

No. 889,366.

PATENTED JUNE 2, 1908.

J. GREIS.
FURNACE.

APPLICATION FILED JAN. 23, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

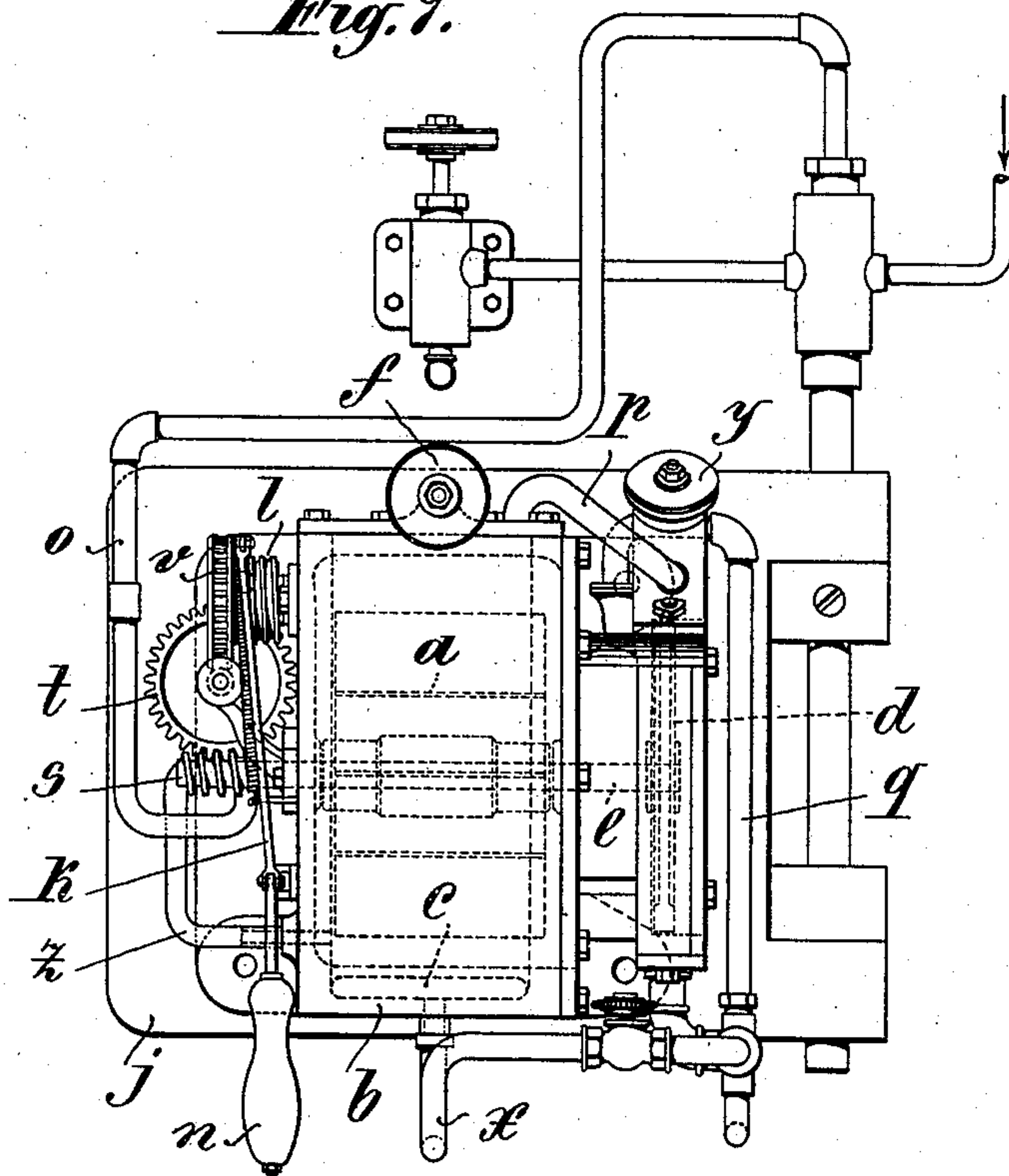
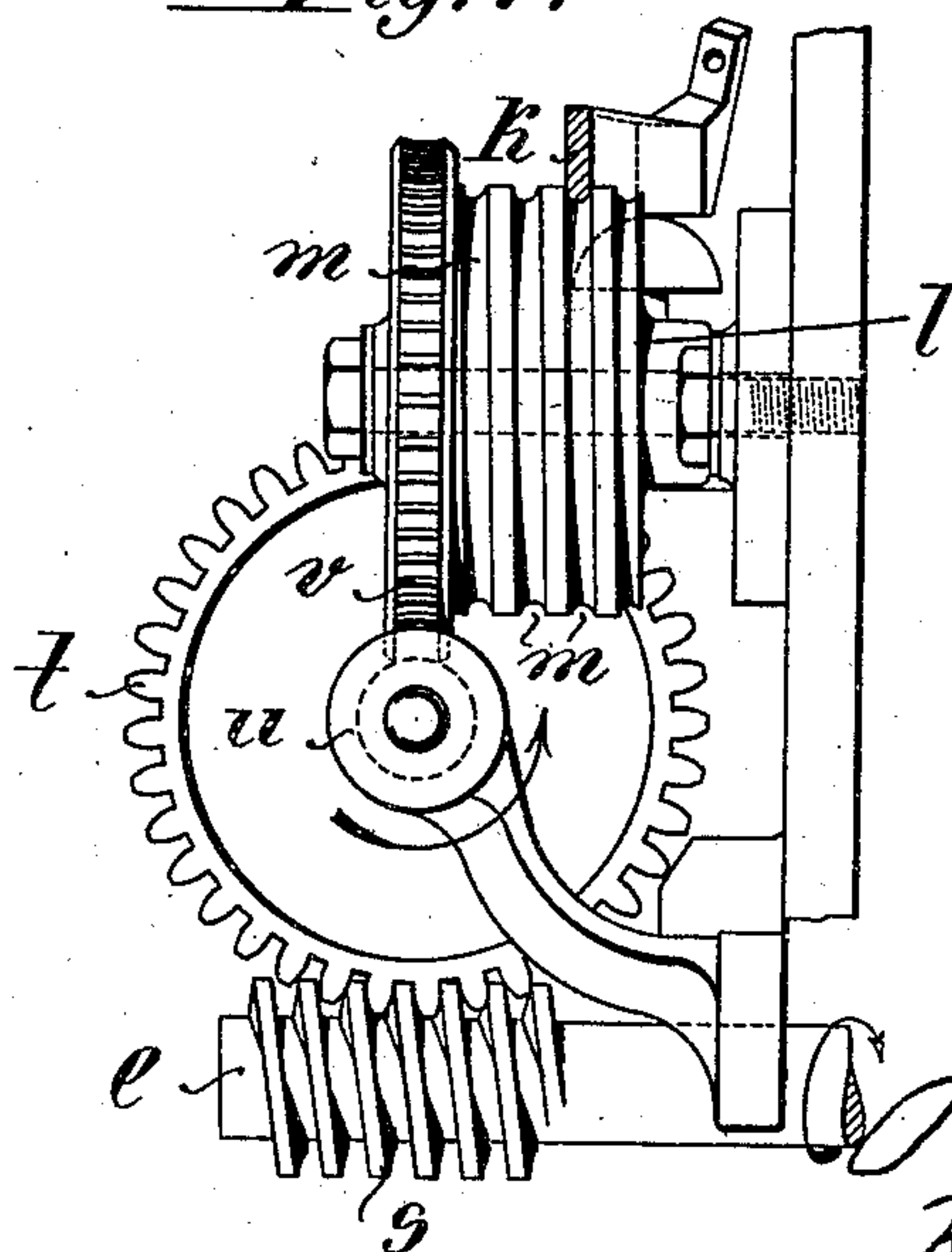


Fig. 4.



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3 SHEETS—SHEET 2.

