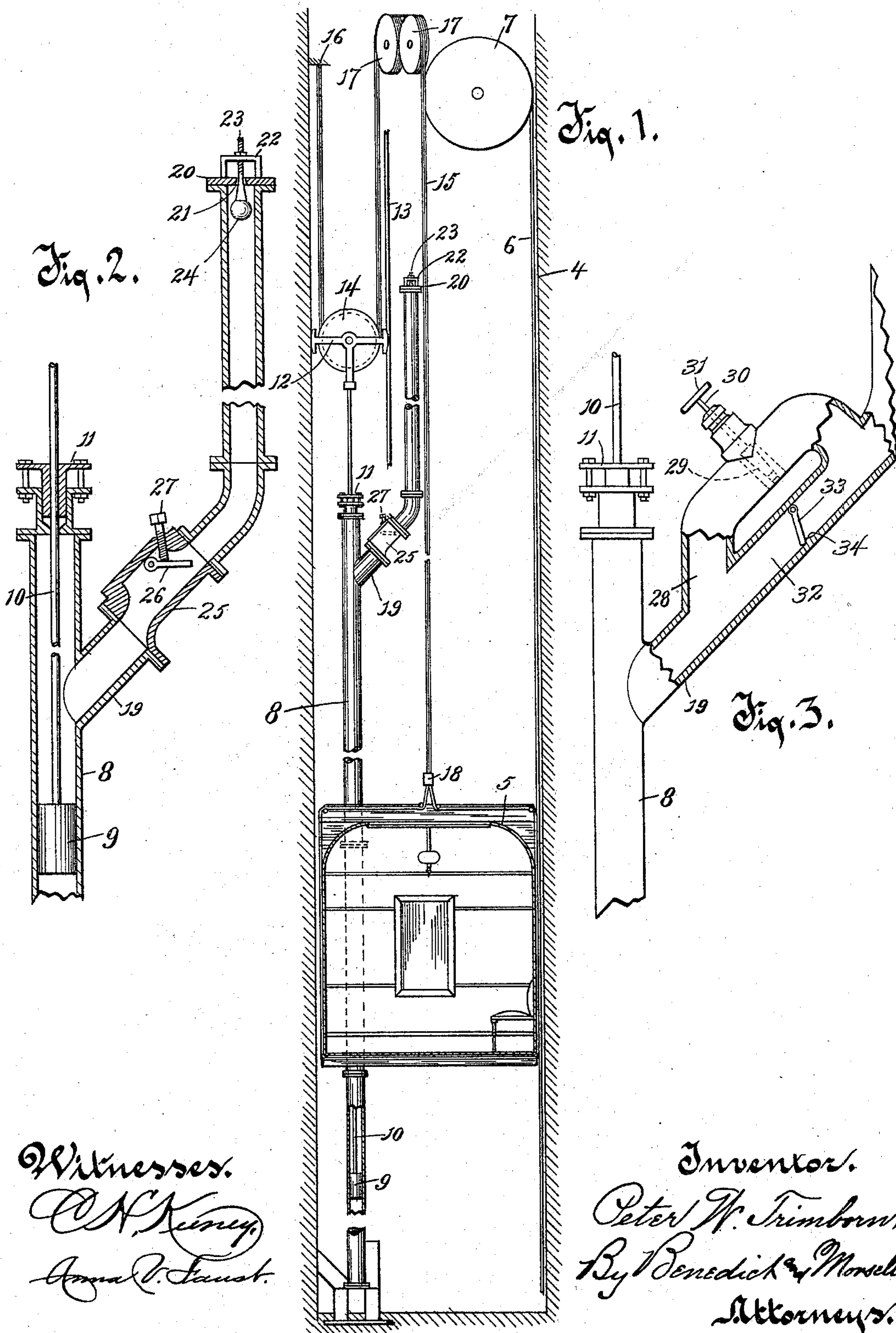


(No Model.)

P. W. TRIMBORN.
SAFETY DEVICE FOR ELEVATORS.

No. 573,935.

Patented Dec. 29, 1896.



Witnesses.

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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 573,935, dated December 29, 1896.

Application filed January 27, 1896. Serial No. 576,989. (No model.)

To all whom it may concern:

Be it known that I, PETER W. TRIMBORN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Safety Devices for Elevators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in safety devices for elevators.

The object is to provide a simple and readily-applied mechanism adapted, in case of breakage or other accident or of the entrance of air into the cylinder proper of the elevator, to permit only of the gradual descent of the cage at the same rate of speed at which it normally travels, thereby obviating all danger of accident to occupants of the elevator.

With the above primary object in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully set forth and claimed.

In the accompanying drawings, Figure 1 is an elevation of an elevator-shaft with an elevator-cage therein and with my improved safety device in connection therewith. Fig. 2 is a sectional view of the main tube or pipe and the auxiliary tube; and Fig. 3 is an elevation of the main tube in connection with a modified form of the auxiliary tube, the latter being partly broken away.

