July 7, 1925. 1,545,232

C. W. BUTTRICK

PUMP UNIT FOR RAILWAY EQUIPMENT

Original Filed April 17, 1922 3 Sheets-Sheet 1

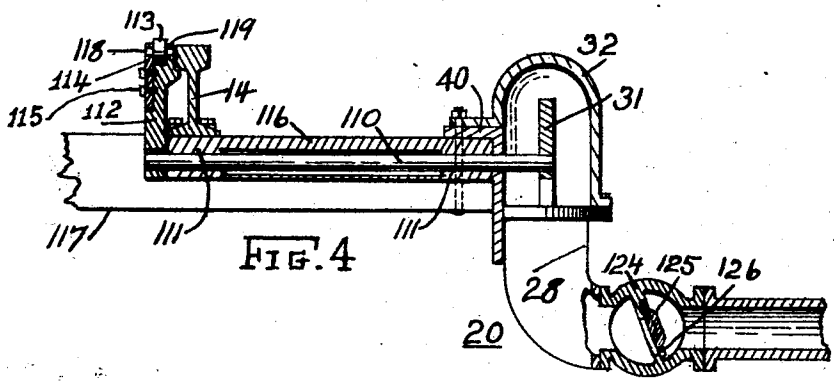


FIG. 4

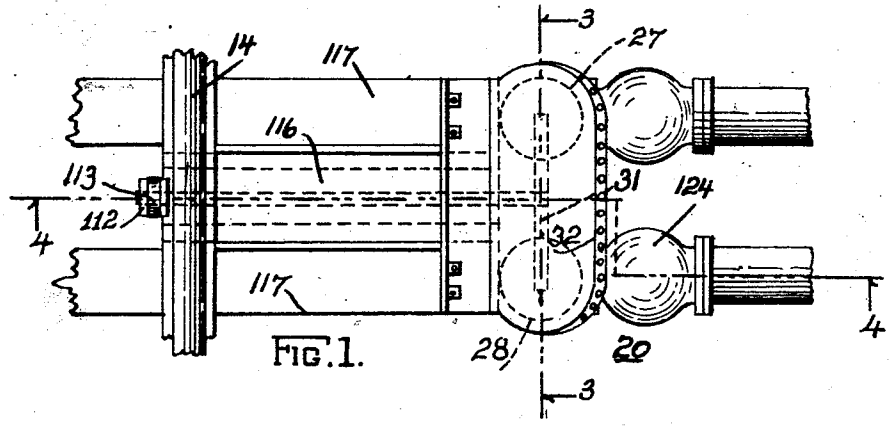


FIG. 1.

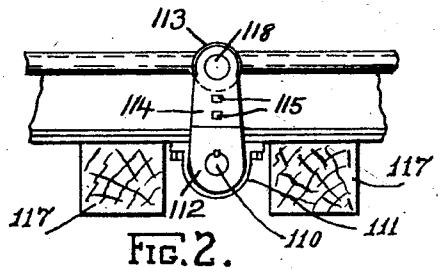


FIG. 2.

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PUMP UNIT FOR RAILWAY EQUIPMENT

