

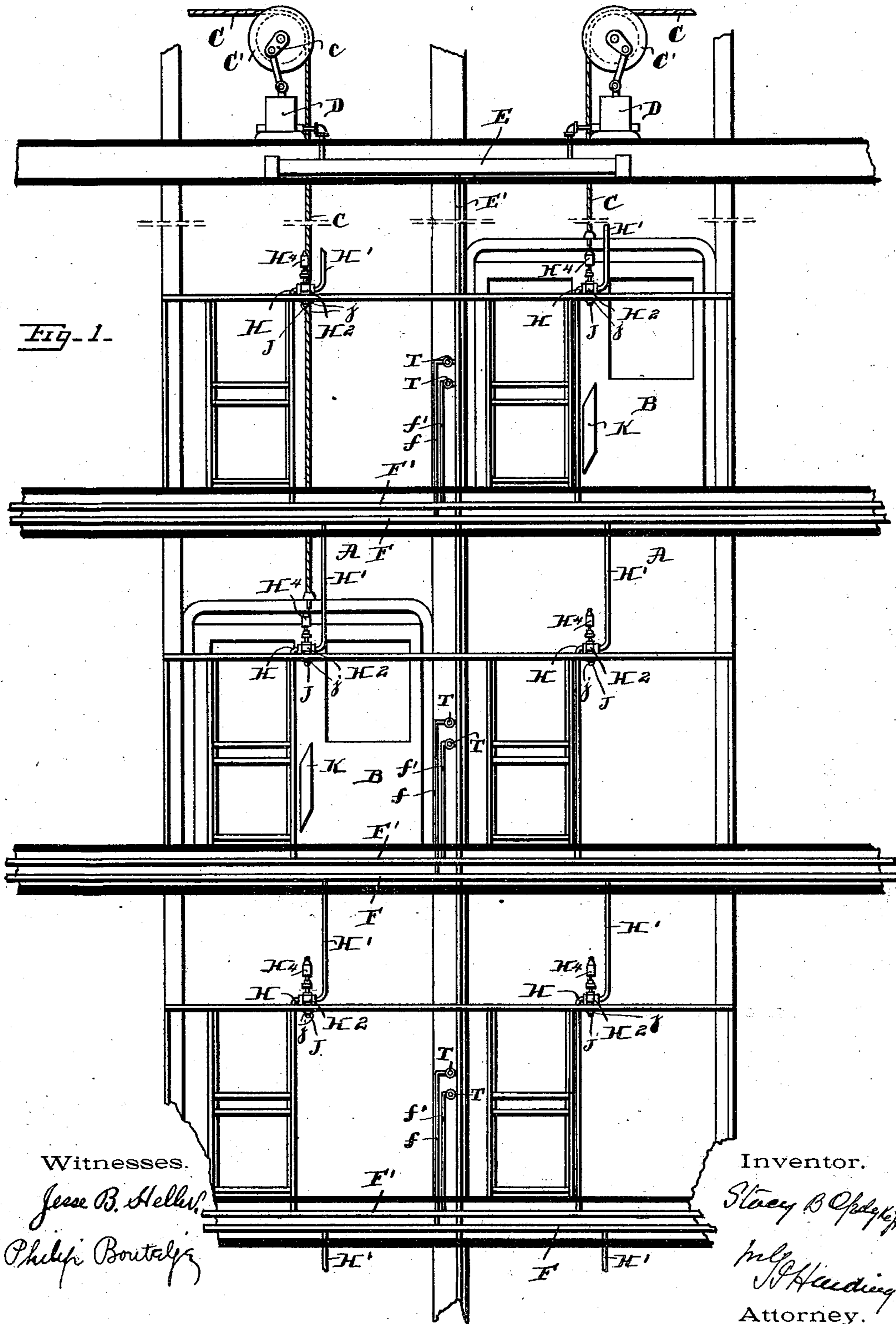
(No Model.)

2 Sheets—Sheet 1.

S. B. OPDYKE, Jr.
PNEUMATIC SIGNAL DEVICE FOR ELEVATORS.

No. 548,721.

Patented Oct. 29, 1895.



Witnesses.

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Inventor.