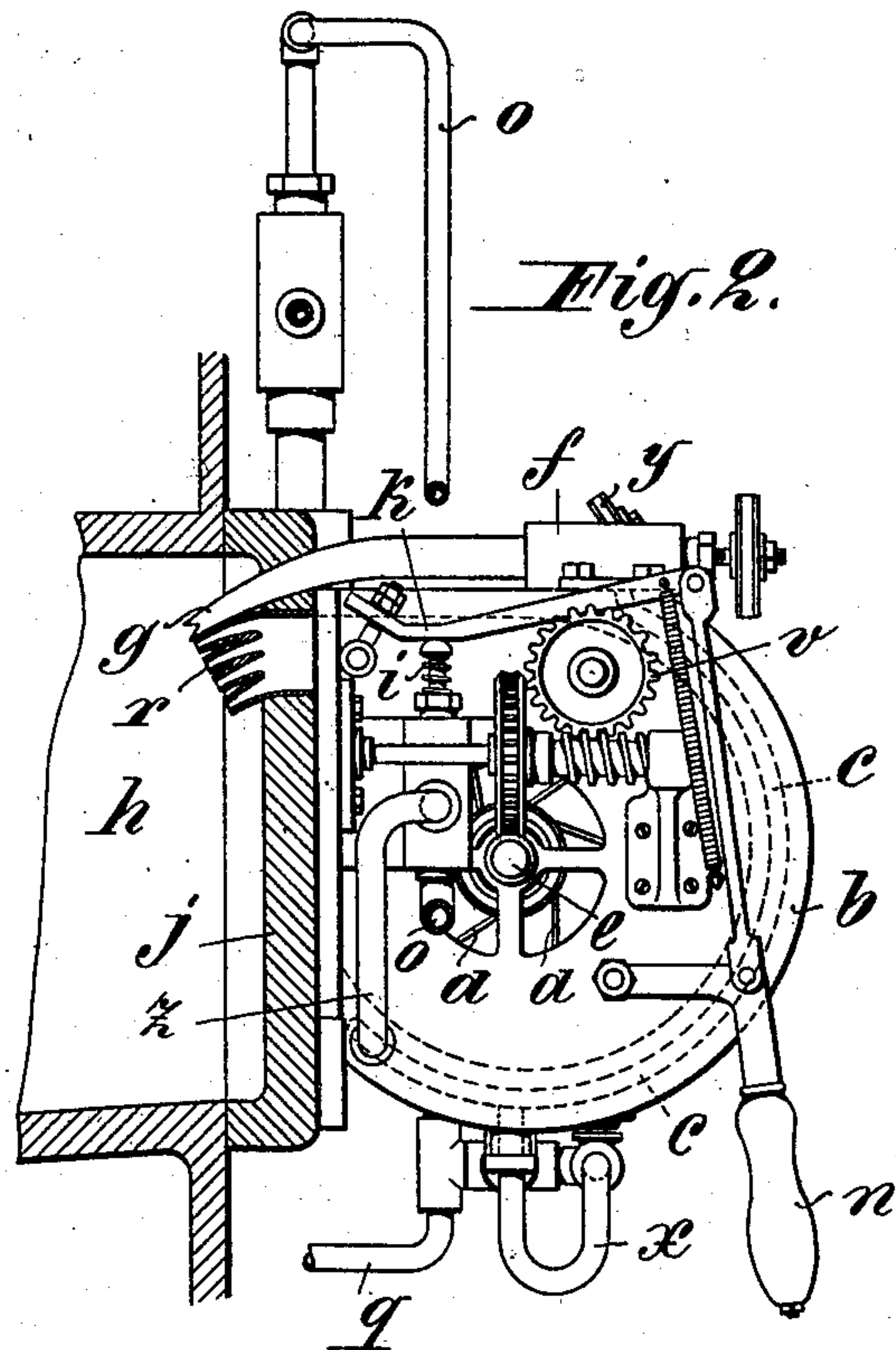