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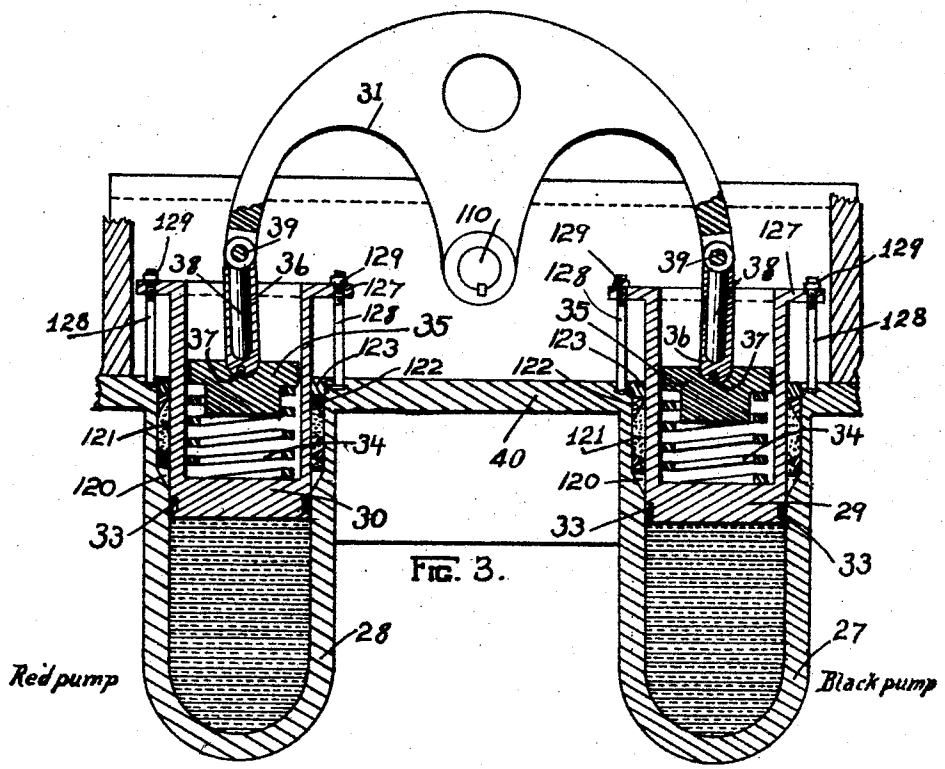


FIG. 3.

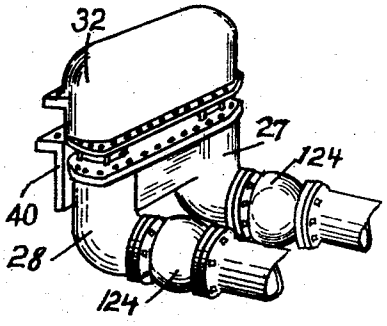


FIG. 5.

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PUMP UNIT FOR RAILWAY EQUIPMENT

