

(No Model.)

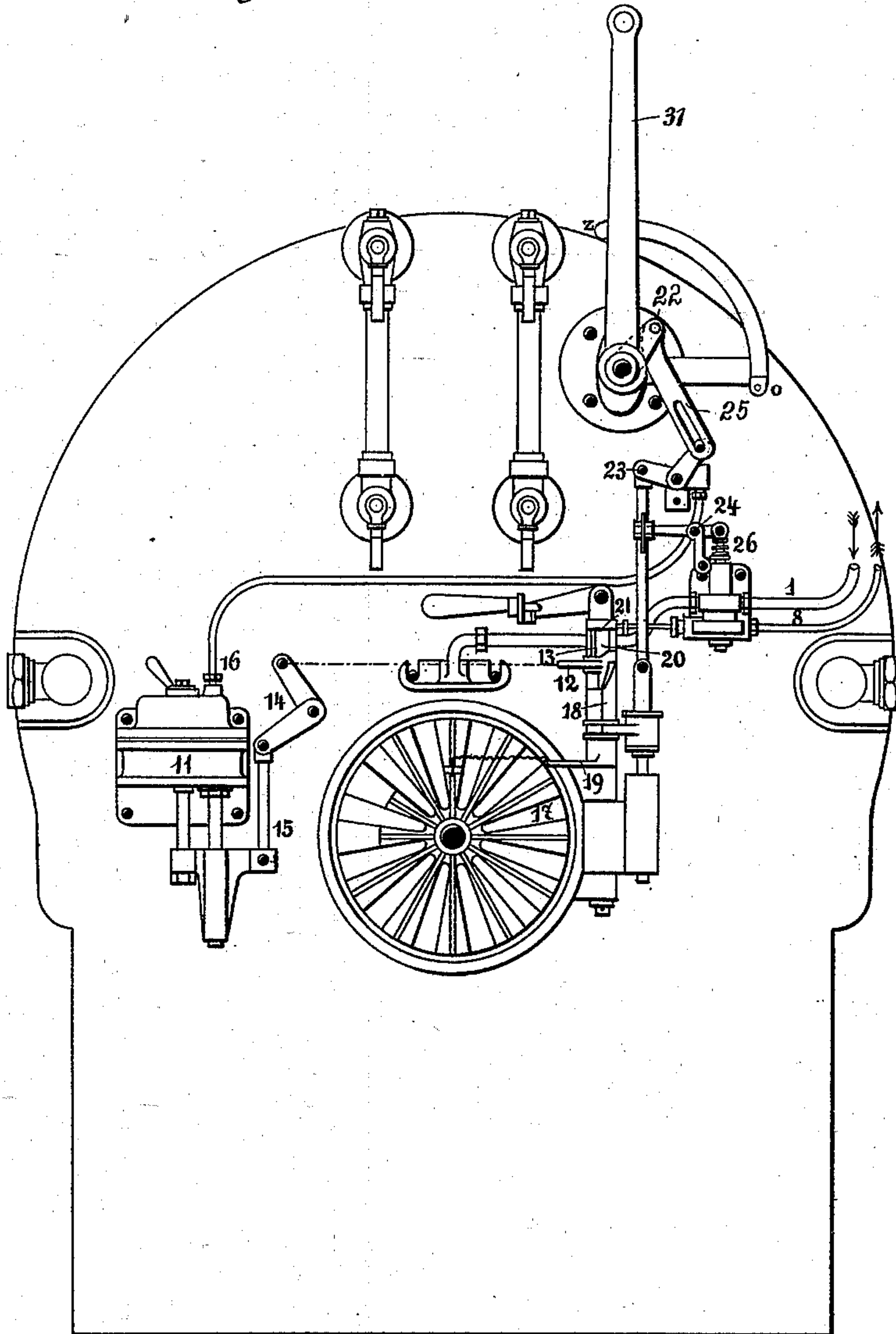
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T. LANGER.  
BOILER FURNACE.

No. 558,967.

Patented Apr. 28, 1896.

Fig. 1



Witnesses:  
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(No Model.)

