witnesses
Jas. E. McEathran
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By

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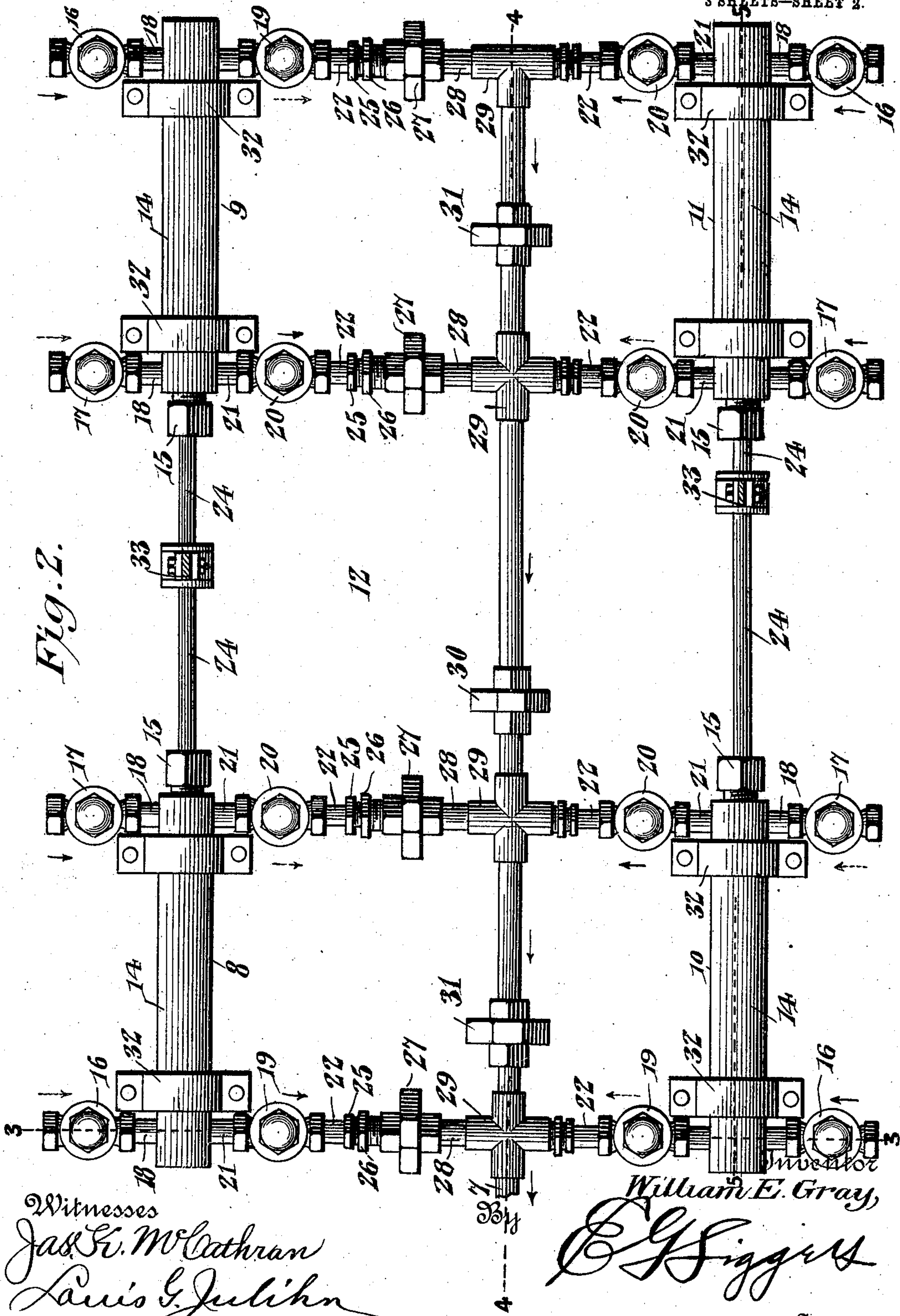
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3 SHEETS—SHEET 2.