Original Filed April 17, 1922 3 Sheets-Sheet 3

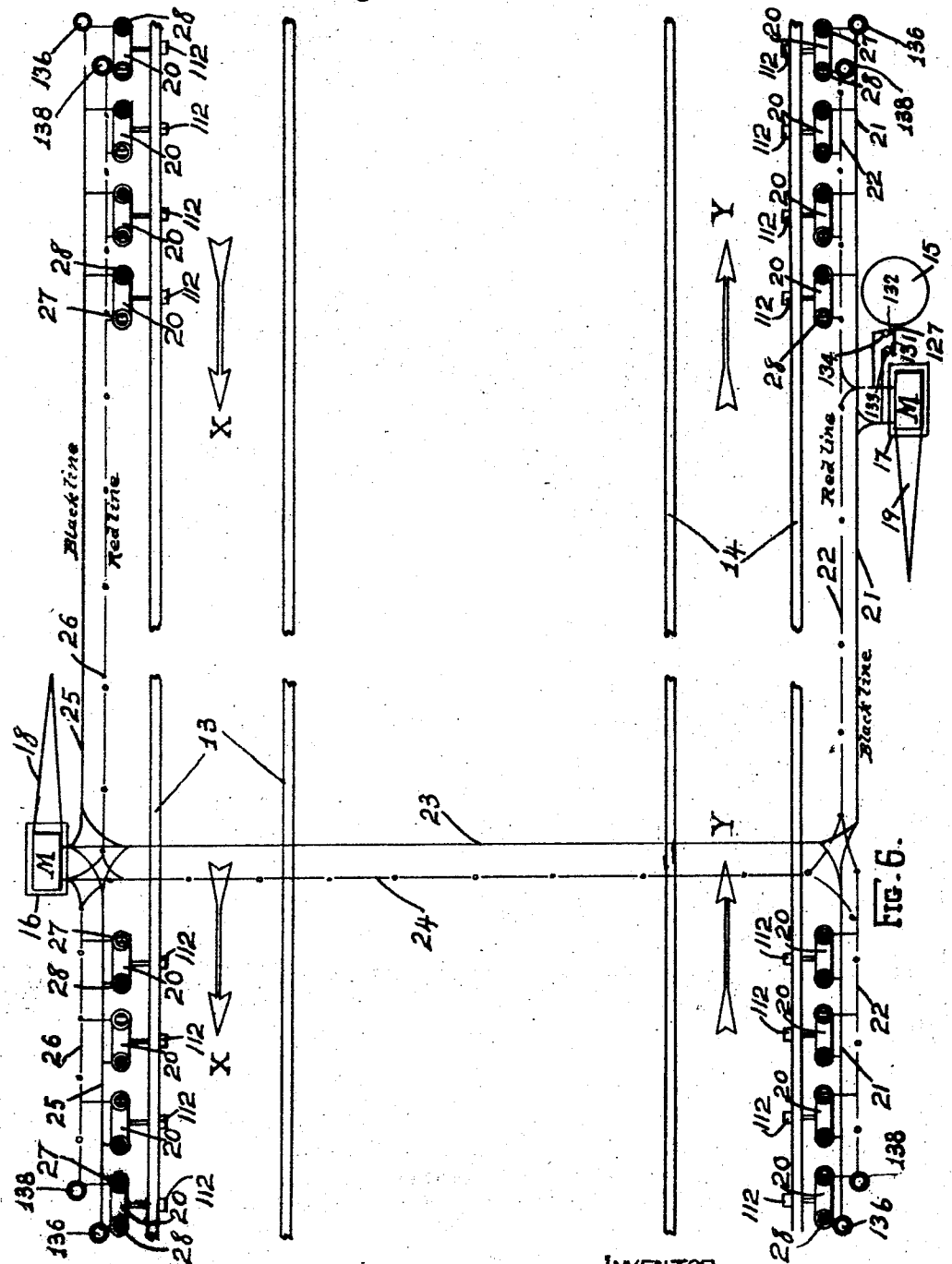


FIG. 6.

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UNITED STATES PATENT OFFICE.

CHARLES W. BUTTRICK, OF SPRINGFIELD, ILLINOIS.

PUMP UNIT FOR RAILWAY EQUIPMENT.

Original application filed April 17, 1922, Serial No. 553,623. Divided and this application filed October 17, 1923. Serial No. 669,001.

To all whom it may concern:

Be it known that I, CHARLES W. BUTTRICK, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Pump Unit for Railway Equipment, of which the following is a specification.

This application is a division of my application, Serial Number 553,623, Railway gate-equipment, filed April 17, 1922.

The invention relates to pump-units used for actuating fluid motors for operating railway gates or other mechanisms. I have shown in the drawings, and will now describe, pump units embodying my invention, as applied in a railway equipment comprising pump units, hydraulic or fluid motors, a reservoir containing fluid supply, pipe lines receiving fluid from the reservoir, pipe lines conveying fluid to and from the motors; and gates actuated by the motors; but it is obvious that the pump units may be used with equal advantage in other and different equipments without departure from my invention.

The purposes of the invention are: to provide a reservoir containing a supply of oil, in conjunction with a pipe system directing the flow of oil from the reservoir through the system; to provide means for maintaining practically constant air pressure on the oil in the reservoir; to provide a number of series of pumps operative by the flanges of car wheels running on railway tracks, the pumps of each series being in pairs, one pump of each pair being operative by trains moving in either direction on the track and the other pump of the same pair being likewise operative by trains moving in either direction on the same track; to provide pumps of improved construction; to provide improved means for securing the pumps in fixed relation to the rails of the track; to provide means for absorbing the shocks incident to the intermittent, sudden, and violent action of the pumps; to provide means for equalizing the pressure in all the pipe lines; and to provide other structural details, as will hereinafter appear.

