E. K. A. BAUMANN.

GAS TURBINE.

APPLICATION FILED AUG. 22, 1910.

990,185.

Patented Apr. 18, 1911

2 SHEETS—SHEET 1.

Fig. 1.

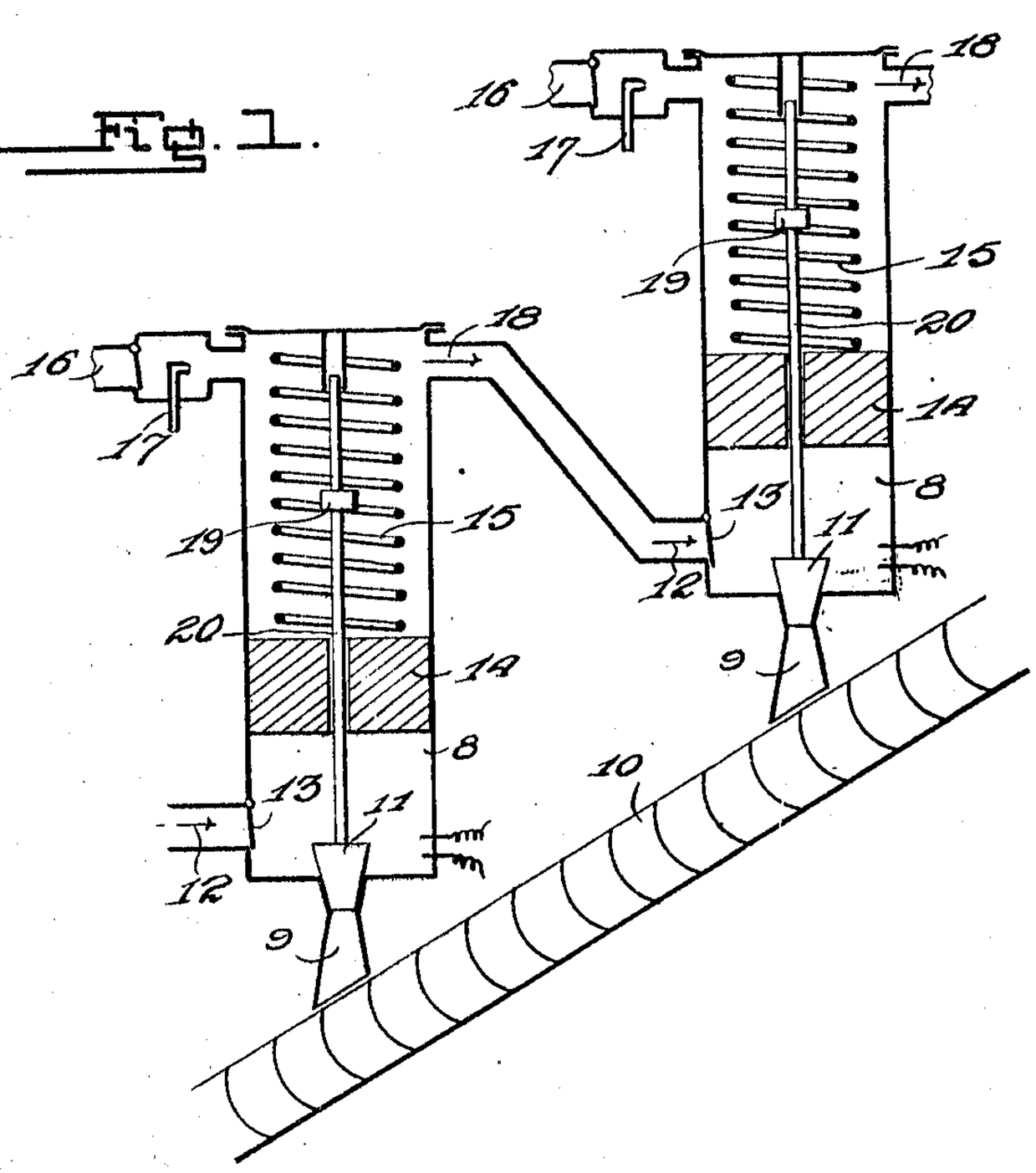
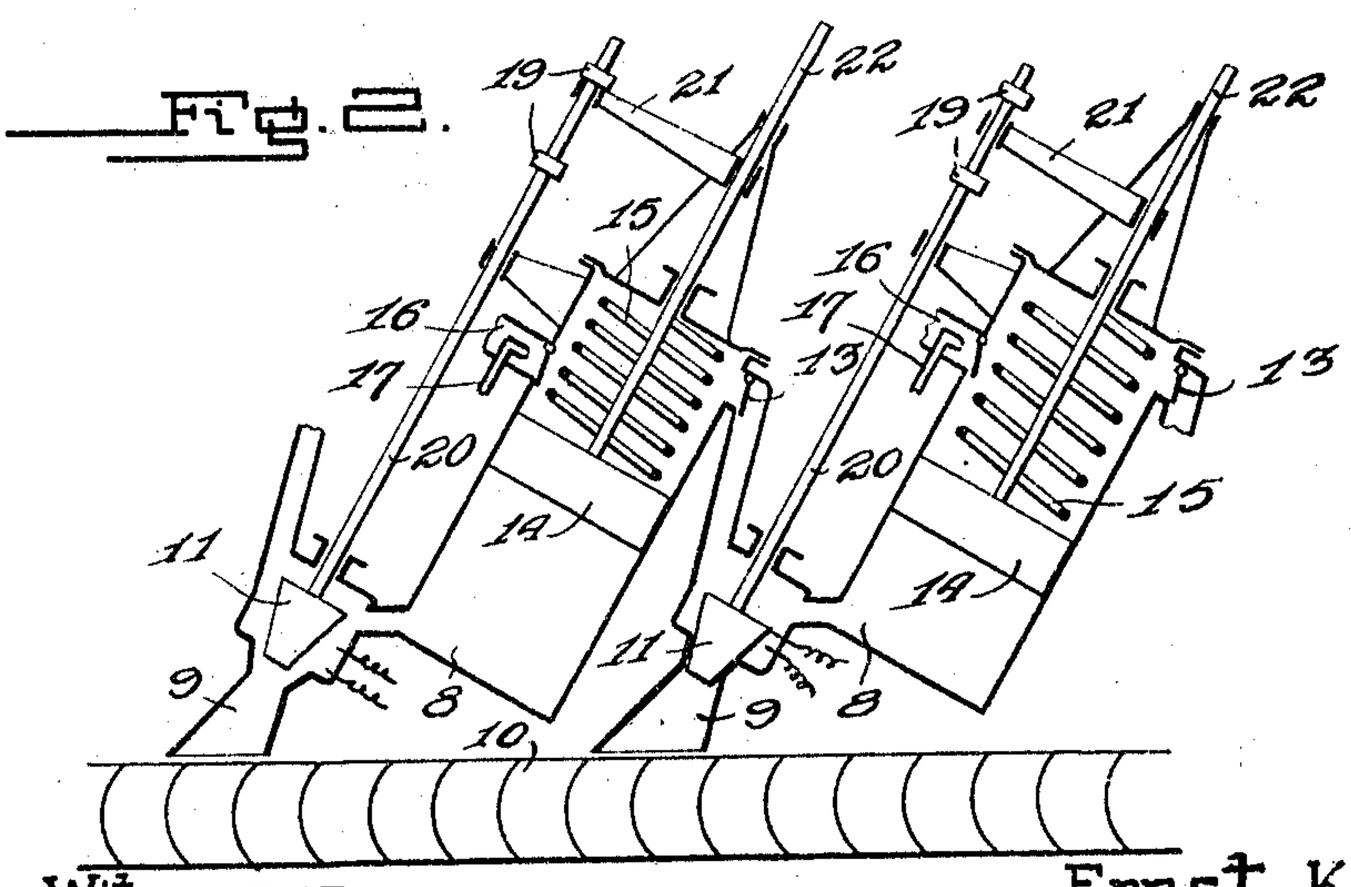