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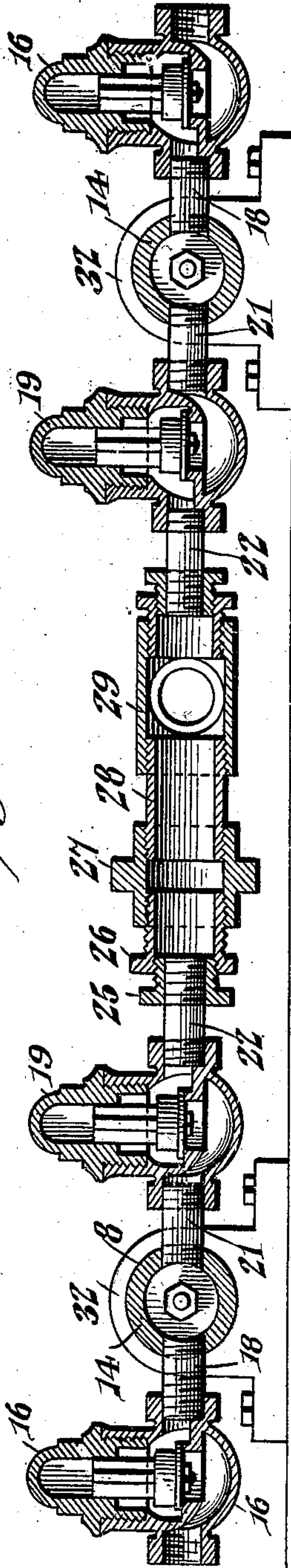
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3 SHEETS—SHEET 3.

Fig. 3.



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Fig. 4.

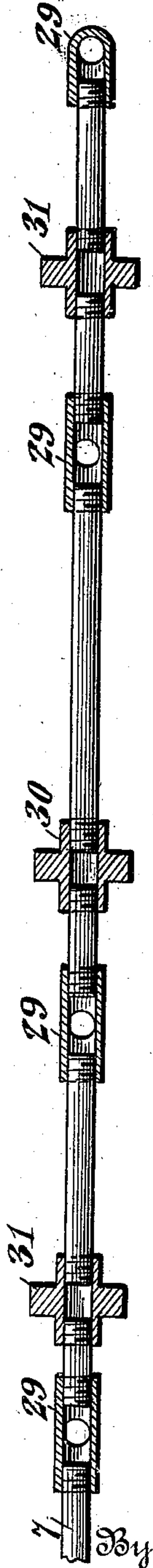
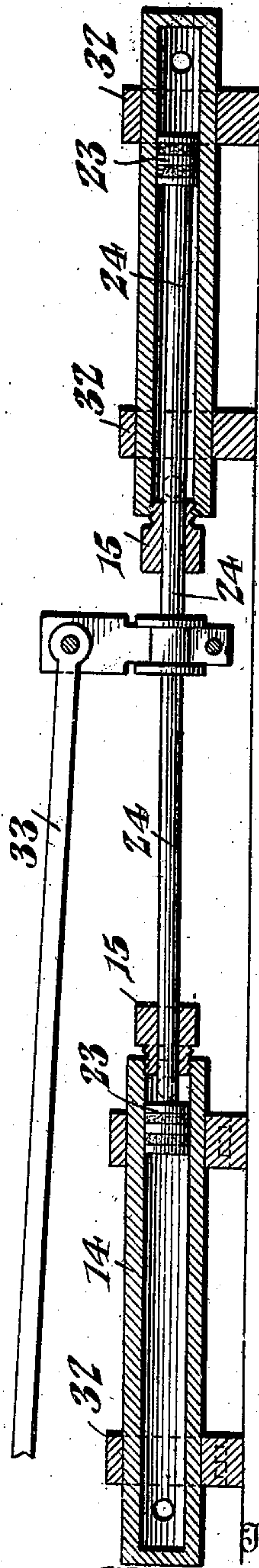


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM E. GRAY, OF VINTON, VIRGINIA, ASSIGNOR OF ONE-HALF TO
JOHN B. BEARD, OF VINTON, VIRGINIA.

AIR-COMPRESSOR.

No. 847,470.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed July 24, 1906. Serial No. 327,528.

To all whom it may concern:

Be it known that I, WILLIAM E. GRAY, a citizen of the United States, residing at Vinton, in the county of Roanoke and State of Virginia, have invented a new and useful Air-Compressor, of which the following is a specification.

This invention relates to an air-compressing apparatus, the object being to produce a simple, durable, and efficient apparatus of this character organized in a manner to permit the parts to be readily disorganized for transportation from one point to another and capable of being assembled or set up with facility and despatch and without the necessity for the employment of skilled labor.

Another object of the invention is to provide a novel arrangement of air pumps or compressing units driven by operating means common thereto and discharging continuously into the reservoir, from which the air is led to the point of use.