With these ends in view, the invention consists in the novel features of construction and combinations of parts shown in the accompanying drawings, to which reference is hereby made. The invention will now be fully described and finally recited in the claims.

Figure 1 is a top plan of one pump unit embodying my invention;

Fig. 2 is an end view of the same pump unit;

Fig. 3 is an enlarged, vertical section taken on the line 3—3 of Fig. 1, the rocking plate being shown in elevation;

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 1;

Fig. 5 is a reduced perspective view of one detached pump unit, showing the cover raised somewhat above the cylinders of the unit; and

Fig. 6 is a diagram of a railway gate equipment comprising a plurality of sets of pump units embodying my invention.

The same reference letters and numerals designate the same parts in all the views.

In Fig. 6 I have shown a railway equipment comprising two parallel tracks 13 and 14; two sets of pump units 20 adjacent to each track, each set comprising four pump-units, but each set may comprise a greater, or less, even number of pump-units, without departure from my invention. I have also shown gate stands 16 and 17 containing fluid motors M which actuate the respective gates 18 and 19.

A reservoir 15 adjacent to the railway tracks contains a supply of oil or other fluid under compressed air. Black pipe lines 21, 23 and 25 inter-communicate between the reservoir 15, the black pumps of the pump units 20, the motors M, and the terminal air domes 136; and red pipe lines 22, 24 and 26 intercommunicate with the red pumps of the pump units 20, the motors M and the terminal air domes 138. Fluid from the reservoir supplies loss from leakage in any part of the system.

A pipe 127 communicates with the interior of the reservoir and with the pipes 131 and 132 of the pipe system. An outwardly opening valve 133 controls the flow of the oil in the pipes 127 and 131, and a similar valve 134 controls the flow of oil in the pipes 127 and 132.

The valves 133 and 134 open outwardly in order that if the pressure in the pipe lines 21 and 22 or either of them, is less than normal the proper valve or valves will operate to admit oil from the reservoir into either or both pipe lines, to replace oil and

thereby restore equilibrium throughout the pipe line system.

The pump units are all alike; so a description of one will suffice for all. The pump unit is of cast iron and comprises a base plate 40; cylinders 27 and 28 integral with the base plate; a piston 29 slidable in the cylinder 27; a piston 30, (Fig. 3) slidable in the cylinder 28; a rocking plate 31 operatively connected with the pistons 29 and 30; a cover 32 having a flange connection with the cylinders 27 and 28 and serving to protect the operating parts of the pump-unit from dirt, from rain, snow, and ice; and other structural details now to be described.

The cylinders 27 and 28 have counter bores 120 to receive packing 121 surrounding the respective pistons 29 and 30. Rings 122 of wedge-shape cross section press the packing into close contact with the circumference of the pistons, to prevent leakage. Annular screw-threaded followers 123 engage internal screw threads in the counter bores 120 and act to press the rings 122 evenly downward, to assure uniform pressure, all around, on the packing 121.

The cylinders 27 and 28 are equipped with valves 124 (Fig. 4) having gates 125 opening outwardly to permit free outward flow of fluid (preferably oil) from the cylinders, each gate having a leak opening 126 to permit gradual return flow of fluid into the cylinders. While the piston is being depressed the valve-gate will be open and fluid from the cylinder will flow rapidly through the valve, to the pipe line.

When the valve gate is closed, fluid from the pipe line will pass through the openings 126 into the cylinder, to raise the piston gradually and fill the cylinder with fluid, in readiness for the next downward movement of the piston, and so on, for each recurring upward and downward movement of the piston.

The rocking plate 31 is secured on a shaft 110 which oscillates in bearings 111 (Fig. 4) in the stationary plate 116.

The plate 116 fills the space between the ties 117; and the rail 14 and the cylinders 27 and 28 are firmly united with the plate, to strengthen the structure so that it will withstand the severe shock and strain to which it is subject.