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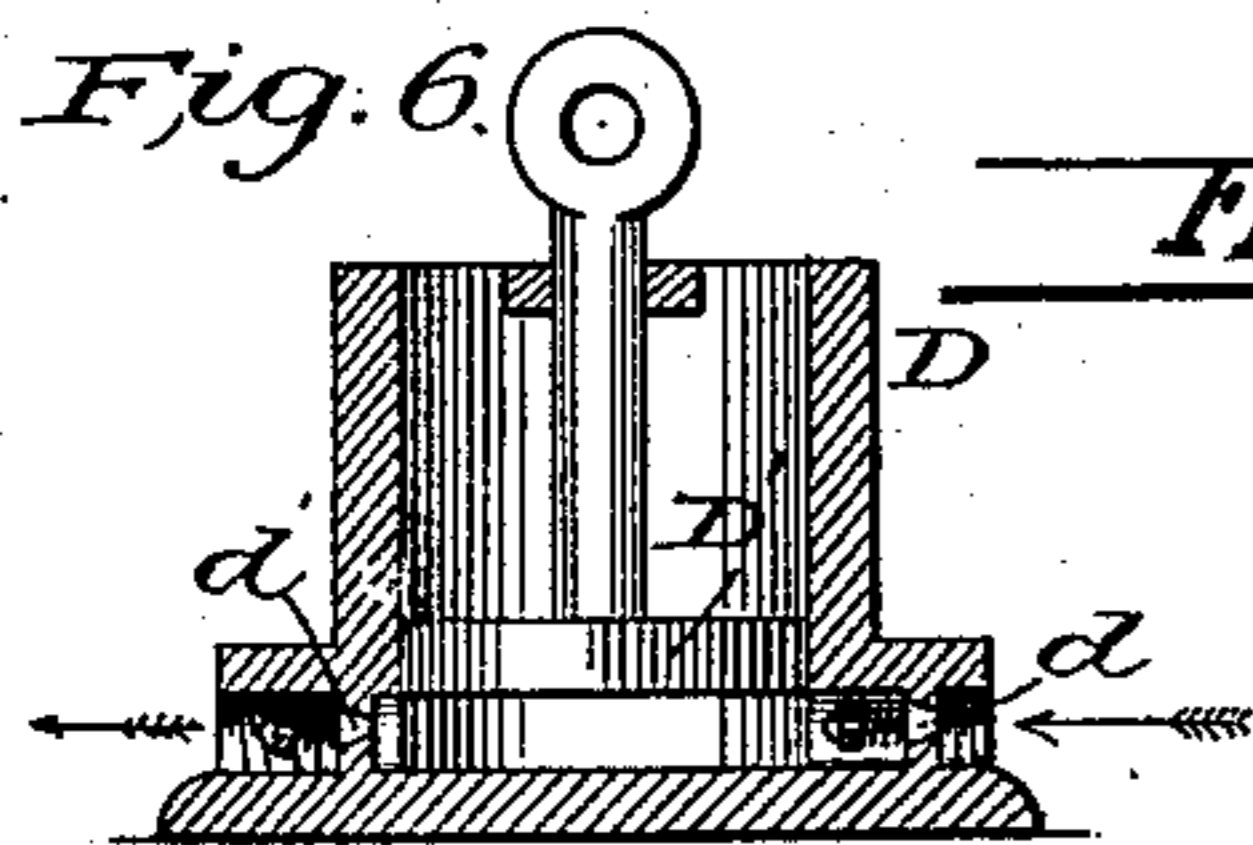