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Fig. 2

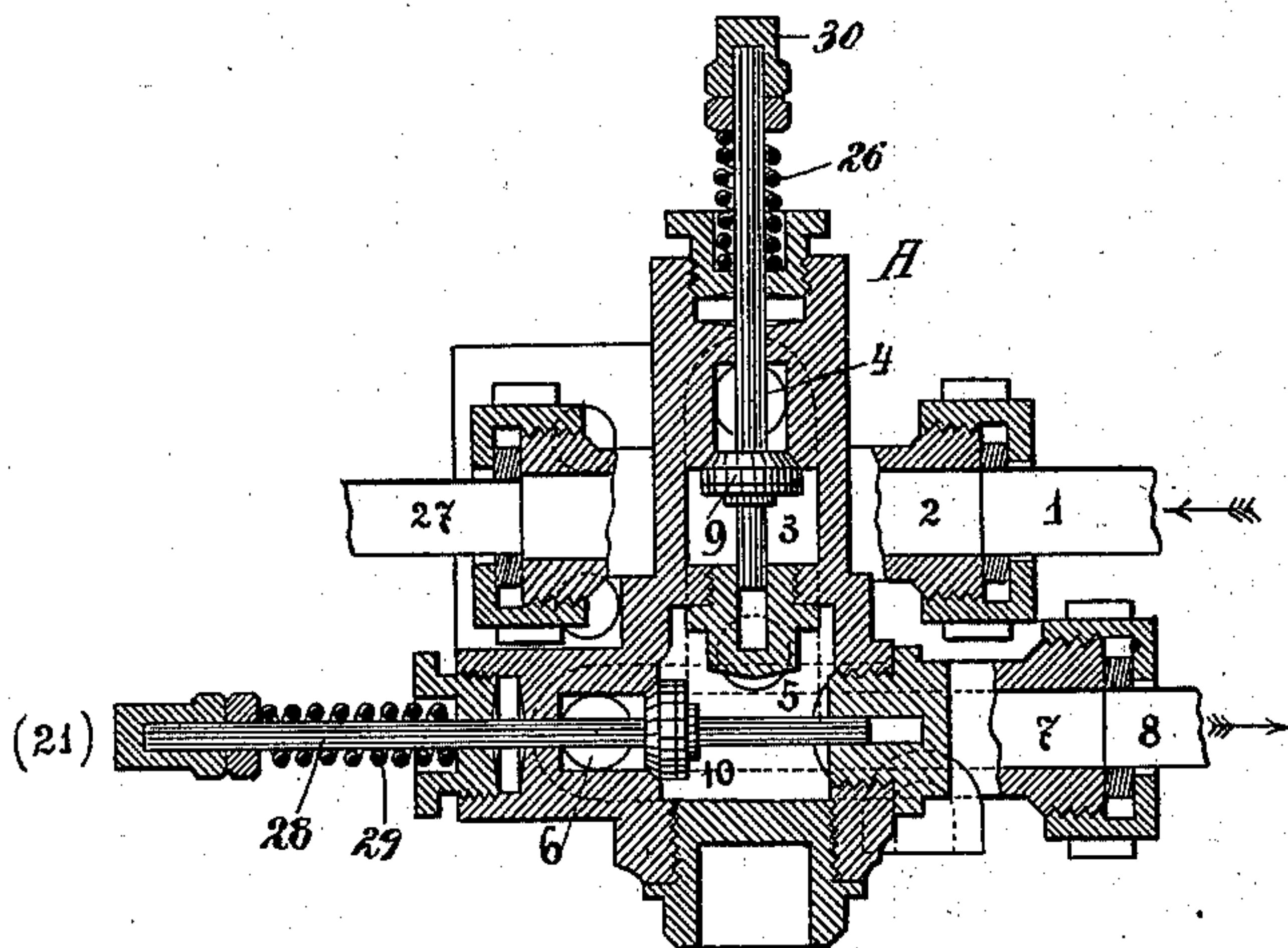


Fig. 3