A still further object of the invention is to organize the several pumps and their connections, including a common discharge-pipe, in a rigid structure capable of being detached as a unit from the remaining elements of the apparatus to facilitate cleaning or repair without disturbing the adjustment or mounting of the remaining portion of the structure.

Other objects of the invention subordinate to those stated will appear during the course of the succeeding description of the illustrated structure.

In the accompanying drawings, Figure 1 is a side elevation of the apparatus with a portion of the frame structure and the driving-belt broken away. Fig. 2 is a plan view of the air-compressor frame detached. Fig. 3 is a section on the line 3 3 of Fig. 2 with certain of the parts in elevation. Fig. 4 is a similar view on the line 4 4 of Fig. 2; and Fig. 5 is still another view of this character, taken on the line 5 5 of Fig. 2.

Each part is indicated by the same numeral in all the views.

The apparatus is mounted in a frame structure 1, including suitably-connected top, bottom, and intermediate rails 2, 3, and 4. Retained by suitable cleats 5, supported from the rails 3 and 4, is an air-reservoir 6, into which air is discharged from a discharge-pipe 7, common to a group of air pumps or com-

pressing units 8, 9, 10, and 11, connected in a rigid structure, which for the sake of convenience will be referred to as the "compressor-frame." This compressor-frame (designated as a whole by 12) is mounted on a platform 13, supported above the reservoir 6 by the frame 1—as, for instance, upon two of the cleats 5. Each of the pumps or compressors 8, 9, 10, and 11 comprises a cylinder 14, closed at its outer end and provided at its inner end with a stuffing-box 15. At opposite ends of the cylinder, and preferably at the outer side thereof, are located induction-valves 16 and 17, connected to the cylinder by nipples 18. At the opposite or inner side of the cylinder, and likewise located at the opposite ends thereof, are education-valves 19 and 20, the casings of which are connected to the cylinder by nipples 21, similar nipples 22 being extended inwardly from the valve-casings.

The features described are common to the several pumps or compressors, and it may be stated that the several induction and education valves are check-valves of ordinary types and that they are of identical construction, as shown in Fig. 3, their opposite action with reference to the flow of air to and from the cylinder being governed by their relation to the latter. The cylinders at each side of the frame 12 are alined in order to permit their pistons 23 to be operated by a piston-rod 24 common to both. This arrangement will compel one piston to move outwardly while the other is moving inwardly, thus causing the air to be drawn into one cylinder while the other cylinder is discharging. It has been stated that all of the pumps or compressors discharge into the common discharge-pipe 7, and it will be observed by reference to Fig. 2 that the pipe 7 is located intermediate of the two side sections of the compressor-frame and is rigidly connected with the several cylinders by means of those connections whereby the cylinders and discharge-pipe are placed in communication.

At one side of the frame the nipples 22 are connected by reducers 25 and 26 to unions 27, connected by short pipe-sections 28 to angle-fittings 29 in the discharge-pipe 7. By means of the unions 27 the two side sections or sets of cylinders are detachable one from the other in order to facilitate trans-

portation, storage, and repair. Ordinarily in taking down the apparatus it is preferable to leave the discharge-pipe and the cylinders at one side of the frame connected up. For this reason the unions are not duplicated at the opposite side of the supply-pipe, but the angle-fittings are directly connected to the nipples 22 by the reducers. However, it will be obvious that if it is desired to disconnect both side sets of cylinders from the discharge-pipe this may be done by unscrewing the unions at one side and the reducers at the opposite side of the discharge-pipe. It is also desirable to so organize the frame that the end sections thereof, comprising a pair of cylinders and their connections, may be disconnected. This end is attained by forming that portion of the discharge-pipe extending between the two intermediate angle-fittings 29 in two sections, connected by a fitting or coupling 30. By unscrewing this coupling and by removing the stuffing-boxes 15 at one end of the frame the end sections are easily drawn apart until completely separated, attention being directed to the fact that by means of the various connections thus far described either side section of the frame or either end section thereof may be removed from the support or platform 13 without disturbing the mounting of the other frame-section. The discharge-pipe is also formed in sections between the end fittings and those adjacent thereto and is connected by similar couplings 31, so as to facilitate a more complete disorganization of the apparatus and to necessitate the removal of the least possible number of parts in the event of derangement or obstruction of the system of conduits. It will thus be seen that while the group of cylinders and their connecting-conduits and the discharge-pipe are assembled in a rigid frame structure which can be displaced or replaced as a unit it is nevertheless possible to detach any single pump or compressor or either a side or end section including a pair of cylinders, together with their connections.