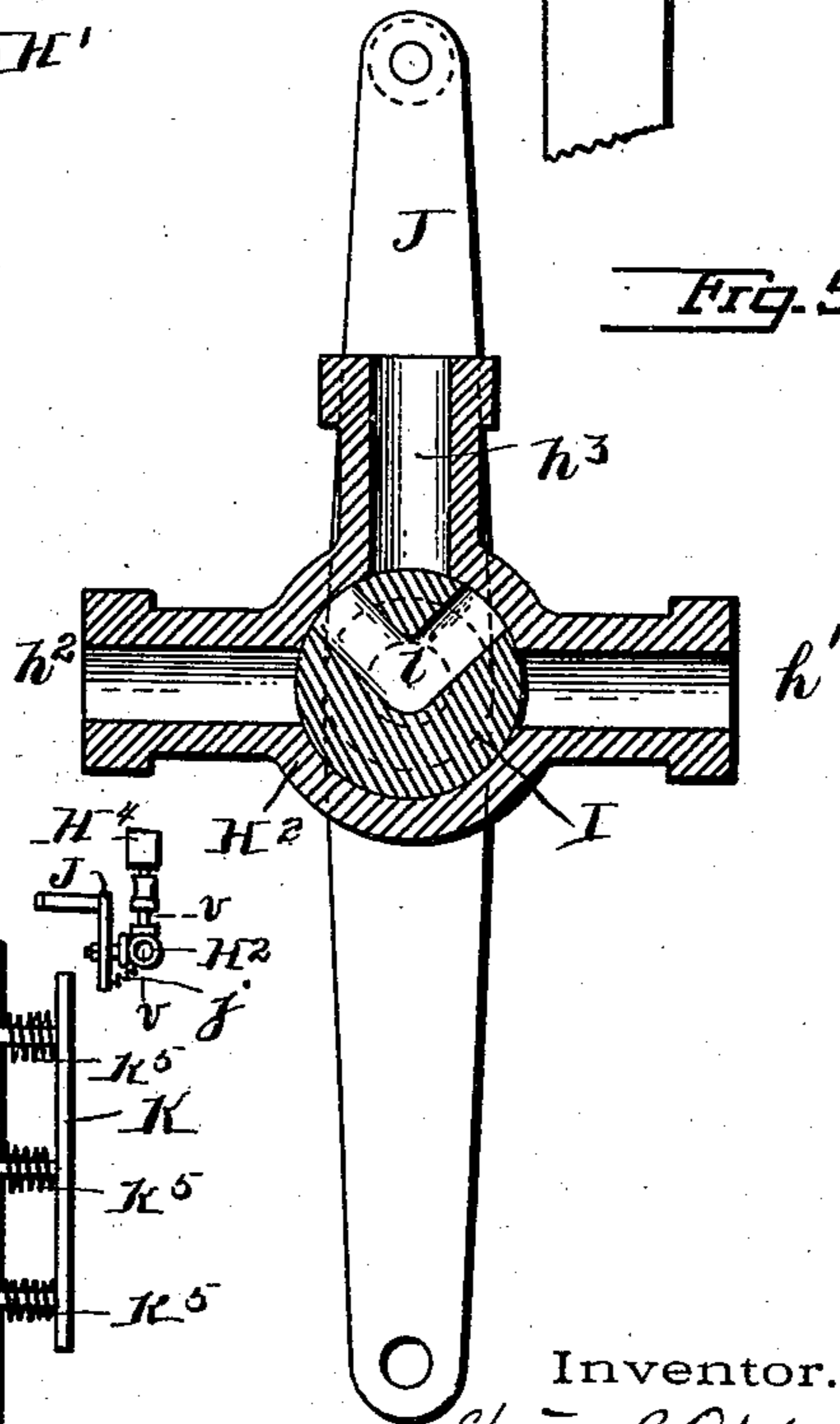
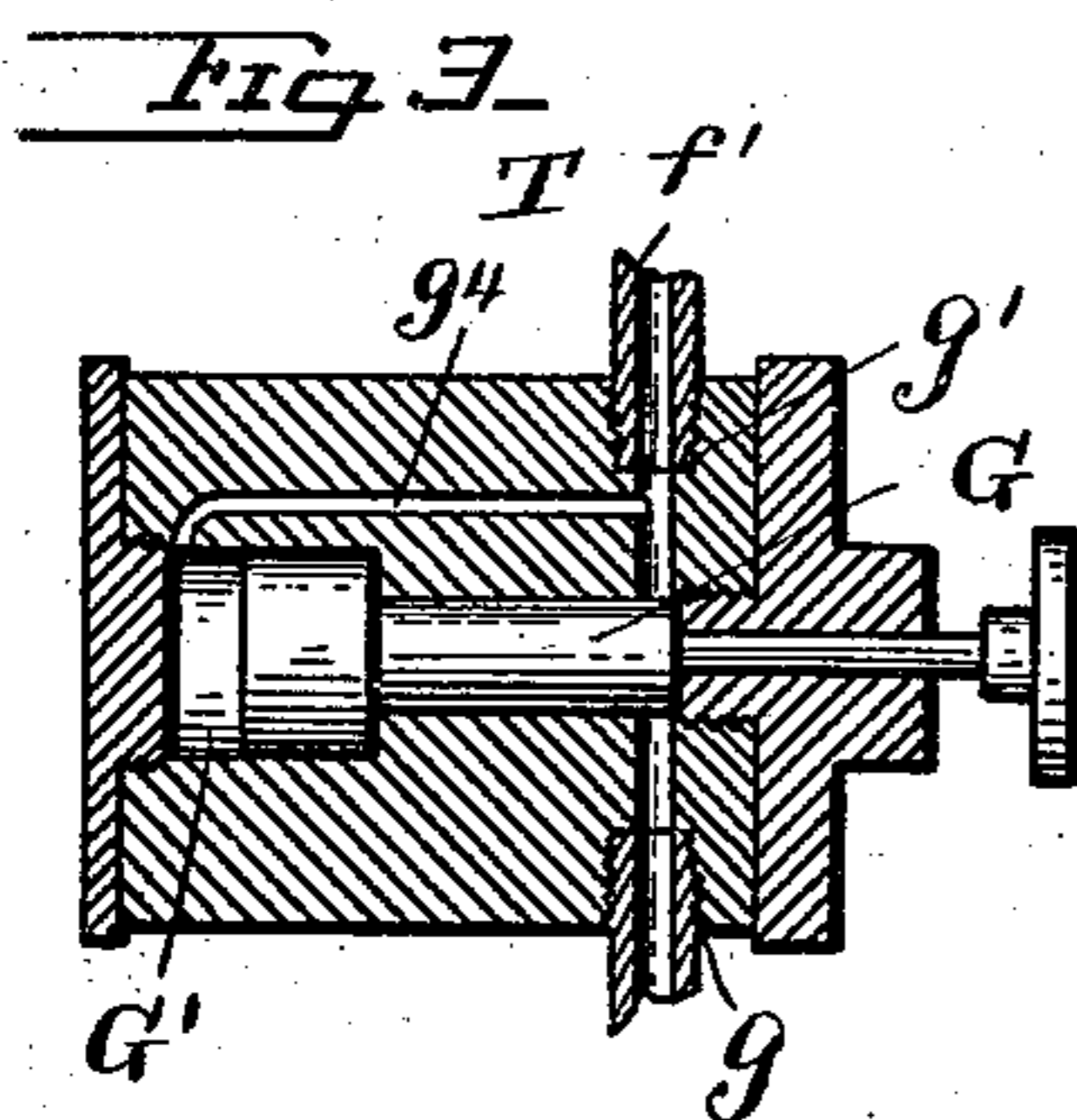