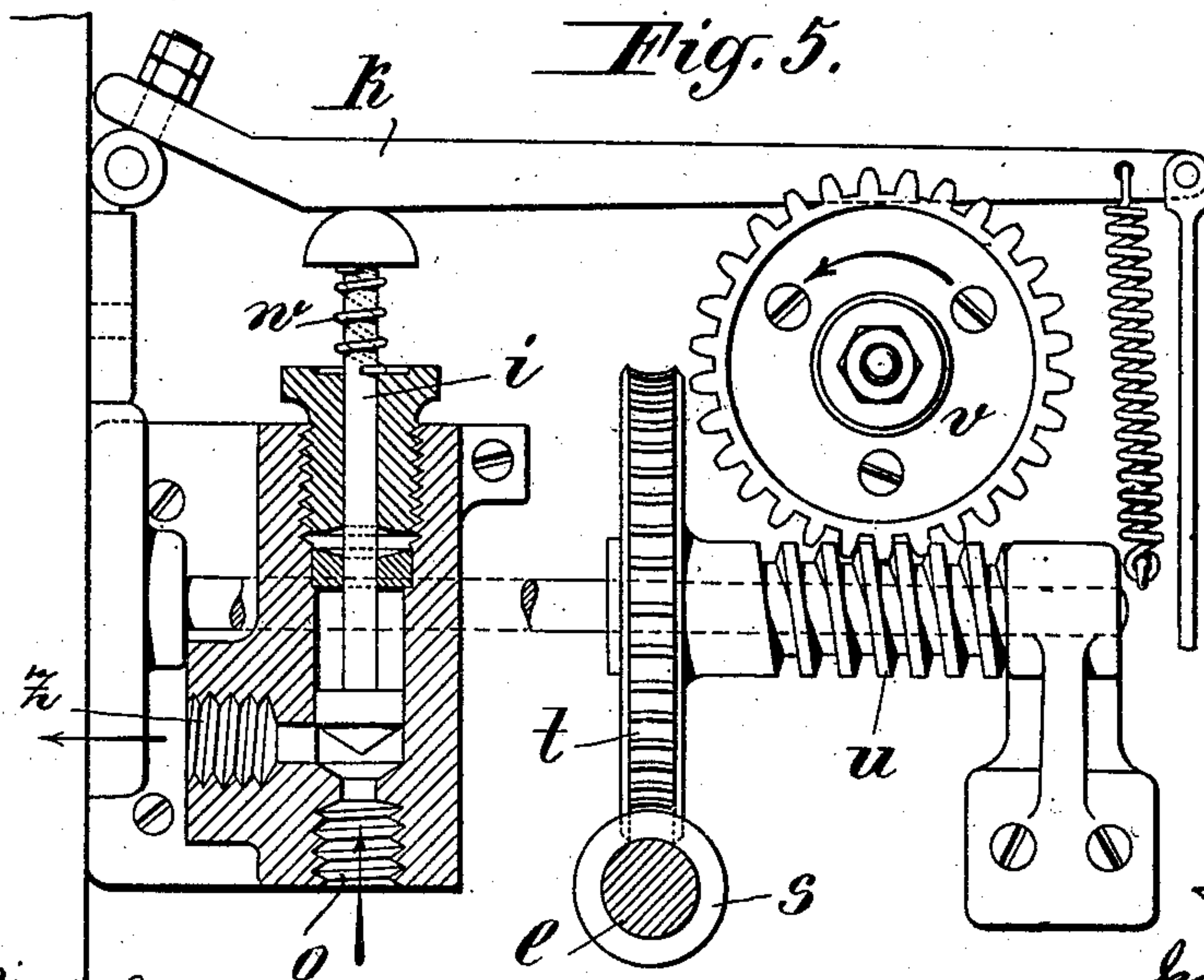