The compressor-frame is detachably secured to the frame 1 of the apparatus by keepers 32, located adjacent to the opposite ends of each pump-cylinder and bolted or otherwise detachably secured to the platform 13. The keepers 32 may be formed integral with the cylinders, but are preferably formed separate therefrom and embrace the same, as shown in Figs. 3 and 5. It will be noted that the keepers 32 are applied to each cylinder and that while they hold the entire frame as a unit any cylinder or cylinders may be independently released when it is desired to detach only a portion of the apparatus without removing the remaining portion of the structure.

The piston-rods 24, each of which, as heretofore stated, is keyed to a pair of cylinders, are connected, by means of pitmen 33, with

the cranks 34 and 35 of a crank-shaft 36, journaled in suitable bearings supported by the frame 1. The cranks 34 and 35 are disposed in angular relation, as shown, to avoid dead-centers—that is to say, the angular disposition of the cranks makes it impossible for both piston-rods to reach their stroke limits at the same time, so that the flow of air through the discharge-pipe is necessarily continuous. The crank-shaft 36 is driven from a power-shaft 37, belted or otherwise connected to a suitable source of power—as, for instance, a motor (not shown)—and geared to the crank-shaft by means of a sprocket-chain 38, passed around sprockets 39 and 40 on the power-shaft 37, and the shaft 36, respectively.

The reservoir 6 is equipped with the usual pressure-gage 41.

It is thought that from the foregoing the construction and operation of my compressing apparatus will be clearly comprehended; but while the illustrated construction is at this time thought to be preferable I wish to be understood as reserving the right to effect such changes, modifications, or variations thereof as may come fairly within the scope of the protection prayed.

What I claim is—

1. In an air-compressing apparatus, a compressor-frame comprising a straight central discharge-pipe disposed longitudinally of the frame, straight lateral discharge-pipes disposed transverse to the frame at opposite sides of the central pipe and each having separate connection therewith, pump-cylinders disposed longitudinally of the frame at the respective corners thereof, each cylinder having each end of its inner side connected to a separate lateral pipe, an outlet-valve in each lateral pipe, inlet-valves located at each end of each pump-cylinder at the outer side thereof, and pistons within the cylinders, the several discharge-pipes and pump-cylinders being located throughout in the same horizontal plane to produce a flat rigid self-contained frame structure.

2. In an air-compressing apparatus, a compressor-frame comprising a straight central discharge-pipe disposed longitudinally of the frame, straight lateral discharge-pipes disposed transverse to the frame at opposite sides of the central pipe and each having separate connection therewith, pump-cylinders disposed longitudinally of the frame at the respective corners thereof, each cylinder having each end of its inner side connected to a separate lateral pipe, an outlet-valve in each lateral pipe, inlet-valves located at each end of each pump-cylinder at the outer side thereof, and pistons within the cylinders, the several discharge-pipes and pump-cylinders being located throughout in the same horizontal plane to produce a flat rigid self-contained frame structure and the central and

lateral discharge-pipes each being made up of separable sections.

3. In an air-compressing apparatus, a compressor-frame comprising a straight central discharge-pipe disposed longitudinally of the frame, straight lateral discharge-pipes disposed transverse to the frame at opposite sides of the central pipe and each having separate connection therewith, pump-cylinders disposed longitudinally of the frame at the respective corners thereof, each cylinder having each end of its inner side connected to a separate lateral pipe, an outlet-valve in each lateral pipe, inlet-valves located at each end of each pump-cylinder at the outer side thereof, and pistons within the cylinders, the several discharge-pipes and pump-cylinders being located throughout in the same horizontal plane to produce a flat rigid self-contained frame structure, each lateral discharge-pipe comprising separable sections

and the central discharge-pipe being made up of sections separable at a plurality of points to permit the separation of the frame into separate end sections or to permit the detachment of any one of the pump-cylinders without otherwise disorganizing the frame.

4. In an air-compressing apparatus, the combination with several pairs of double-acting pumps, of piston-rods each common to a pair of pumps, a crank-shaft provided with a plurality of cranks in angular relation, pitmen connecting said cranks to the piston-rods, and means for driving the crank-shaft.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM E. GRAY.

Witnesses:

S. S. BROOKE,
V. V. DOWDY.