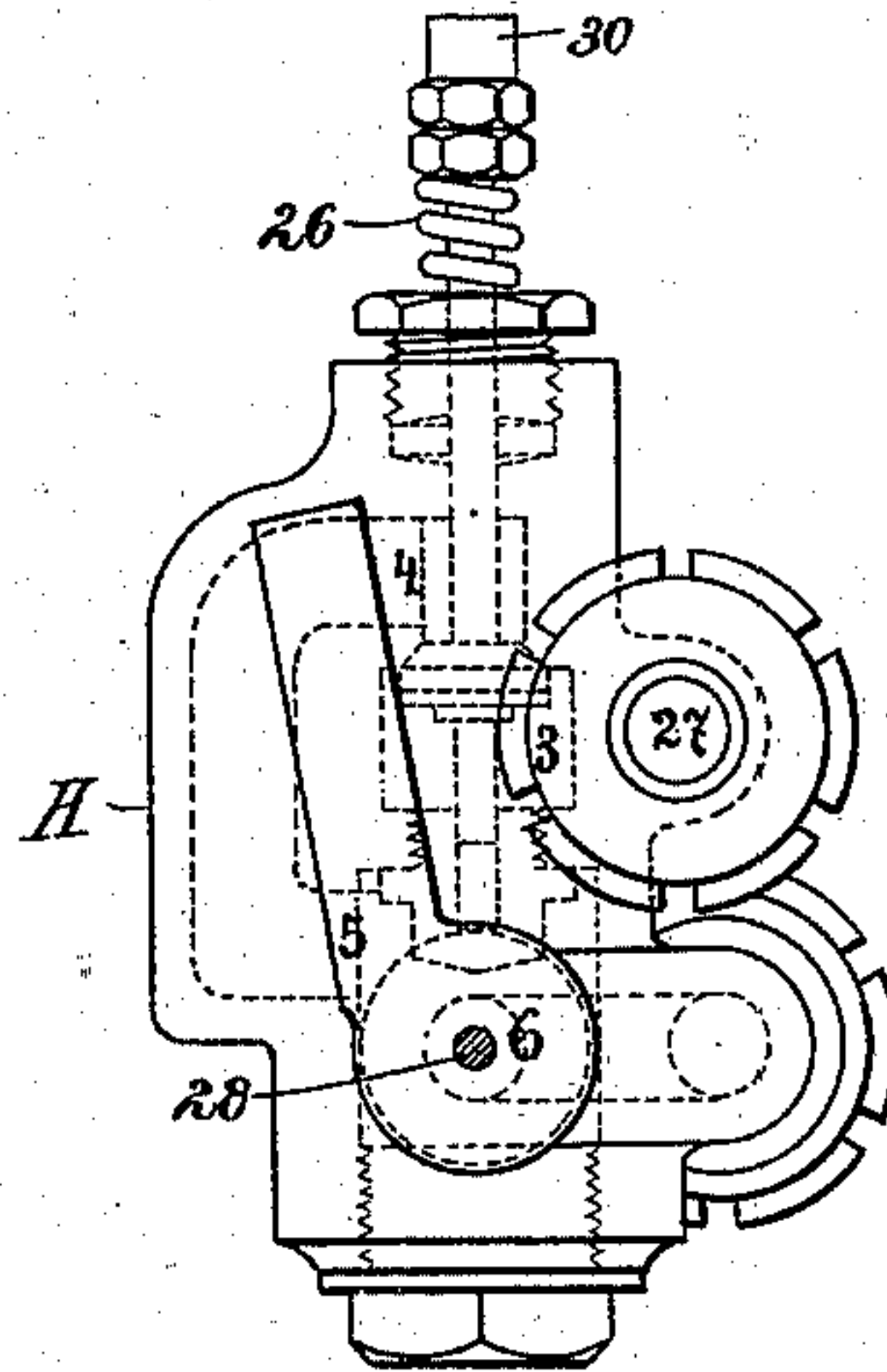
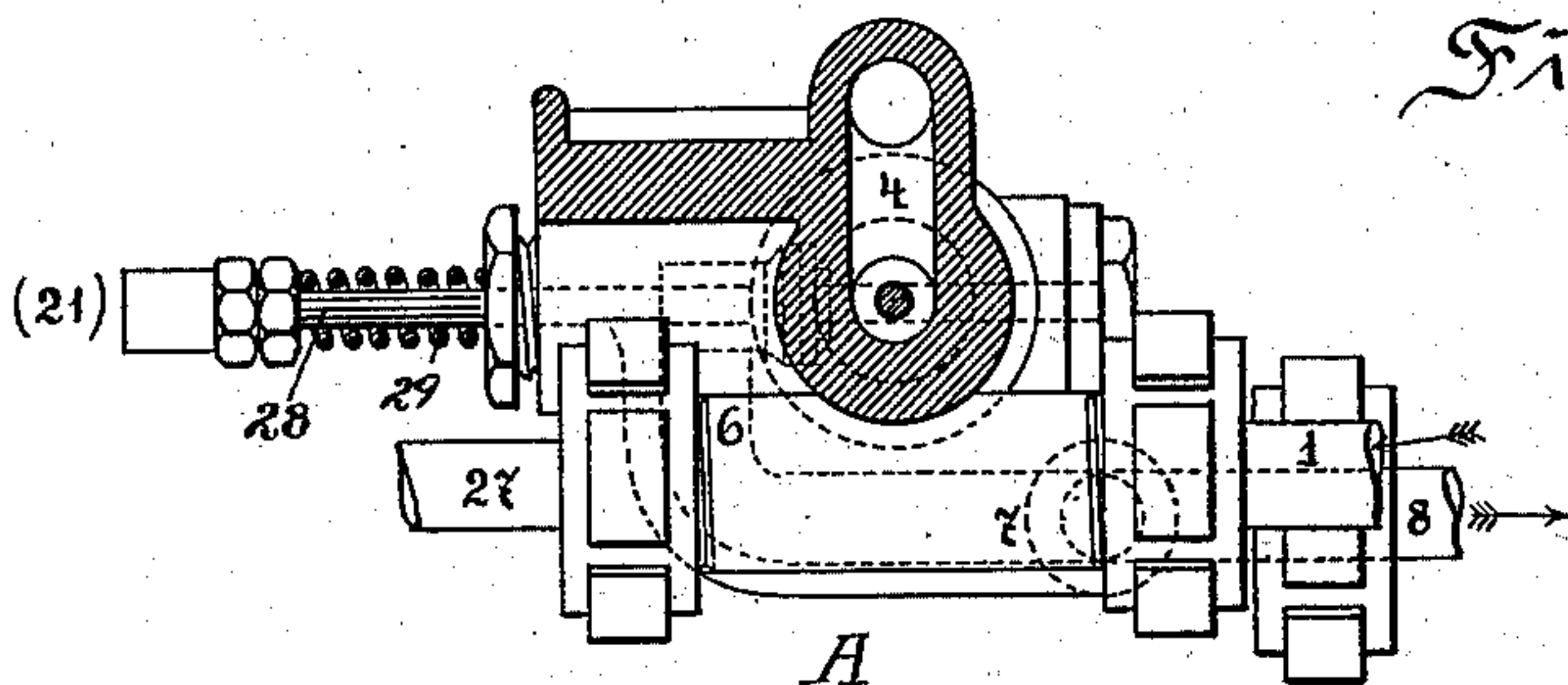