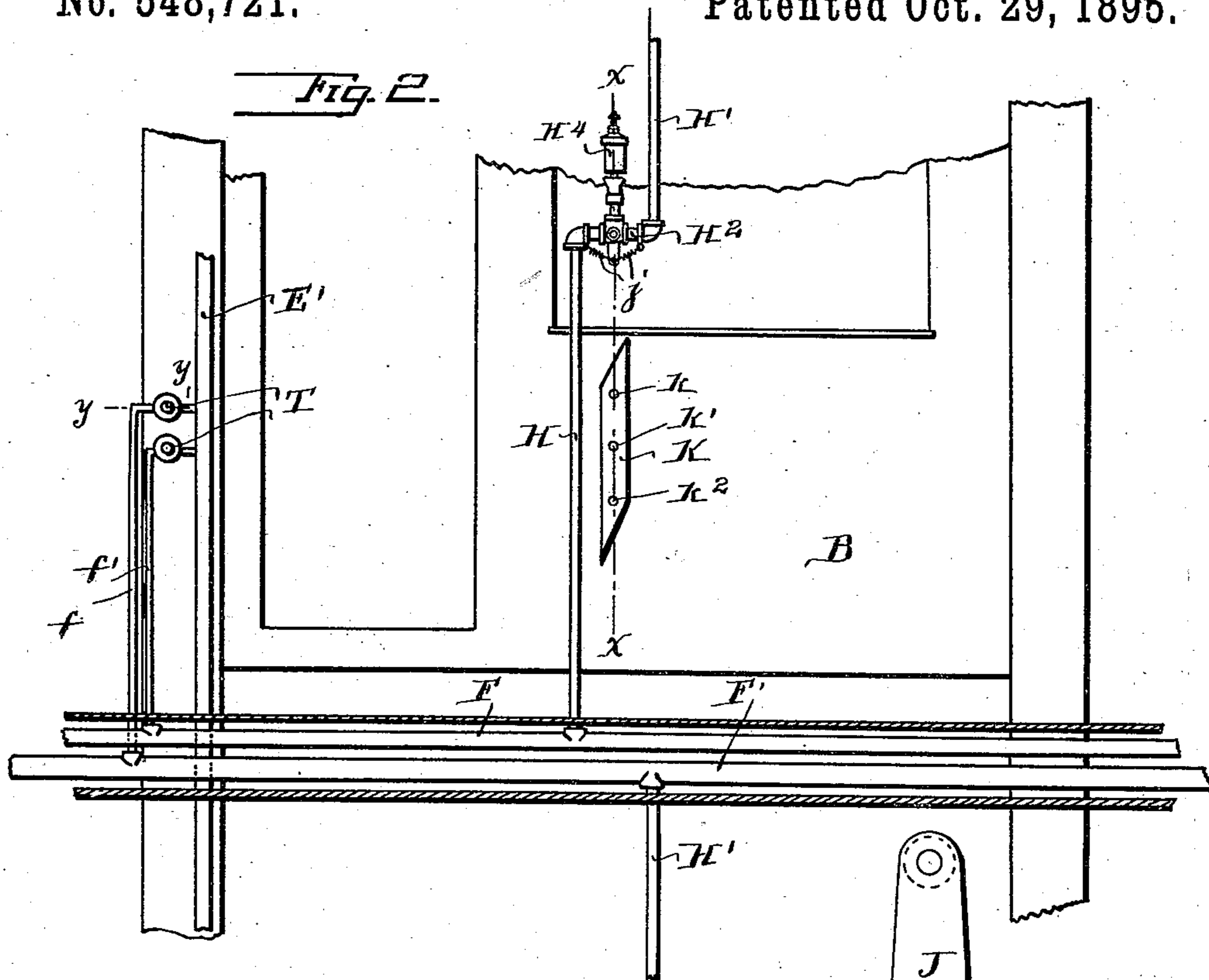
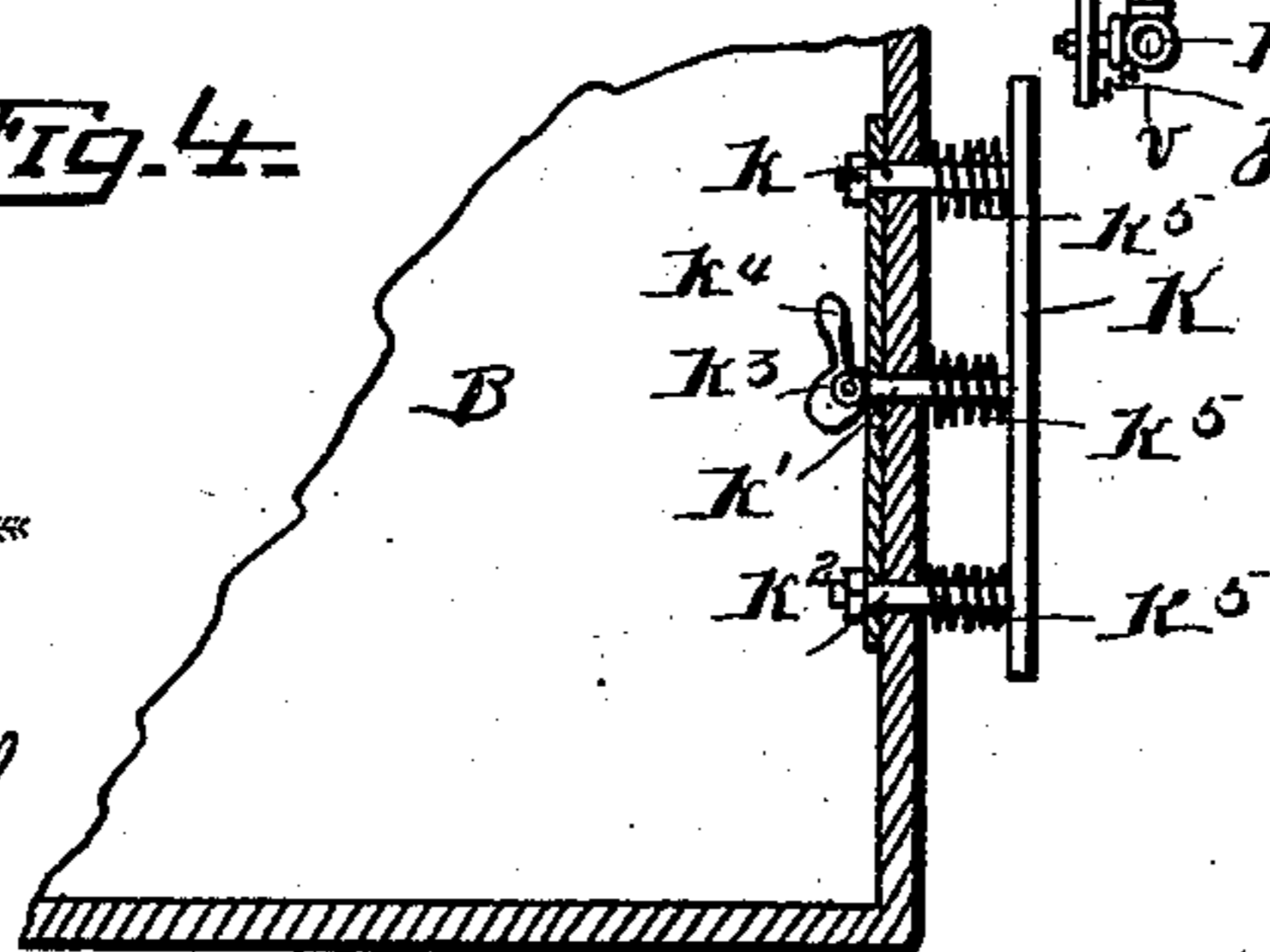