Like numerals of reference denote like parts throughout the several views.

Referring to the drawings, the numeral 4 indicates an elevator well or shaft, and 5 the elevator-cage therein, which cage is operated by the usual cable 6, running over a sheave or pulley 7 in the upper part of the well or shaft.

Referring particularly to the improved safety device, the numeral 8 indicates a long vertical pipe or tube which is located in the elevator-well back of the cage 5. Within this tube or pipe is a piston 9, which has connected thereto a long piston-stem 10, said stem extending through a stuffing-box 11, fitted to the upper end of the tube or pipe. The extremity of the piston-stem is provided with a cross-head 12, which has its outer ends preferably enlarged to form bearing-surfaces,

which bear, respectively, against one wall of the elevator-well and against a guide-strip 13. In this cross-head is mounted a doubly-grooved sheave or pulley 14. One end of a cable 15 is secured to a fixed surface 16. This cable is continued down and beneath the sheave 14 in one of the grooves thereof, and is then extended upwardly over two pulleys or sheaves 17 17, which pulleys or sheaves are provided with a plurality of grooves and are mounted at an angle. The cable is then continued down through a sleeve 18, located just above the top of the elevator-cage. For the sake of safety the cable is then advisably wound several times around the cage and thence extended up through the sleeve 18, again over the pulleys or sheaves 17, thence downwardly and beneath the sheave 14 in the other groove of said sheave, and thence back to the fixed surface 16, at which point it is secured. If preferred, of course, the strands of the cable may terminate at the sleeve 18 and a separate cable extended from said sleeve and wound around the cage; or, again, the cable 15 may be attached directly to the top of the elevator-cage. By winding the cable around the cage, however, it is obvious that greater security is thereby obtained.

Extending obliquely from the main pipe or tube 8 is an auxiliary tube 19, the terminal portion of this tube being preferably extended in a vertical plane. The upper end of this tube is capped by a plate 20, which is provided with an air vent or opening 21. Extending up from this plate is a bracket 22, in which the valve-stem 23 is guided, said stem also passing through the air vent or opening and carrying at its lower end a gravity ball-valve 24. The portion of the auxiliary pipe indicated by the numeral 25 is square or rectangular in cross-section, and in this portion is pivoted a flat plate-valve 26. The upward swing of this valve is limited by an adjusting-screw 27.

In the operation of the device a pressure agent is confined in the pipe or tube 8 in the space between the top of said tube or pipe and the upper side of the piston 9. This pressure agent is advisably a liquid of any suitable character, such as water, oil, and the

like. Now it is obvious that as the cage descends a downward pull is exerted on the cable 15, and as this cable engages the sheave 14 the piston-stem 10 and its piston 9 are necessarily raised in the main pipe or tube. This has the effect of compressing the pressure agent and forcing it into the auxiliary tube 19. The pressure agent acting against the plate-valve 26 will throw said valve upwardly to the extent allowed by the adjusting-screw 27. This screw should be so adjusted as to permit the valve to be only partially opened, whereby a narrow or restricted opening in the auxiliary tube is formed, thereby requiring a greater power on the cable 15 in order to effect the raising of the piston 9. Of course the moment the pressure agent passes the valve 26 it begins to press on the column of air above it, and as the ball-valve 24 is down this air has an opportunity to escape through the valve-opening 21, so that the upward flow of the liquid is not retarded by air-pressure. The moment the column of water reaches the valve, however, it raises the same and closes the valve-opening. On the ascent or upward movement of the elevator-cage the tension or pull on the cable 15 is relieved, and as soon as this occurs the piston by its gravity and the weight and expansion of the pressure agent above will cause the descent of said piston. As this piston descends pressure on the ball-valve is relieved, which causes said valve to drop by gravity and allow air to again enter the auxiliary tube 19. The pressure agent acts against the flat plate-valve 26 and causes the swinging of the same on its pivot in an opposite direction to that shown in Fig. 2, and as there is nothing to retard the movement of the valve in that direction a large opening for the flow of the pressure agent into the main pipe is secured. From this arrangement it will be seen that the upward movement of the elevator-cage is not in the least interfered with, but on the contrary is facilitated; whereas the downward movement of the cage is limited to a certain speed. Now should the elevator-cable 6 through any cause break, or should air enter into the cylinder proper of the elevator, it is obvious that the cage cannot possibly descend at any faster rate of speed than its normal speed.