Fig. 4



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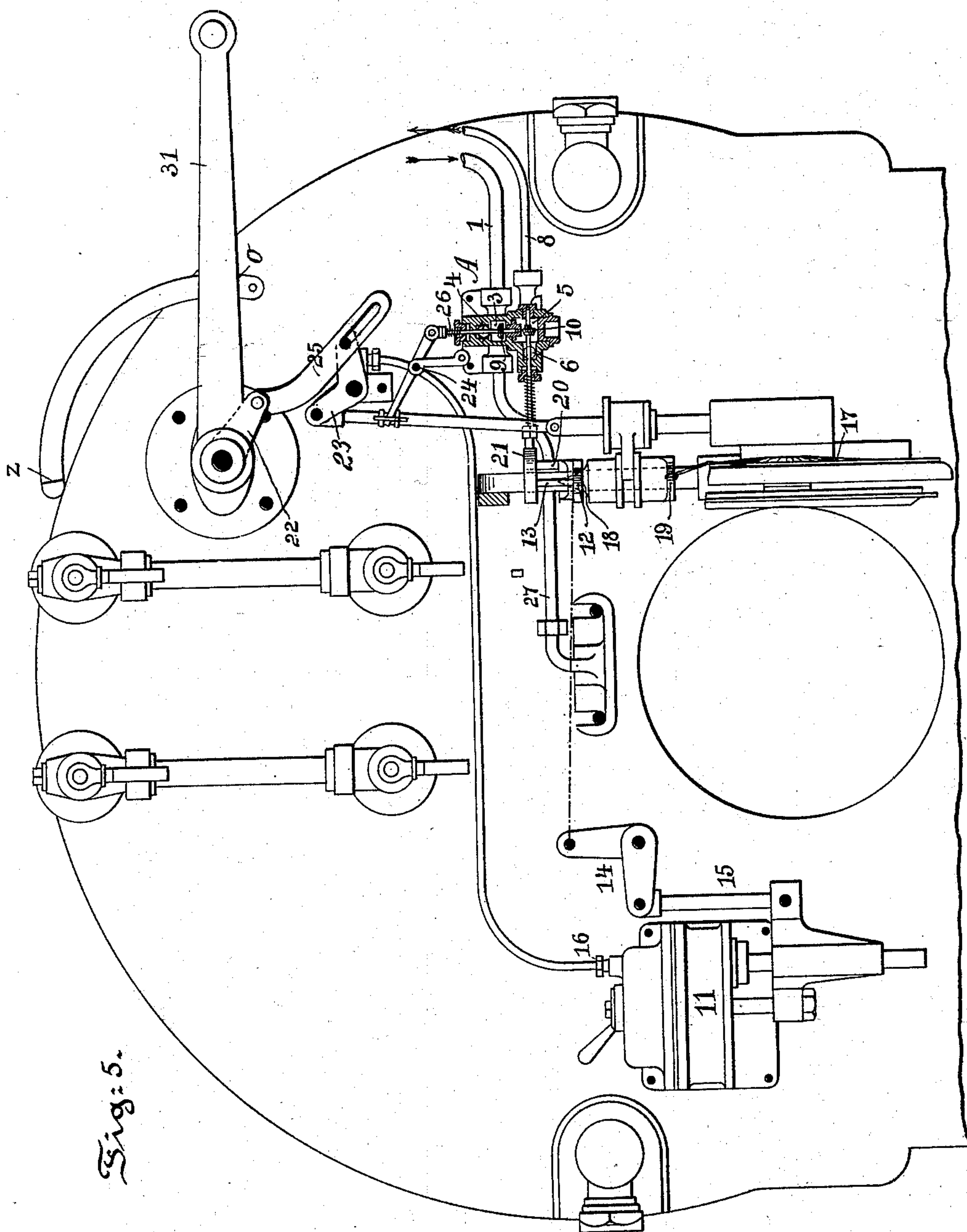
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3 Sheets—Sheet 3.

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BOILER FURNACE.

No. 558,967.

Patented Apr. 28, 1896.



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# UNITED STATES PATENT OFFICE.

THEODOR LANGER, OF VIENNA, AUSTRIA-HUNGARY.

## BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 558,967, dated April 28, 1896.

Application filed January 30, 1895. Serial No. 536,630. (No model.) Patented in Germany August 11, 1894, No. 80,090; in France August 14, 1894, No. 240,744; in Belgium August 16, 1894, No. 111,413; in England August 22, 1894, No. 15,981; in Austria September 26, 1894, No. 44/5,161; in Switzerland October 16, 1894, No. 9,420; in Italy October 30, 1894, No. 37,549, and in Hungary November 16, 1895, No. 4,479.

*To all whom it may concern:*

Be it known that I, THEODOR LANGER, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Boiler-Furnaces, (for which I have obtained Austrian Letters Patent No. 44/5,161, dated September 26, 1894; Hungarian Letters Patent No. 4,479, dated November 16, 1895; German Letters Patent No. 80,090, dated August 11, 1894; Swiss Letters Patent No. 9,420, dated October 16, 1894; English Letters Patent No. 15,981, dated August 22, 1894; French Letters Patent No. 240,744, dated August 14, 1894; Belgian Letters Patent No. 111,413, dated August 16, 1894, and Italian Letters Patent No. 37,549, dated October 30, 1894,) of which the following is a specification.

My invention has relation to that class of smoke-consumers for locomotives or similar boiler-furnaces in which air or steam and air are fed into the furnace above the grate; and it relates more particularly to a device whereby when the draft created by the exhaust-steam is cut off by cutting off the supply of steam to the cylinder a steam-pipe leading steam to the smoke-stack, and hereinafter designated as a "blast-pipe," is opened to increase the draft, and in such connection it relates particularly to the general construction and arrangement of such a device for said purposes.