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

STACY B. OPDYKE, JR., OF PHILADELPHIA, PENNSYLVANIA.

PNEUMATIC SIGNAL DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 548,721, dated October 29, 1895.

Application filed January 30, 1895. Serial No. 536,639. (No model.)

To all whom it may concern:

Be it known that I, STACY B. OPDYKE, Jr., a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Pneumatic Signal Devices for Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to mechanism whereby the passenger at any floor may, by giving the proper signal, indicate to the conductor of the first approaching elevator-car of a series of elevator-cars approaching in the direction corresponding to the signal slightly before said car reaches the floor corresponding to the signal that the passenger wishes said car to stop.

My invention further relates to the accomplishment of this by means of compressed air.

I will first describe the embodiment of my invention, as illustrated in the drawings, and then particularly point out the invention in the claims.

In the drawings, Figure 1 is a front view of two elevator-shafts and three floors. Fig. 2 is a front view of one car with the device. Fig. 3 is a section on line $y y$ of Fig. 2. Fig. 4 is a section on line $x x$ of Fig. 2. Fig. 5 is a section on line $v v$ of Fig. 4. Fig. 6 is a section through pump D.

A represents the elevator-shafts, of which two are shown, and B the cars corresponding to said shafts, and C the lifting-cables, each of which passes over a sheave C' at the top of its shaft. Connected to each of these sheaves by means of the crank c is an air-pump D.

d is the inlet-port; d' , the outlet-port; D', the plunger. The ports are provided with proper check-valves. The port d' opens into the air-reservoir E, from which air-reservoir extends a vertical main pipe E', extending from the top to the bottom of the building.

At each floor there are transverse pipes F F', respectively. Connected with the pipe F' of each floor is the pipe f' , and connected with the pipe F of each floor is the pipe f . Upon the pipes f and f' , at a point convenient to the floor or landing, respectively, is a valve

mechanism, which is shown in detail, Fig. 3. It consists of a movable piston G, moving within the cylinder G'. This piston G is larger at one end than it is at the other, and the chamber is correspondingly larger at the large end of the piston than at the small end.

g is an inlet-port connected with the pipe E', and g' is a port connected with the pipe f' . In the corresponding valve mechanism upon the pipe f' , the inlet-port g is connected with the pipe E' and the port g' with the pipe f' , and there is in both cases a passage from port g and port g' . When the piston is in the position shown in Fig. 3, the inlet or passage from port g to port g' is closed; but when the piston is pushed the passage between the ports g and g' is open, and, dependent upon whether the piston corresponding to pipe F or F' is operated, air is admitted to the transverse pipe F or F'. Each floor has these two pipes F and F' and a pipe corresponding to each one of these connecting said pipes with the main pipe E' through the medium of plunger device T. Projecting upward from each pipe F is a vertical pipe H, and projecting downward from the pipe F' of the floor above is a vertical pipe H'. These pipes meet in the common pipe H², which has the three ways h' h^2 h^3 , the way h' connecting with the pipe H', way h^2 with the pipe H, and the way h^3 with a whistle or other signal H⁴.

I is a three-way valve having the port i , adapted to make connection in the movement of the lever J in one direction from its central position (shown in Fig. 5) between way h and the way h^3 , and in the movement of the lever in the other direction between way h^2 and the way h^3 .

There are projecting from the pipes F and F' of each floor as many vertical pipes as there are elevator-shafts, and the vertical pipe from the pipe F of one floor in each shaft, at a point between the floors, joins with a vertical pipe from pipe F' of the floor above in a pipe H² common to both. Upon each elevator is the cam K, having its top and bottom portions pointing in opposite directions, and is in such position that in the movement of the car in one direction it strikes the lever J of the series of levers of the valve I with one end of said cam, moving it in one direction,

and in the other direction of movement of the car strikes it with the other end, moving it in the other direction.

