Aug. 3, 1926. 1,595,004

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PNEUMATICALLY OPERATED CHAIR FOR HOIST CAGES

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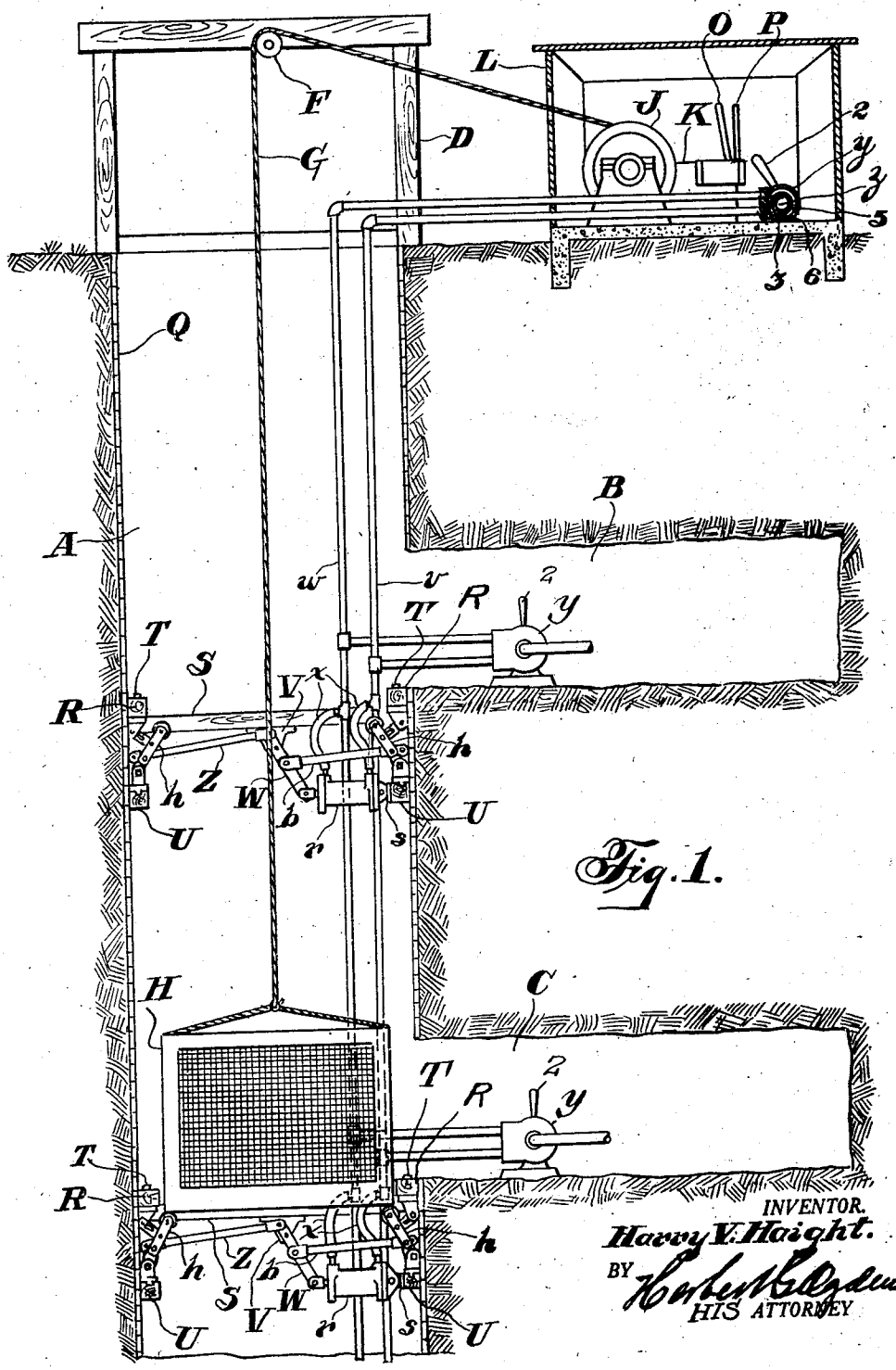


Fig. 1.