Fig. 2.



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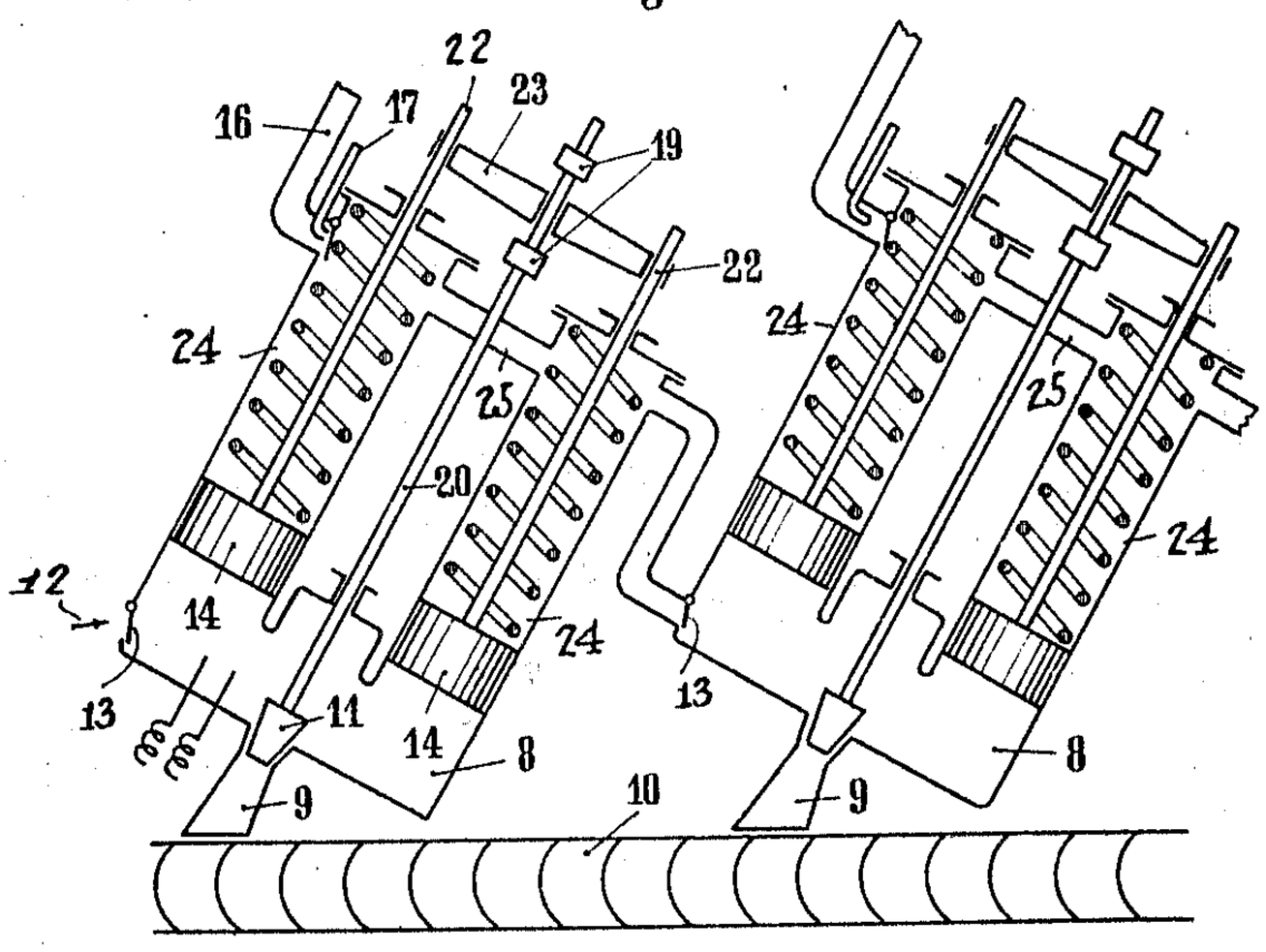
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ERNST KARL ALEXANDER BAUMANN, OF STUTTGART-OBERTÜRKHEIM, GERMANY, ASSIGNOR OF ONE-HALF TO ERNST EMIL FREYTAG, OF ZWICKAU, SAXONY, GERMANY.

GAS-TURBINE.

990,185. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed August 22, 1910. Serial No. 578,394.

To all whom it may concern:

Be it known that I, ERNST KARL ALEXANDER BAUMANN, a subject of the German Emperor, residing at 8 Bergstrasse, Stuttgart-Obertürkheim, Germany, have invented certain new and useful Improvements in and Relating to Gas-Turbines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to gas turbines of the class in which use is made of the explosion taking place under one of the pistons of the explosion chamber for preliminarily compressing the mixture for the next explosion while the admission into the turbine only takes place after explosion and partial expansion. Various methods have already been proposed for carrying out this system of working, such for instance as the construction of a radial turbine with inner admission passages in which the explosion chamber adjoining the admission inlet was formed into a compressor piston or a construction having two pistons forming differential pistons arranged on the same axis controlling a ring of nozzles belonging to a rotor also located on the same axis. Both constructions have this drawback, that the compressor pistons when fitted to turbines of considerable power, themselves take considerable power, so that comparatively slow working of the compressor and consequently flow of the gas can take place with long intervals between each flow. In addition to this the valve motions with these constructions must be controlled direct from the moving piston rendering the regulation of the preliminary compression difficult.