If we take the pipes F, with their appurtenant valve mechanism, to correspond with the descending-elevator signals and the pipes F', with their appurtenant valve mechanism, to correspond with the upward movement of the car, then whenever a passenger at any floor pushes the piston in corresponding to pipe F air is admitted from the main pipe E' to the pipe F corresponding to that floor and to the pipes h^2 of all of the shafts, and the cam of the first descending car when it strikes the lever throws it, so that the pipe h^2 connects with the pipe h^3 , and the signal is given. When the passenger at any floor pushes the piston corresponding to the pipe F', then the air is admitted to the pipes h' of all of the series of pipes corresponding to that floor, and the first ascending elevator will move the lever J, so as to form the connection between the pipe h' and pipe h^3 , and the signal is given. The spring j returns the lever to its normal position after the passage of the cam in either direction. When the piston G is operated, the air passes through the passage g' and to the floor-pipe; but when the pressure in floor-pipe balances the incoming air from the pipe E' the air passes through passage g^4 to the large end of the cylinder G', and the area of the cylinder being greater at this end than at its other end and acting in the greatest area of the piston the back-pressure will exert sufficient force to return the piston to its normal position, closing the inlet between the port g and the port g' .

In order to prevent a car too crowded to stop working the signal and preventing a car with sufficient capacity to receive the additional passenger receiving the signal, I adopt the following means: The cam K is secured to the car, as shown in Fig. 4, where it connects to pins k k' k^2 , which pass through perforations in the wall of the car and have a capacity for movement in said perforations. The central pin k' has connected to its inner end the eccentric cam k^3 operated by crank k^4 . By moving this crank in one direction the cam, striking the walls of the car, moves the pins k k' k^2 , and with them the cam K, inward out of alignment with its levers, and so no signal is given. When the crank k^4 is released, the springs k^5 , which surround the pins, return and rest between the cam K and the wall of the car, returning the cam to its outward position.

While I have shown the device which causes connection to be made with the signal carried by the car, still I do not intend to limit myself to it, it being necessary only that it have a relative movement with the car and moves with the car; nor do I intend to limit myself to the shape or configuration shown.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. The combination with an elevator car, of a reservoir adapted to receive air under pressure, a main pipe leading from said reservoir, a pipe corresponding to each floor, a valve mechanism for each floor, adapted to make connection with said main pipe and said pipe corresponding to said floor, a signal, a device moving with the car and adapted in its movement to cause connection to be made between said floor pipe and the signal, whereby when the valve mechanism is operated to admit air to the last mentioned pipe and the device causes connection to be made with the signal, a signal is given.

2. The combination with an elevator car, of a reservoir adapted to receive air under pressure, a main pipe leading from said reservoir, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one adapted to make connection with said main pipe and one of said pair of pipes corresponding to said floor, and the other adapted to make connection with said main pipe and the other of said pair of pipes corresponding to said floor, a signal, a device moving with the car and adapted in its movement in one direction to cause connection to be made between one of the pipes corresponding to the floor and the signal, and in its movement in the other direction to cause connection to be made between the other of said floor pipes and the signal, whereby when the valve mechanism is operated the air is admitted to the pipe corresponding to the mechanism operated, and when the device moving with the car causes connection to be made with the signal, a signal is given.

3. The combination with an elevator car of a main pipe adapted to contain air, a pipe corresponding to each floor, a valve mechanism for each floor adapted to make connection with said main pipe and said pipe corresponding to said floor, a signal, a device moving with the car and adapted in its movement to cause connection to be made between said floor pipe and the signal, whereby when the valve mechanism is operated and the device causes connection to be made with the signal, a signal is given.

4. The combination with an elevator car of a main pipe adapted to contain air, a pipe corresponding to each floor, a valve mechanism for each floor adapted to make connection with said main pipe and said pipe corresponding to said floor, a signal, a device moving with the car and adapted in its movement to cause connection to be made between said floor pipe and the signal, whereby when the valve mechanism is operated and the device causes connection to be made with the signal, a signal is given, and means to return said valve mechanism to its initial position.

5. The combination with an elevator car of a main pipe adapted to contain air, a pipe corresponding to each floor, a valve mechanism for each floor adapted to make connection with said main pipe and said pipe corresponding to said floor and admit one charge

of air to said pipe, a signal, a device moving with the car and adapted in its movement to cause connection to be made between said floor pipe and the signal, whereby when the valve mechanism is operated and the device causes connection to be made with the signal, a signal is given.

6. The combination with an elevator car, of a main pipe adapted to contain air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one adapted to make connection with the main pipe and one of said pair of pipes corresponding to said floor, and the other adapted to make connection with the main pipe and the other of said pair of pipes corresponding to said floor, a signal, a device moving with the car and adapted in its movement in one direction to cause connection to be made between one of the pipes corresponding to the floor and the signal, and in its movement in the other direction to cause connection to be made between the other of said floor pipes and the signal, whereby when the valve mechanism is operated and when the device moving with the car causes connection to be made with the signal, a signal is given.

7. The combination with an elevator car, of a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor connecting the said main pipe and said pipe corresponding to the floor, a signal, said last mentioned pipe being adapted to be connected with the signal, a valve for controlling the connection to the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car to operate said valve, whereby, when the valve mechanism for the floor corresponding to said floor pipe is operated, the signal is operated.