A lever 112 (Fig. 4) is keyed on the shaft 110 and normally occupies a vertical position and has an integral extension 119 adjacent to the head of the rail 14.

A keeper 114 is secured on the lever 112 by screws 115.

A roller 113 at the upper end of the lever has trunnions 118 which rotate freely in aligned holes in the extension 119 and in the keeper 114. The roller 113 is in such relation to the head of the rail, that the flange of a car wheel running on the rail will engage the roller to depress the lever.

Cup-shape pistons 29 and 30, each having at its upper end an integral rim 127 and each having a packing ring 33 near its lower end, are adapted to slide in the respective cylinders 27 and 28.

Stiff coiled springs 34 occupy the cups of the respective pistons 29 and 30 and serve to absorb shocks incident to the rapid and violent action of the moving parts.

Followers 35 are supported on the respective springs 34 and are adapted to slide inside the respective pistons 29 and 30. Tubular link-members 36 are connected with the blocks 35, by pivots 37.

Plungers 38, connected with the rocking plate 31 by pivots 39, are adapted to slide in the tubular links 36.

Vertical rods 128, screw-threaded at their upper ends and provided with nuts 129, are fixed at the upper ends of the respective cylinders 27 and 28, and extend through the piston flanges 127. When the parts are assembled and the nuts are on the rods, the nuts may be adjusted to vary the scope of the outward sliding of the pistons and to prevent complete expulsion of the pistons from the cylinders,

In order to describe clearly the mode of operation of the equipment it is necessary to distinguish, from each other, the two pumps which constitute a single pump-unit. For this purpose I will call one pump "red" and the other pump "black". In Fig. 6 I have indicated conventionally a red pump and a black pump in each pump-unit. As a matter of convenience in installing the equipment, the colors red and black will preferably be used to distinguish the pumps of each unit. The pipes with which the red pumps are connected are indicated by lines which I call "red" lines, each of which is broken and dotted; and the pipes with which the black pumps are connected are indicated by solid lines which I call "black" lines. The two sets of pump-units, adjacent to any one rail of a track at a place where the track is crossed by a highway, are preferably, but not necessarily, arranged in a block, such a distance apart from each other that one train will not ordinarily be on both sets of pump-units at the same time; and are such a distance apart from each other that after the pump units in one set have been passed, the levers 112 of that set will normally be returned to vertical position, as already described, before the pump units of the other set will be brought into action; and furthermore, the pump units of each set are in such relation to each other, and cooperate in such manner that a train entering the block from either direction will operate the levers 112 of that set to operate the red pumps to effect the closing of the two gates; and the

same train backing out of the section will operate the black pumps to effect the opening of both gates.

The mode of operation of the respective pump-units will now be described:

The railway track will be divided into blocks and a series of pump-units will be located at each terminal of each block as shown in Fig. 6. For convenient recital, I will designate the vehicle running on the track as a "car", but it is to be understood that the vehicle may be a locomotive, a train of cars, or a single car. I will also designate the wheel of the vehicle which first strikes an operating lever 112, as the "car wheel" or simply as the "wheel".

Assume that the car running on the track 13 is entering the block in the direction indicated by the arrow X. The first car wheel will depress the first lever 112 in the set of pump-units at the right hand terminal of the block and will in succession depress the other levers 112 of the same series. The depressing of the successive levers 112 will cause the piston of each red pump to force fluid from the cylinder of that pump into and through the red pipe line to the motor M. to actuate the gate 18 and effect closing of the gate. While the piston of the red pump is active the piston of the black pump will remain inactive by reason of the upward sliding of the plunger 38 in the tubular link 36 which is pivotally connected with the R. H. follower 35 in the piston 29 of the black pump and conversely, the piston of the red pump will remain inactive while the piston of the black pump is active.