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 3.

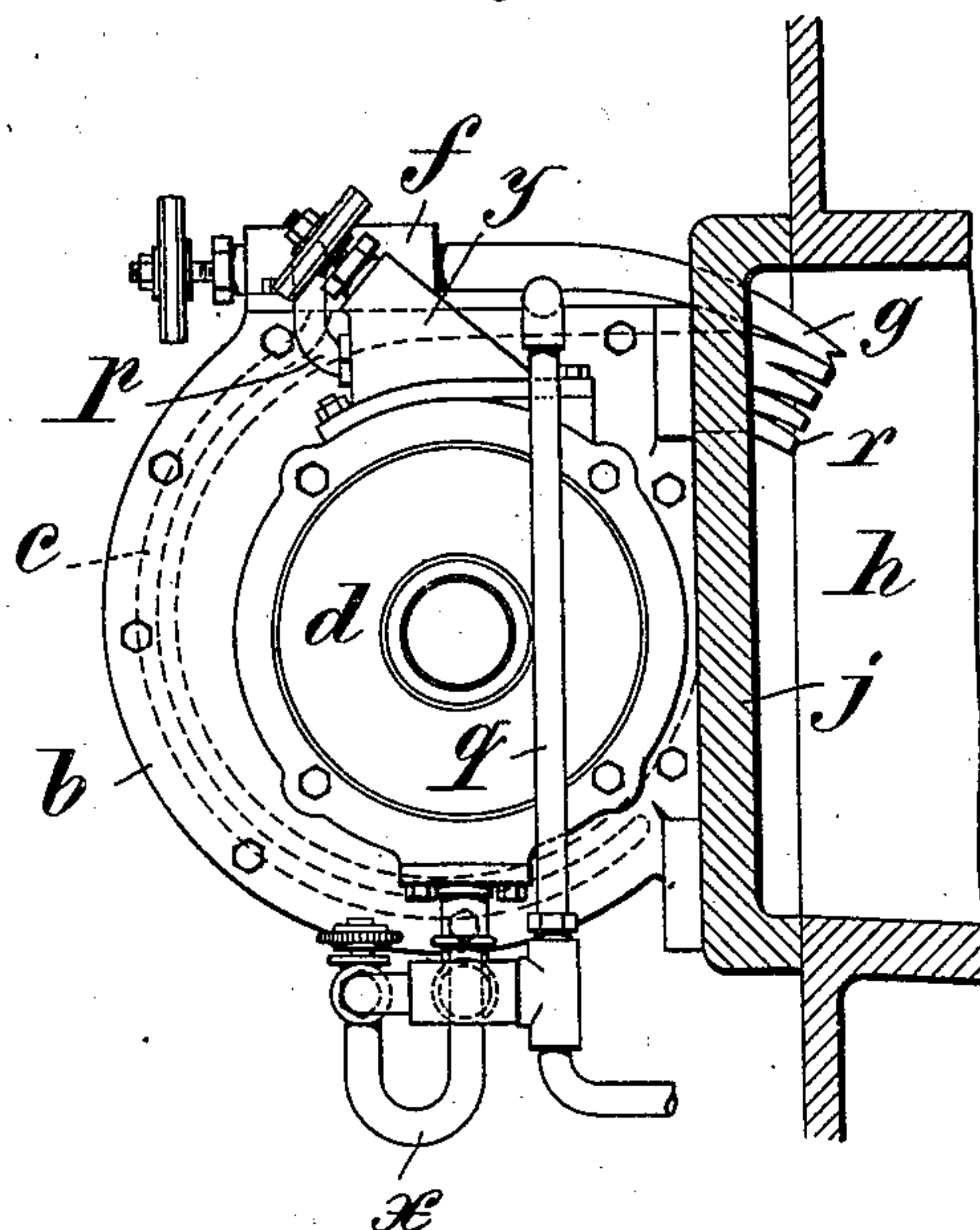
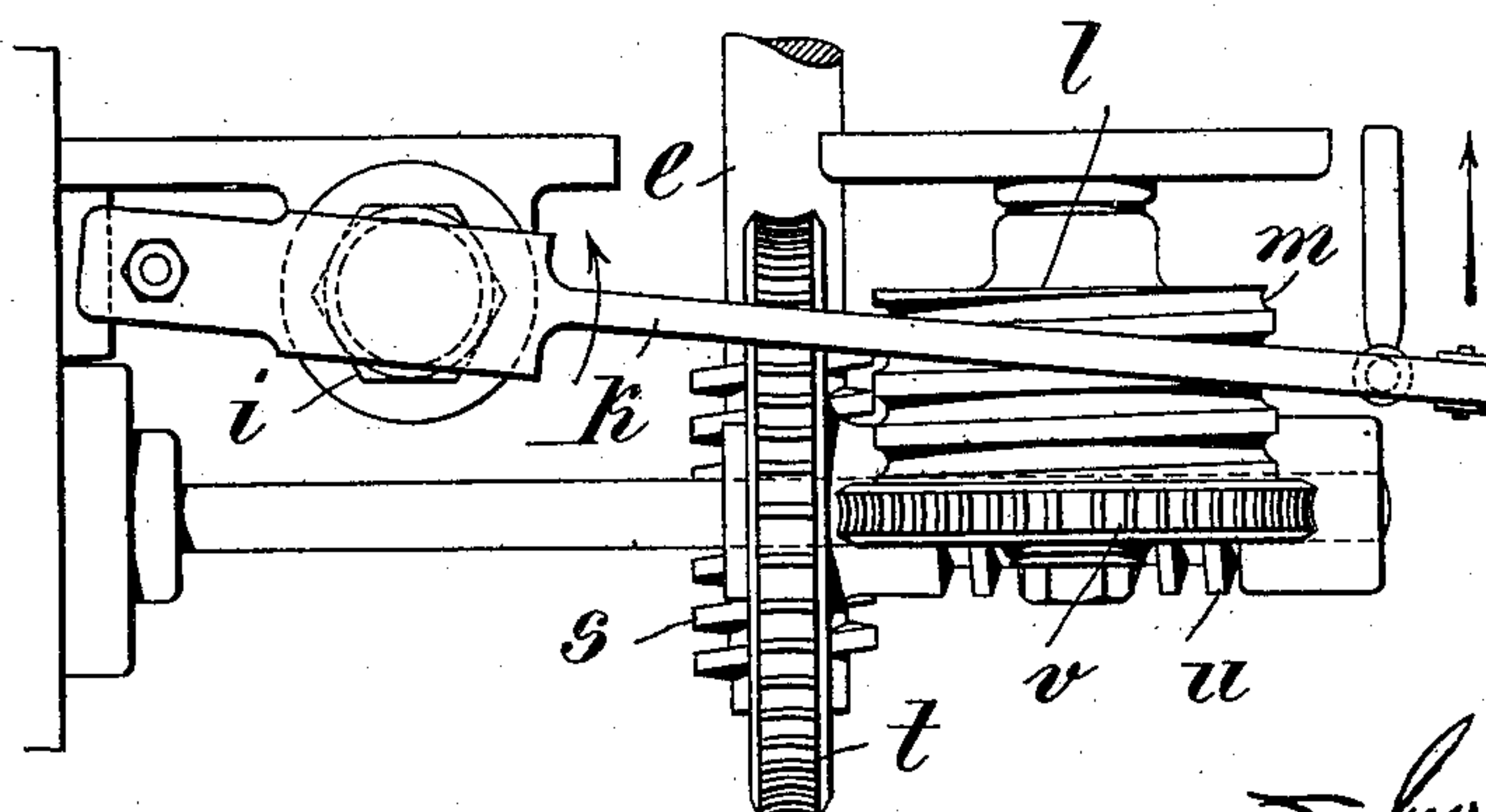