8. The combination with an elevator car, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main pipe and the other of said pair of pipes corresponding to each floor, a signal, a pipe leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe opposite to that of the last mentioned floor pipe of another floor, a valve adapted in its movement in one direction to make connection between one floor pipe and the signal, and in the other direction with the other floor pipe, a lever to control said valve, a cam carried by the car adapted in the movement of the car in one direction to move the lever in one direction, and in its movement in the other direction to move the lever in an opposite direction.

9. The combination with a series of elevator cars, a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor connecting the said main pipe and said pipe corresponding to the

floor, a signal corresponding to each car, pipes connecting said floor pipe and the signals, valves for controlling the connection to the signals, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars to operate said valves, and when the valve mechanisms for the floors corresponding to said pipes are operated, operate the signal.

10. The combination with a series of elevator cars, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main pipe and the other of said pair of pipes corresponding to each floor, a signal corresponding to each car, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe opposite to that of the last mentioned pipe of another floor, valves adapted in their movement in one direction to make connection between one of the floor pipes and the signal, and in the other direction with the other of the floor pipes, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars in one direction to move the levers in one direction, and in their movement in the other direction to move the levers in an opposite direction.

11. The combination with an elevator car, of a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor connecting the said main pipe and said pipe corresponding to the floor, a signal, a pipe connecting said floor pipe and the signal, a valve for controlling the connection to the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car to operate said valve, and when the valve mechanism for the floor corresponding to said floor pipe is operated, operate the signal, and means to move said cam out of alignment with the lever.

12. The combination with an elevator car, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main pipe and the other of said pair of pipes corresponding to each floor, a signal, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe, opposite to that of the last mentioned floor pipe, of another floor, a valve adapted in its movement in one direction to make connection between one floor pipe and the signal, and in the other direction between the other floor pipe and the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car in one direction to move the lever in one direction, and in its movement in the

other direction to move the lever in an opposite direction, and means to move said cam out of alignment with the lever.

13. In combination with a series of elevator cars, a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor connecting the said main pipe and said pipe corresponding to the floor, a signal corresponding to each car, pipes connecting said floor pipe and the signals, valves for controlling the connection to the signals, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars to operate said valves, and when the valve mechanism for the floors corresponding to said pipes are operated, operate the signal, and means to move said cams out of alignment with their corresponding levers.

14. The combination with a series of elevator cars, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main pipe and the other of said pair of pipes corresponding to each floor, a signal corresponding to each car, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe opposite to that of the last mentioned pipe of another floor, valves adapted in their movement in one direction to make connection between one of the floor pipes and the signal, and in the other direction between the other of the floor pipes and the signal, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars in one direction to move the levers in one direction, and in their movement in the other direction to move the levers in an opposite direction, and means to move said cams out of alignment with their corresponding levers.

15. The combination with an elevator car, of a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor consisting essentially of a cylinder, a piston, two ports, and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe, and the other port connecting with said pipe corresponding with the floor, a signal, a pipe connecting said floor pipe and the signal, a valve for controlling the connection to the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car to operate said valve, and, when the valve mechanism for the floor corresponding to said pipe is operated, operate the signal.

16. The combination with an elevator car, of a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor consisting essentially of a cylinder, a piston, two ports and a passage con-

necting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with main pipe, and the other port connecting with said pipe corresponding to the floor, and a passage connecting the port leading to the pipe corresponding to the floor and one end of said cylinder, said cylinder at that point being enlarged and the piston at the point corresponding with that end of the cylinder being also enlarged, a signal, a pipe connecting said floor pipe and the signal, a valve for controlling the connection to the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car to operate said valve, and, when the valve mechanism for the floor corresponding to said pipe is operated, operate the signal.

17. The combination with an elevator car, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, each mechanism consisting essentially of a cylinder, a piston, two ports and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe and the other port connecting with said pipe corresponding to the floor, a signal, a pipe leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe, opposite to that of the last mentioned floor pipe, of another floor, a valve adapted in its movement in one direction to make connection between one floor pipe and the signal, and in the other direction with the other floor pipe, a lever to control said valve, a cam carried by the car adapted in the movement of the car in one direction to move the lever in one direction, and in its movement in the other direction to move the lever in an opposite direction.

18. The combination with an elevator car, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, each mechanism consisting essentially of a cylinder, a piston, two ports, and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe and the other port connecting with the pipe corresponding to the floor, and a passage connecting the port leading to the pipe corresponding to the floor and one end of cylinder, said cylinder at that point being enlarged, and the piston at the point corresponding with that end of the cylinder being also enlarged, a signal, a pipe leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe, opposite to that of the last mentioned floor pipe of another floor, a valve adapted in its movement in one direction to make connection between one floor pipe and the signal, and in the other direction between the other floor pipe and the signal, a lever to

control said valve, a cam carried by the car adapted in the movement of the car in one direction to move the lever in one direction, and in its movement in the other direction to move the lever in an opposite direction.

19. The combination with a series of elevator cars, a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor consisting essentially of a cylinder, a piston, two ports and a passage connecting said ports which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe and the other port connecting with the pipe corresponding to the floor, a signal corresponding to each car, pipes connecting said floor pipes and the signals, valves for controlling the connection to the signals, levers to control said valves, a cam carried by each of the cars adapted in the movement of the car to operate said valves, and when the valve mechanism for the floors corresponding to said pipes is operated, operate the signals.