Heretofore in locomotive or similar boiler-furnaces, when the draft below the grate artificially generated by the exhaust-steam from the cylinders is cut off and the suction of air necessary for effecting combustion in the furnace ceases, the furnace will as a natural consequence smoke. Even where the furnace is provided with an apparatus for automatically feeding in above the grate top air to assist the bottom draft the smoking in the furnace is not avoided, for, as is necessary during the charging of the furnace, the under or bottom draft is cut off.

The principal objects of my present invention are, first, to provide a device in conjunction with the apparatus for automatically

feeding in the top air and the regulator or throttle-valve which cuts off the draft created by the exhaust-steam by cutting off the supply of steam to the cylinder, whereby a blast-pipe leading steam to the smoke-stack is opened and set in operation when the exhaust-steam draft is cut off, and, second, to provide in a device such as above described a double valve interposed between the steam-feed pipe to the furnace above the grate and the blast-pipe and adapted to be opened when the cut-off for the exhaust-steam draft is operated and to be closed when said draft is not cut off, whereby steam from the boiler is admitted into or cut off from the blast-pipe, said double valve being controlled also by the top-air-feeding device.

My invention, stated in general terms, consists in the arrangement and combination of parts whereby the above-mentioned objects are attained; and my invention further consists in the arrangement and parts of said device when constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is an end elevation of a boiler-furnace, illustrating the position and arrangement of the improved device, in conjunction with an air-regulator or cataract for supplying the top air to the furnace, the regulator or cut-off for the exhaust-steam draft, and the blast-pipe. Fig. 2 is a central longitudinal section of the double valve and connections, illustrating the valve in its closed position. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is a top or plan view, partly in section, of the said valve; and Fig. 5 is an end elevation, enlarged, of the boiler, showing the position assumed by the parts when the furnace-door is open.

Referring to the drawings, 11 represents the cataract or suitable device for regulating the admission of top air to the furnace. The



construction and arrangement of this cataract has been already described in Letters Patent No. 538,046, granted to me April 23, 1895.

Briefly stated, the piston of the cataract 11 is raised when the furnace-door is opened by means of a lever 12, rigidly secured to a cam 21 and having a rotary movement about said spindle. This lever 12 is rotated by an arm 13, rigidly secured to the door-spindle, and the motion of the lever 12 is transferred to the piston of the cataract by means of links 14 and 15. When the furnace-door is closed, the arm 13 is swung out of contact with the lever 12, which is then free to rotate backward under the influence of the links 14 and 15, which are operated by the piston of the cataract. The movement of the piston upward in the cataract 11 creates a vacuum in said cataract, and the downward movement of the piston is regulated by the admission of air into the cataract, which is controlled by a regulating-screw 16. In my Letters Patent No. 544,765, granted August 20, 1895, I have explained how this movement of the piston is transferred to the slide or register 17. Briefly stated, the lever 12 is brought into engagement with an arm and sleeve 19 through a wedge 18, and, according to the position vertically of this wedge 18, more or less of the rotary motion of the lever 12 is transferred to the arm and sleeve 19, which is secured to and controls the position of the slide or register by means of a cord or wire. The position of this wedge 18 is controlled by the regulator 31 through the arm 22, slotted link 25, and levers 23, which operate in a vertical direction a rod carrying a fork in engagement with a sleeve carrying the wedge 18 and arm 19.

My present invention relates especially to a device adapted to be operated either by the cataract 11, regulator 31, or both, whereby when the draft created by the exhaust-steam is cut off by the cutting off of steam to the cylinder, as in the charging of the furnace, a blast or steam pipe discharging into the smoke-stack is automatically opened and set in operation to increase the upper and under grate-draft. To accomplish this I make use of the following mechanism:

The cam 21 is connected by a link 20 with the lever 12 and rotates with said lever. This cam 21 in its rotation is adapted to bear on the spindle 28 of one of the valves 10 of the double valve A, hereinafter more fully explained, and to open said valve when the cataract 11 is set in operation and to gradually close the valve 10 with the gradual return of the piston of the cataract 11. The double valve A consists of a suitable housing, in which are two valve-controlled chambers 3 and 5. The chamber 3 is connected by the inlet 2 and pipe 1 with the boiler and by pipe 27 with the furnace above the grate. In this chamber 3 is an outlet-port 4, controlled by a valve 9, normally held in closed position by the spring 26. Below the cham-