According to the present invention a large number of compressor pistons are provided mounted around a rotor and these compression pistons also control the admission nozzles, as illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatical view showing a plurality of coöperating cylinders, containing explosion and compression chambers, and valve actuating mechanism therein, embodying one form of the invention. Fig. 2 is a similar view showing a modified form of valve actuating mechanism. Fig. 3 is a similar view in which a plurality of coöperating twin cylinders are equipped with the valve actuating mechanism shown in Fig. 2.

Similar numerals refer to similar parts throughout the views.

At Fig. 1, 8 indicates the explosion chambers with a nozzle 9 through which the products of explosion are enabled to pass to the rotor 10 of the turbine. The nozzle 9 is normally closed by means of a valve 11.

Supposing that there is in the explosion chamber 8, mixture previously compressed, which has been admitted in the direction of the arrow 12, from the preceding compression chamber through the flap valve 13 by the rise of pressure; then on the ignition of the mixture the piston 14 is caused to rise against its own weight and the pressure of the spring 15 and thereupon the mixture which has been drawn in through the passages 16 and 17 to the back of the piston 14 by a previous descent is expelled in the direction of the arrow 18 to the next chamber. As soon however as the piston 14 reaches the projection 19 on the valve rod 20 of the nozzle valve 11 the valve is opened and allows the exploded mixture in the chamber 8, which has already been partly expanded, to pass through and act upon the turbine rotor 10 at a comparatively low temperature and low velocity.

The arrangement shown at Fig. 2 represents an arrangement resembling in principle that illustrated at Fig. 1 except that to avoid passing the valve rod 20 through the piston 14 the valve rod 20 as well as the nozzle 9 are placed outside the chamber 8 communicating with the nozzle. The opening and closing of the valve 11 of the nozzle 9 is effected by means of projections 19 which are actuated at the proper moment by the arm 21 fixed to the piston rod 22 of the piston 14.

In the arrangement shown in Fig. 3, twin cylinders 24 are employed having a common explosion chamber 8 and nozzle 9. The compression chambers are connected by a passage 25 and in this way, upon an explosion in the chamber 8, both pistons 14 act in unison to compress the mixture drawn through the passages 16 and 17 and force into the next cylinder substantially as described in connection with Fig. 1. The valve actuating mechanism is similar to that shown in Fig. 2 in that the opening and closing of the

valve 11 is actuated by the cross piece 23, secured to the piston rods 22, coming in contact with the stops 19, secured to the valve 20, upon the up and down movement of the piston 14.

What I claim and desire to secure by Letters Patent of the United States of America is:—

1. An explosive turbine comprising in combination, a rotor, a plurality of explosive cylinders communicating with each other and arranged to successively deliver charges to actuate said rotor, and spring actuated pistons arranged to be operated against said spring by explosion of the charges to compress a charge in the next adjacent cylinder.

2. An explosive turbine comprising in combination, a rotor, a plurality of explosive cylinders arranged to successively deliver explosive charges to actuate said rotor, spring controlled pistons in said cylinders dividing the same into explosion and compression chambers and arranged to be actuated against said spring by ignition of the charges on one side of the piston to compress a charge on the other side thereof, and means connecting the compression chamber of one cylinder with the explosion chamber of the next adjacent cylinder.

3. An explosive turbine comprising in combination, a rotor, a plurality of explosive cylinders communicating with each other and arranged to successively deliver charges to actuate said rotor, and pistons arranged within said cylinders adapted upon an explosion therein to compress a charge in the next adjacent cylinder.

4. An explosive turbine comprising in combination, a rotor, a plurality of explosive cylinders communicating with each other and arranged to deliver to said rotor, valves controlling admission of charges from said cylinders arranged upon an explosion in one side of the piston to compress a charge in the next adjacent cylinder.

5. An explosive turbine comprising in combination, a rotor, a plurality of explosive cylinders communicating with each other and adapted to deliver said rotor, valves controlling admission charges from said cylinders to actuate said rotor, and pistons within said cylinders arranged upon an explosion therein to compress a charge in the next adjacent cylinder, said valves being operatively connected to said pistons to open and close the former.

In testimony whereof, I affix my signature, in presence of witnesses.

ERNST KARL ALEXANDER BAUMANN.

Witnesses:
G. Lormanov,
Werner Freytag,
Friedrich W. Schreiner.