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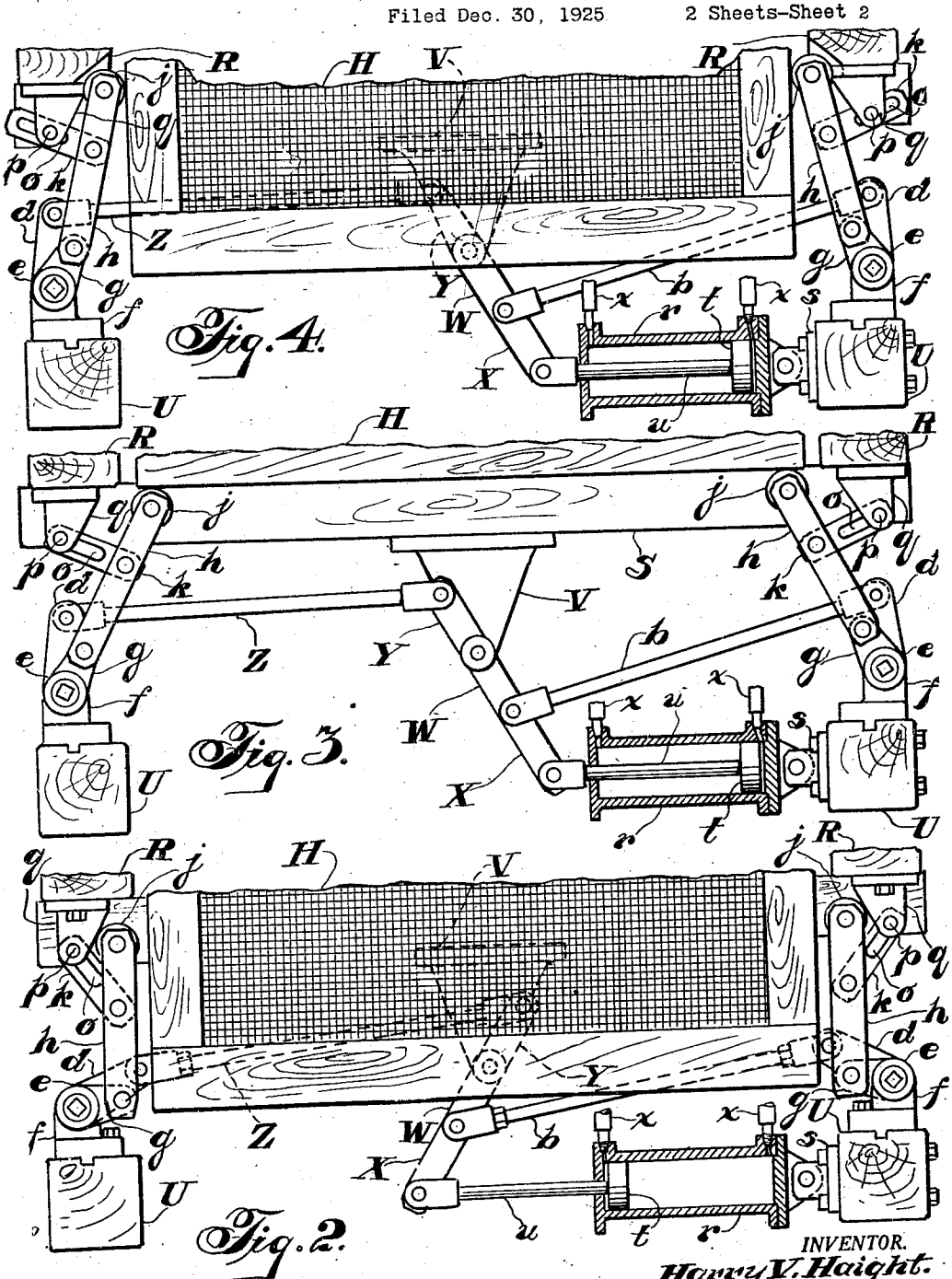


Fig. 4.

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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PNEUMATICALLY-OPERATED CHAIR FOR HOIST CAGES.

Application filed December 30, 1925. Serial No. 78,360.

This invention relates to supporting devices for hoist cages, but more particularly to pneumatically operated chairs for supporting hoist cages, such as are used for lifting iron ore, coal, etc., from mines to the surface of the ground.

The objects of the invention are to relieve the lifting cable of the weight of the hoist cage and its contents while the hoist cage is being loaded, to prevent excessive strains on the cable when the weight of the hoist cage is transferred from the chairs to the cable and to enable the chairs to be automatically moved out of supporting position by the hoist cage.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention consists of the combination of elements, features of construction and arrangement of parts having the general mode of operation substantially as hereinafter described and more particularly pointed out in the appended claims and illustrated in the accompanying drawings, in which

Figure 1 is an elevation in section of a mine shaft equipped with pneumatically operated chairs constructed in accordance with the practice of the invention,

Figure 2 is an enlarged detail view in elevation showing the chairs in releasing position,

Figure 3 is a view similar to Figure 2 showing the manner in which the chairs may be rocked into position to support a hoist cage, and

Figure 4 is a view similar to Figures 2 and 3 illustrating the manner in which the chairs may be rocked out of supporting position by the hoist cage in the up direction of the travel of the cage.