ber 3 and preferably at right angles thereto is another chamber 5, communicating with chamber 3 through the port 4, controlled by the valve 9. In the chamber 5 is placed a valve 10, adapted in its normal position under the influence of a spring 29 to close the outlet-port 6, which leads to the outlet 7 and pipe 8 and from thence to the blast-pipe. The arrangement of these valves is such that when either valve 9 or both valves are closed steam from the boiler from pipe 1 passes only through the inlet 2 and the chamber 3 to the pipe 27 and is fed into the furnace, but when both are opened the steam is conducted through the inlet 2, the chamber 3, and the port 4 into the chamber 5 and from thence through the port 6 to the outlet 7 and the pipe 8 to the blast-pipe. This double valve, as shown, when used in connection with devices for feeding in steam above the grate, is preferably placed in the pipe leading from the boiler to the furnace above the grate and is arranged, as above explained, so that a portion of said steam in said pipe 1, when valves 9 and 10 are open, is conducted into a blast or steam pipe discharging into the smoke-stack for the purpose of increasing the under draft. The valve 10, as hereinbefore explained, is controlled by the cataract 11. The valve 9 is connected, as illustrated in Figs. 1 and 5, by means of the levers 22 and 24, slotted together, as at 25, to the regulator or cut-off 31 in such a manner that when the cut-off is closed or moved into a position indicated at Fig. 5 the stem 30 of the valve 9 is depressed by the said lever 24 against the action of the spring 26 and the valve 9 thereby opened. When, however, the cut-off is returned to its former position, as at Z, the valve 9 is closed by its spring 26, the lever 24 being withdrawn from contact with the spindle 30. It will thus appear that if now the cataract 11, being still in operation or not yet run down and the valve 10 still open, the regulator 31 is closed and the valve 9 is opened thereby, the steam from the boiler is diverted partly from pipe 27 to the blast-pipe, as hereinbefore explained, and will draw in the necessary air both above and below the grate for effecting the smokeless combustion of the fuel so long as gas is generated in the furnace.

When the generation of gas has ceased and the regulator 31 is opened to permit the generation of the necessary current of air by the exhaust-steam from the cylinder, the connection between the steam-pipe 1 and the blast-pipe is cut off by the double valve A. By a suitable adjustment of the stems or spindles of the valves 9 and 10 in regard to their extent of travel a regulation of the draft created by the blast-pipe is obtained.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a smoke-consuming apparatus, a device adapted to feed top air into the furnace,



a pipe normally adapted to feed steam into the furnace above the grate, a throttle-valve adapted to cut off the draft created by the exhaust-steam from the cylinder, a double valve placed in the steam-pipe and adapted normally to permit the free passage of steam therethrough to the furnace, means controlled by the air-feeding device for opening one of said double valves, and means controlled by the throttle-valve in its cut-off position for opening the other of the double valves, all arranged so that when both valves are opened, steam in said pipe is diverted from the furnace to the smoke-stack to create an increased upper and under grate-draft, substantially as described.

2. In a smoke-consuming apparatus, a cataract adapted to feed top air to the furnace, a throttle-valve for cutting off the draft created by the exhaust-steam from the cylinder, and a valve interposed in a pipe conducting steam into the furnace above the grate, the valves in said double valve being controlled by the cataract and throttle-valve, all arranged so that when air is being fed into the furnace by the cataract and the draft is cut off by the throttle-valve, both of said valves of the double valve are opened to divert a portion of the steam fed into the furnace above the grate, to the smoke-stack to thereby increase the

upper and under grate-draft, substantially as described.

3. In a smoke-consuming apparatus, a pipe adapted to normally convey steam to the furnace above the grate, a double valve placed in the steam-pipe and consisting of a housing provided with two chambers, each controlled by a valve, one of said chambers connected by an inlet and pipe with the boiler and in open communication when its valve is closed with the steam-pipe leading to the furnace, said chamber being provided with an outlet-port normally closed by said valve, the second chamber being in communication with the first chamber when said outlet-port is opened, an outlet-port in said second chamber normally closed by the valve of said second chamber, an outlet and pipe leading from said outlet-port of the second chamber to the smoke-stack, all arranged so that when the valves of both chambers are opened steam from the boiler is conducted partially to the furnace and partially to the smoke-stack, substantially as described.

In witness whereof I hereunto set my hand in presence of two witnesses.

THEODOR LANGER.

Witnesses:

VICTOR TISCHLER,  
FERDINAND SATTLER.