I have herein shown and described the valve 26 adapted for securing a restricted passage for the uplifted pressure agent and a wider passage for the downflowing pressure agent, and have also shown the modified construction, illustrated in Fig. 3 for accomplishing the same function. It will be understood, however, that such mechanism is not absolutely necessary, as it could be omitted and yet successful results obtained, although the device as a whole would not perhaps prove as desirable as when the valve mechanism is employed. When used without the valve mechanism, it is apparent that as the elevator-cage descends, and the piston 9 is thereby

raised, the downward movement of the cage is necessarily against the resistance offered by the pressure agent above the piston 9, which pressure agent by the up movement of said piston is lifted or forced into the auxiliary pipe 19. This resistance offered by the pressure agent above the piston 9 therefore limits the speed of descent of the elevator-cage.

In the modified form shown in Fig. 3, instead of employing the square or rectangular portion 25 in the auxiliary pipe, I provide said pipe with a supplemental passage 28. This passage is regulated by an ordinary gate-valve 29, the stem 30 of said valve provided on its exterior end with a hand-wheel 31 for manipulating the same. In the main passage 32 of this modified form is pivoted a valve 33, which valve is adapted normally to rest against a stop 34, which stop prevents the upward movement of said valve. In the working of this modified form, when the elevator-cage descends and the pressure agent enters the auxiliary tube or pipe, inasmuch as it cannot pass the valve 33, it enters the supplemental passage 28. The gate-valve 29 in this passage may be regulated so as to form only a small opening through which the pressure agent is permitted to pass. In this case it will of course require a greater pull on the cable 15 in order to force the pressure agent through this restricted opening, and consequently the elevator-cage will descend slowly. If now it is desired that the elevator-cage should descend more rapidly, the valve may be regulated so as to increase the opening. This is also true in regard to the form of valve illustrated in Fig. 2, which of course can regulate the size of the passage for the pressure agent by the adjusting-screw 27. After the pressure agent passes the valve 29 of Fig. 3 it then again enters the main portion of the auxiliary tube. On the up movement of the elevator-cage, as the pressure agent forces the valve 33 away from its seat, said pressure agent has an unobstructed flow without the necessity of passing through the supplemental passage 28. There is therefore no impediment to the free up movement of the elevator-cage.

From the above description it will be seen that my invention is not only simple and enduring in construction, but is furthermore comparatively inexpensive, and may be adjusted to any elevator already in use without changing or disarrangement of parts.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a safety device for elevators, the combination, of an elevator-cage, mechanism for operating said cage, safety mechanism separate from, and independent of, the operating mechanism, said safety mechanism consisting of a main pipe, a piston therein, said main pipe containing a pressure agent located therein on one side of the piston, an auxiliary pipe extending from the main pipe, and a con-

nection between the piston and the elevator-cage, said connection, as the elevator-cage descends, adapted to lift the piston, and thereby carry the pressure-column into the supplemental pipe, and when the elevator-cage ascends to permit the pressure-column by gravity to flow down the supplemental pipe back into the main pipe and against the piston, to assist said piston in its return stroke.

2. In a safety device for elevators, the combination with an elevator-cage, of a main pipe, a piston therein, a pressure agent located in the main pipe on one side of the piston, an auxiliary pipe extending from the main pipe, said auxiliary pipe provided with a valve-controlled air-vent, and a connection between the piston and the elevator-cage, said connection, as the elevator-cage descends, adapted to lift the piston and thereby carry the pressure-column into the supplemental pipe, and when the elevator-cage ascends to permit the pressure-column by gravity to flow down the supplemental pipe back into the main pipe and against the piston to assist said piston in its return movement.

3. In a safety device for elevators, the combination with an elevator-cage, of a main pipe, a piston therein, said main pipe containing a pressure agent located therein on one side of the piston, an auxiliary pipe extending from the main pipe, said auxiliary pipe having a restricted passage for the flow upwardly of the uplifted pressure agent, and a wider passage for the downflow of the pressure agent, and a connection between the piston and the elevator-cage, said connection as the elevator-cage descends, adapted to lift the piston, and thereby carry the pressure-column into the supplemental pipe, and when the elevator-cage ascends to permit the pressure-column by gravity to flow down the supplemental pipe back into the main pipe and against the piston, to assist said piston in its return stroke.

4. In a safety device for elevators, the combination, with an elevator-cage, of a main pipe, a piston therein, said pipe containing a pressure agent located therein on one side of the piston, an auxiliary pipe extending from the main pipe, a valve within the auxiliary pipe, means for regulating the upward throw of said valve, and a connection between the stem of the piston and the elevator-cage, substantially as described.

5. In a safety device for elevators, the combination, with an elevator-cage, of a main pipe, a piston therein, said pipe containing a pressure agent located therein on one side of the piston, an auxiliary pipe extending from the main pipe, a pivoted valve within the auxiliary pipe, an adjusting-screw adapted to limit the upward throw of the valve, and a connection between the stem of the piston and the elevator-cage, substantially as described.

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

PETER W. TRIMBORN.

Witnesses:

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