Referring to the drawings, A indicates a mine shaft from which lead at different levels, drifts B and C. A frame D spans the entrance to the mine shaft and supports a sheave F upon which is adapted to run a rope or cable G which supports at one end a hoist cage H and is secured at its other end to a drum J of a hoisting engine K. The hoisting engine K in this instance is housed in a shanty L and is provided with suitable levers O and P whereby the operator may control the direction of rotation of the drum J for lifting and lowering the hoist cage H. In the present instance the walls of the mine shaft A are reinforced by sheathing Q. The sheathing Q may be secured rigidly in position in the usual manner.

In accordance with the present invention, beams R are secured to the sheathing Q on opposite sides of the shaft A approximately on a level with the floors of the drifts B and C. In this instance cross beams S are supported by the beams R and are held securely thereto by suitable bolts T. At a suitable distance beneath the beams R are arranged somewhat similar beams U which may also be secured to the sheathing Q. Secured to the beam S in any suitable manner is a bracket V to the free end of which in this instance is pivoted a lever W. The pivotal point of the lever W is preferably near the upper end of the lever so as to form a long arm X and a somewhat shorter arm Y.

Attached pivotally to the lever W and on opposite sides of its pivotal point are rods Z and *b*. The opposite ends of the rods Z and *b* are in this instance pivoted to arms *d* of bell cranks *e* rotatable in bearings *f* which are supported by the beams U.

Secured pivotally to arms *g* of the bell cranks *e* are chairs *h* carrying at their free end rollers *j*. Between the ends of the chairs *h* are attached pivotal links *k* which are provided with oblong apertures *o* near their opposite end. The slots *o* in this instance are adapted to receive pins *p* in brackets *q* supported by the beams R.

Suitable means are provided for rocking the chairs *h* into and out of the path of the hoist cage H. To this end a horizontal cylinder *r* is pivoted at one end to a bearing *s* supported by one of the beams U. The cylinder *r* is provided with a reciprocatory piston *t* having a rod *u* which in this instance is attached pivotally to the free end of the arm X of the lever W.

Pressure fluid for actuating the piston *t* may be supplied by a pair of pipes *v* and *w* leading from the shanty L and adapted to communicate with the front and rear ends of the cylinder *r* through flexible connections *x*. The pipes *v* and *w* in this instance also serve as discharge pipes for releasing the pressure fluid from opposite ends of the cylinder *r*.

Any suitable means may be provided for controlling the admission of pressure fluid

to the cylinder r and for controlling the exhaust of pressure fluid therefrom. In this instance a convenient controlling means is shown in the form of a valve y having a central aperture z which may be in constant communication with a pressure fluid supply. The valve y carries a suitable lever 2 whereby said valve may be manipulated and has a port 3 adapted to register with one or the other of the pipes v and w for admitting pressure fluid to the ends of the cylinder r. A semi-annular groove 5 is formed on the valve y and is so positioned with respect to the port 3 that when said port is in position to admit pressure fluid into one of the pipes v and w the groove 5 will be brought into registry with the other pipe, so that when pressure fluid is admitted to one end of the cylinder r the pressure fluid in the opposite end of said cylinder will be simultaneously released. An exhaust port 6 in constant registration with the groove 5 affords an escape for the pressure fluid from said groove to the atmosphere.

Although the controlling valve y is shown conveniently located for the hoisting engine operator, it is to be understood that said valve may be located in either of the drifts B or C, or if desired, separate controlling valves may be arranged in both drifts so that either the hoisting engine operator or the hoist case attendant may control the chairs h.

In the operation of the device: Let is be assumed that the hoist cage H is about to be lowered into the main shaft A and that the chairs h are in the position illustrated in Figure 2. If then it be desired to lower the cage H to the position illustrated in Figure 1, the cage may be dropped past the chairs adjacent the drift B. After the cage has reached the position between the drifts B and C air may be admitted to the front end of the cylinder r to drive the piston t rearwardly and thus rock the chairs h into the supporting position shown in Figure 3. The cage may then be seated on the chairs and will be supported thereby during the loading period.

When the cage is again in readiness to be raised the valve y may be rocked to admit pressure fluid through the pipe v to the rearward end of the cylinder r. This will drive the piston t towards the forward end of the cylinder r and, in consequence, will rock the linkage connecting said piston with the chairs h so that the free end of the chairs will be rocked towards the walls of the shaft A, or in other words, into a releasing position.