20. The combination with a series of elevator cars, a main pipe adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor consisting essentially of a cylinder, a piston, two ports, and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe, and the other port connecting with the pipe corresponding to the floor, and a passage connecting the port leading to the pipe corresponding to the floor and one end of said cylinder, said cylinder at that point being enlarged and the piston at the point corresponding to that end of the cylinder being also enlarged, a signal corresponding to each car, pipes connecting said floor pipe and the signals, valves for controlling the connection to the signals, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars to operate said valves, and when the valve mechanism for the floors corresponding to said pipes are operated, operate the signals.

21. The combination with a series of elevator cars, of a main pipe adapted to receive air, a pair of pipes corresponding to each floor, valve mechanisms for each floor, each consisting essentially of a cylinder, a piston, two ports, and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe, and the other port with the pipe corresponding to the floor, a signal corresponding to each car, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe opposite to that of the last mentioned floor pipe of another floor, valves adapted in their movement in one direction to make connection between one of the floor pipes and the signal, and in the other direc-

tion between the other of the floor pipes and the signal, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars in one direction to move the levers in one direction, and in their movement in the other direction to move the levers in an opposite direction.

22. The combination with a series of elevator cars, of a main pipe adapted to receive air, a pair of floor pipes corresponding to each floor, valve mechanisms for each floor, each consisting essentially of a cylinder, a piston, two ports, and a passage connecting said ports, which passage is normally closed by the piston but adapted to be opened by the movement of the piston, one port connecting with the main pipe, and the other port connecting with the pipe corresponding to the floor, and a passage connecting the port leading to the port corresponding to the floor and one end of the cylinder, said cylinder at that point being enlarged and the piston at the point corresponding with that end of the cylinder being also enlarged, a signal corresponding to each car, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe, opposite to that of the last mentioned pipe of another floor, valves adapted in their movement in one direction to make connection between one of the floor pipes and the signal, and in the other direction with the other of the floor pipes, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cars in one direction to move the levers in one direction, and in their movement in the other direction to move the levers in an opposite direction.

23. The combination with an elevator car, of a lifting cable, a sheave around which said cable passes, an air pump operated by said sheave, a reservoir adapted to receive air compressed by said pump, of a main pipe opening into said reservoir adapted to receive air, a pipe corresponding to each floor, valve mechanism for each floor connecting the main pipe and said pipe corresponding to the floor, a signal, said floor pipe being adapted to be connected with the signal, a valve for controlling the admission of air to the signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car to operate said valve, and, when the valve mechanism for the floor corresponding to said floor pipe is operated, operate the signal.

24. The combination with an elevator car, of a lifting cable, a sheave around which said cable passes, an air pump operated by said sheave, a reservoir adapted to receive air compressed by said pump, of a main pipe opening into said reservoir and adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main pipe and

the other of said pair of pipes corresponding to each floor, a signal, a pipe leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor
 5 pipe opposite to that of the last mentioned pipe of another floor, a valve adapted in its movement in one direction to make connection between one floor pipe and the signal, and in the other direction with the other floor
 10 pipe and signal, a lever to control said valve, a cam carried by the car adapted in the movement of the car in one direction to move the lever in one direction, and in its movement in the other direction to move the lever in an
 15 opposite direction.

25. The combination with a series of elevator cars, of lifting cables for each car, sheaves around which said cables pass, air pumps operated by said sheaves, a reservoir adapted to
 20 receive the air compressed by said pumps, a main pipe opening into said reservoir and adapted to receive air under pressure, a pipe corresponding to each floor, valve mechanism for each floor connecting the main pipe and
 25 said pipe corresponding to the floor, a signal corresponding to each car, pipes connecting said floor pipes and the signals, valves for controlling the admission of air to the signals, a cam carried by each of the cars adapted in
 30 the movement of the cars to operate said valves, and when the valve mechanism for the floors corresponding to said pipes is operated, operate the signals.

35 26. The combination with a series of elevator cars, of lifting cables for each car, sheaves around which said cables pass and pumps operated by said sheaves, a reservoir adapted to receive the air compressed by said pumps, of

a main pipe opening into said reservoir and adapted to receive air, a pair of pipes corresponding to each floor, two valve mechanisms
 40 for each floor, one mechanism making connection with the main pipe and one of said pair of pipes corresponding to each floor, and the other making connection with the main
 45 pipe and the other of said pair of pipes corresponding to each floor, a signal corresponding to each car, pipes leading from the signal and adapted to be connected with one of the floor pipes of one floor and the floor pipe
 50 opposite to that of the last mentioned floor pipe of another floor, valves adapted in their movement in one direction to make connection between one of the floor pipes and the signal, and in the other direction between the
 55 other of said floor pipes and the signal, levers to control said valves, a cam carried by each of the cars adapted in the movement of the cams in one direction to move the levers in one direction, and in their movement in the
 60 other direction to move the levers in an opposite direction.

27. A valve mechanism consisting essentially of two ports, a passage connecting said ports, a piston, the area of which is greater
 65 at one end than the other, said piston being adapted to close said passage, a cylinder conforming to said piston, and a passage leading from one port to the cylinder at its point of larger area.
 70

In testimony of which invention I have hereunto set my hand.

STACY B. OPDYKE, JR.

Witnesses:

FRANK S. BUSSER,
 PHILIP BOUTELJE.