Fig. 6.



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UNITED STATES PATENT OFFICE.

JACOB GREIS, OF WIESBADEN, GERMANY.

FURNACE.

No. 889,366.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed January 23, 1907. Serial No. 353,651.

To all whom it may concern:

Be it known that I, JACOB GREIS, of Wiesbaden, a subject of the King of Prussia, and whose post-office address is No. 20 Walramstrasse, Wiesbaden, Prussia, German Empire, have invented new and useful Improvements in Furnaces, of which the following is a specification.

The present invention relates particularly to such devices for the introduction of air and steam through the fire-door of a furnace in which a fan or blower is driven by a steam turbine for the introduction of air.

The invention is based upon known devices arranged at the furnace-door, by which devices air is introduced through the furnace-door into the fire-chamber by a blower driven by a steam turbine, and substantially consists in the arrangement of means which make it possible to maintain the period during which the turbine is driven of the correct duration for the process of combustion in the furnace. For this purpose duplicate worm-gearing is connected with the shaft of the fan or blower, which shaft also carries the turbine, said worm-gearing driving a cylinder or drum provided with a screw-thread on which a lever which actuates the steam-admission valve is displaced. According in each case as this lever is set on one or another thread of the screw of the drum, the steam admission is cut off earlier or later. The steam-admission conduit is placed in the box or casing of the fan in order to preliminarily heat the air.

In the accompanying drawings Figure 1 represents a front elevation of the device. Figs. 2 and 3 represent side-elevations from the left hand side and the right hand side of Fig. 1 respectively. Figs. 4, 5 and 6 represent an end elevation, a side elevation and a plan view of the worm gearing and the admission valve on an enlarged scale.

The device consists of a blower or fan *a* and a fan-casing *b*, the latter being fastened on the fire-door *j* and provided with an inner steam channel *c*; it consists further of a steam turbine *d*, mounted on the same shaft *e* as the fan *a*, of a steam valve *f* for a steam nozzle *g* which enters into the fire-chamber *h* and of a steam-admission valve *i* (Fig. 5) which is controlled by means of a lever *k* from a worm-gear and a drum *l* provided with a screw-thread *m*. When the fire-door *j* is shut the mentioned lever *k* is raised by a handle *n* on to a thread *m* of the drum *l* whereby the con-

trolling valve *i* is opened. By this means steam can flow from a pipe *o*, which is in connection with the steam boiler through the valve *i* and a pipe *z* into the annular conduit or channel *c* which is arranged in the periphery of the casing *b* of the fan *a*, and flowing through said conduit preliminarily heats the air in the casing of the fan. One part of the steam goes from this conduit by means of a pipe *p* to the admission-nozzle *y* of the turbine *d* which drives the fan *a*, whereas the other part of the steam passes from the said conduit through the valve *f* into the steam nozzle *g* which leads into the fire-chamber *h*. The preliminarily heated air is blown by the fan *a*, driven as described, through an air-nozzle *r* which is arranged under the steam nozzle *g* on to the fire, and the steam from the steam nozzle mixes with the air from the air-nozzle above the fire.

The exhaust steam from the steam turbine passing through a pipe *q* may be conducted from below against the grate and may be utilized for cooling the grate. The condensed water which is formed by the steam in the casing of the fan may be led away through a conduit *x* by means of a suitable steam-trap, so that the steam conducted on to the fire remains dry.

A duplicate worm-gear is employed for regulating the time of working by means of the mentioned lever *k* and the drum *l* provided with a screw thread *m* in the following manner: A worm *s* which is situated on the main-shaft *e* of turbine or fan is rotated by the rotation of the turbine, said worm being in engagement with a wheel *t* mounted on a shaft, the latter again carrying a worm *u* which is in engagement with a wheel *v* which is connected with a barrel or drum *l*, the latter having a screw-thread *m* on its periphery. In this manner the drum provided with a screw-thread is set in rotation very slowly, with duplicate transmission, by the shaft of the turbine, as soon as the turbine runs.