The present invention has been found to operate in an unusually efficient manner and possesses the desirable advantage of gradually transferring the load of the hoist cage from the chairs to the cable G. The manner in which this is accomplished may be readily understood when it is noted that whenever the piston t is actuated in the direction for releasing the chairs, the arm g of the bell crank e is rocked downwardly so that the movement of the chairs h will also be downwardly. The movement of the chairs h being capable of being readily controlled, the transference of the weight of the hoist cage together with its load from the chairs h to the cable G may be brought about in a gradual manner. In this way the cable G will be protected against any excessive strains which might otherwise occur if the cage H were permitted to drop suddenly. Another desirable advantage is that if the hoist cage H were lifted from the lower flight of chairs without removing the flights of chairs at a higher level into releasing position, the chairs in the path of the ascending cage will automatically be displaced by the hoist cage as illustrated in Figure 4.

Owing to the manner in which the load of the hoist cage is transferred to the cable before the chairs start to rock towards the sides of the mine shaft, a small amount of power will be required for rocking said chairs from beneath the hoist cage, since little or no friction will have to be overcome.

As hereinbefore described, the chairs may be rocked into both the supporting and releasing positions by means of the piston t. It is to be noted, however, that the construction of the device is such that the chairs will drop automatically into the supporting position unassisted by pressure fluid, and will remain in such position until again released by the operator. This feature has been found to be very desirable in devices of this character since it eliminates the possibility of accidents which might otherwise be caused through the negligence of the operator or in case the supply of pressure fluid for actuating the chairs should fail.

I claim:

1. The combination with a mine shaft, a hoist cage, and a cable for said hoist cage, of chairs adapted to be moved into a position for supporting the hoist cage, and fluid actuated means including a cylinder and a piston for gradually lowering the chairs to transfer the weight of the hoist cage from the chairs to the cable and for removing the chairs out of the path of the hoist cage, said chairs being capable of automatically rocking to the supporting position and of remaining in such position in the absence of pressure fluid in the cylinder.

2. The combination with a mine shaft, a hoist cage, and a cable for said hoist cage, of chairs disposed on opposite sides of the mine shaft and adapted to be rocked into a position for supporting the hoist cage, linkage connecting said chairs, a cylinder

pivoted at one end and connected at its ends with a source of pressure fluid supply, and a piston in the cylinder, said piston being connected to the linkage for rocking the chairs simultaneously to extend into the path of the hoist cage upon the admission of pressure fluid to one end of the cylinder and to rock said chairs simultaneously downwardly and outwardly out of the path of the hoist cage upon the admission of pressure fluid to the other end of the cylinder.

3. The combination with a mine shaft, a hoist cage, and a cable for said hoist cage, of chairs arranged in pairs on opposite sides of the shaft, bell cranks pivoted to the chairs, linkage connecting the bell cranks, a cylinder pivoted at one end, a piston in the cylinder connected to the linkage whereby the bell cranks may be rocked to gradually lower the chairs for transferring the weight of the hoist cage to the cable and for rocking the chairs into and out of the path of the hoist cage in accordance with the direction of movement of the piston.

4. The combination with a mine shaft, a hoist cage, and a cable for said hoist cage, of chairs arranged in pairs on opposite sides of the shaft, bell cranks pivoted to the chairs, a bracket secured to the mine shaft between the chairs, a lever pivoted on said bracket, rods connecting the bell cranks with the lever, said rods being pivoted to the lever on opposite sides of the pivotal point of said lever, a cylinder supported pivotally at one end, a piston in said cylinder and connected to the lever for rocking the chairs downwardly to gradually transfer the weight of the hoist cage from the chairs to the cable and for rocking the chairs out of and into the path of the hoist cage in accordance with the direction of movement of the piston and a valve for controlling the admission and exhaust of pressure fluid to and from the piston.

5. The combination with a mine shaft, a hoist cage and a cable for said hoist cage, of chairs adapted to rock automatically into position for supporting the hoist cage, and fluid actuated means including a cylinder and a piston for gradually lowering the chairs to transfer the weight of the hoist cage from the chairs to the cable, and pipes leading from a source of supply to the ends of the cylinder for conveying pressure fluid to the cylinder for actuating the piston in opposite directions.

6. The combination with a mine shaft, a hoist cage and a cable for said hoist cage, of chairs at different elevations in the mine shaft adapted to rock automatically into position for supporting the hoist cage, said chairs being adapted to be automatically rocked into releasing position by the ascending hoist cage, horizontal cylinders pivoted to the side of the mine shaft, and pistons in the cylinders connected to actuate the chairs into supporting and releasing positions.

In testimony whereof I have signed this specification.

HARRY V. HAIGHT.