When the fire-door *j* is shut, the above mentioned lever *k* is set by means of a handle *n* on a part of the thread *m* on the circumference of the drum, and thereby the controlling valve *i*, on the spindle of which valve the lever *k* presses, if it is not raised up, opens under the action of a spring *w*, so that steam is admitted to the turbine and the latter drives the fan. When the turbine runs, the duplicate worm-gear *s*, *t*, *u*, *v* is also ro-

tated and with it the drum *l* provided with the screw-thread *m*, so that the lever *k* slides in the thread of the drum, until it falls off at one end of the drum, and thereby closes the valve *i* again and stops the turbine, as well as the fan. The duration of the time, during which the fan works may be set to from one or two up to ten minutes according as the lever *k* is set on the last turn, or on the last but one turn of the thread on the drum, and so on.

When the fire-door is opened the controlling valve *i* shuts off the steam from the casing of the fan whilst a part of the steam may be conducted above the furnace-door as required by means of a valve of a steam nozzle on to the fire, whereby the development of smoke whilst stoking the fire is prevented in known manner.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a device of the character described, the combination with a furnace and its door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, an air nozzle adapted to discharge into said furnace, a communication from said fan to said air nozzle, means for supplying steam to said annular conduit and thus heating the air in the fan, and means for leading steam from said annular conduit to said turbine.

2. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, air and steam nozzles adapted to discharge into said furnace, a communication leading from the fan to the air nozzle, a communication leading from the annular heating conduit in the fan to the steam nozzle, a communication leading from said annular heating conduit to said turbine and means for supplying steam to said annular heating conduit.

3. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, an air nozzle adapted to discharge into said furnace, a communication from said fan to said air nozzle, means for supplying steam to said annular heating conduit and thus heating the air in the fan, means for leading steam from said annular conduit to said turbine and automatic means for discontinuing the supply of steam to said annular heating conduit after a certain interval of time.

4. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, air and steam nozzles adapted to discharge into said fur-

nace, a communication leading from the fan to the air nozzle, a communication leading from the annular conduit in the fan to the steam nozzle, a communication leading from said annular conduit to said turbine, means for supplying steam to said annular conduit and automatic means for discontinuing the supply of steam to said annular conduit after a certain interval of time.

5. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, an air nozzle adapted to discharge into said furnace, a communication from said fan to said air nozzle, means for supplying steam to said annular heating conduit, means for leading steam from said conduit to said turbine, a valve adapted to control the supply of steam to said annular conduit, a rotatable screw threaded drum, a valve control lever adapted to travel in and be operated by the threaded portion of said rotatable drum and means for imparting rotation to said drum.

6. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, air and steam nozzles adapted to discharge into the furnace, a communication leading from the fan to the air nozzle, a communication leading from the annular heating conduit in the fan to the steam nozzle, a communication leading from said annular heating conduit to said turbine, means for supplying steam to said annular heating conduit, a valve adapted to control the supply of steam to said annular heating conduit, a rotatable screw threaded drum, a valve control lever adapted to travel in and be operated by the threaded portion of said rotatable drum, and means for imparting rotation to said drum.

7. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit in the periphery of said fan, an air nozzle adapted to discharge into said furnace, a communication from said fan to said air nozzle, means for supplying steam to said annular heating conduit, means for leading steam from said conduit to said turbine, a valve adapted to control the supply of steam to said annular conduit, a rotatable screw threaded drum, a valve control lever adapted to travel in and be operated by the threaded portion of said rotatable drum and means for imparting rotation from the shaft of said turbine to said drum.

8. In a device of the character described, the combination with a furnace and furnace door; of a fan and its driving turbine mounted on said door, an annular heating conduit

in the periphery of said fan, air and steam
nozzles adapted to discharge into the fur-
nace, a communication leading from the fan
to the air nozzle, a communication leading
5 from the annular heating conduit in the fan
to the steam nozzle, a communication lead-
ing from said annular heating conduit to said
turbine, means for supplying steam to said
annular heating conduit, a valve adapted to
10 control the supply of steam to said annular
heating conduit, a rotatable screw threaded
drum, a valve control lever adapted to travel

in and be operated by the threaded portion
of said rotatable drum, and means for im-
parting rotation from the shaft of said tur- 15
bine to said drum.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

JACOB GREIS.

Witnesses:

FRITZ FLIEST,
MORITZ WETZEL.