If the car reverses its direction and backs out of the block the leading wheel of the car will depress the lever 112 of the left hand pump-unit of the series of pump-units at the right hand terminal of the block and will depress in succession the other levers 112 of the same series, resulting in depressing the pistons in the black pumps to force the fluid through the black pipe line into and through the motor M. to actuate the gate 18, to open the gate.

If, however, the car proceeds through the block, in the direction X the leading wheel of the car leaving the block will depress the lever 112 of the right hand pump-unit of the set of pump-units at the left hand terminal of the block, to depress the piston of the black pump to force fluid through the left hand black pipe 25 to and through the motor to actuate the gate to open the gate; and so on for each successive pump-unit. From the foregoing description, it will be seen that the wheel of a car entering the block from either direction will be effective to operate the red pumps successively to attain cumulative action of the red pumps to actuate the motor, to close the gate; and the wheel of a car leaving the block in either direction will be effective to operate the black pumps successively to attain cumulative action thereof, to actuate the motor to open the gate.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. A pump unit comprising two parallel cylinders; pistons slidable in the respective cylinders; an oscillative horizontal shaft intermediate of said cylinders; a lever fixed on said shaft and adapted to be operated by the flange of a wheel running on a track rail adjacent to the lever; a rocking plate attached to said shaft; followers slidable in the respective pistons; springs supporting said followers; tubular links pivotally connected with the respective followers; and rods pivotally connected with the respective terminals of the rocking plate and telescoping in the respective tubular links, to permit sliding movement of each piston independently of the companion piston.

2. In an appliance of the class described, the combination of twin cylinders adjacent to a railway track; pipe lines communicating with the respective cylinders; an oscillative shaft at right angles to the track; a lever fixed on the shaft; a rocking plate secured on said shaft; and valves inter-communicating with the respective cylinders and pipe lines, said valves being adapted to open to permit free exit of oil from the respective cylinders into the respective pipe lines, each valve having a leak opening admitting oil under air pressure into the cylinder with which that valve is connected.

3. In an installation of the class described, the combination of a track rail; plural sets of pump units adjacent to the track rail; an operating lever co-acting with each pump unit; a reservoir containing oil under air pressure; pipe lines in communication with the reservoir and with the respective pump units; gate stands on opposite sides of the track; engines inside the respective gate stands and operated by oil under air pressure flowing through pipe lines; and gates operated by said engines.

4. In an appliance of the class described, the combination of a track rail; a reservior containing fluid supply; duplex pipe lines receiving fluid from the reservoir; a fluid-actuated motor receiving fluid at one end from one pipe line, and at the other end from the other pipe line; and duplex sets of pump units adjacent to said track rail, each set consisting of an even number of duplex pump units, each pump unit comprising two pump cylinders, one receiving fluid from one pipe line and the other receiving fluid from the other pipe line; hollow pistons in said cylinders; coiled springs inside the respective pistons, followers supported on said springs, a rocking plate in operative

relation to both pistons, tubular link members pivotally connected with said followers and plunger rods pivotally connected with said rocking plate and telescoping in said tubular links.

5. In an appliance of the class described, the combination of a block of railway track; a series of pump-units at each terminal of the block, each pump-unit comprising two individual pumps complemental to each other, one inactive while the other is active; a fluid motor; a gate operated by said fluid motor; pipe lines connecting the respective individual pumps with the motor; and wheel-actuated means for operating one individual pump of each pump-unit of a series, to effect closing of the gate when a car going in either direction on the track comes into the block, and for operating the other individual pump of each pump-unit of a series, to effect opening of the gate when a car going in either direction on the track leaves the block.

6. The duplex pump structure, comprising two cylinders; hollow pistons sliding in the respective cylinders; coiled springs, one in each piston; slidable followers supported on the respective springs; tubular link members pivoted on said followers; a rocking plate in operative relation to said followers; and plungers pivotally connected with said rocking plate and telescoping in said tubular links; said rocking plate plungers, tubular links, springs and hollow pistons coacting to permit the depressing of either piston independently of the other.

7. A duplex pump unit comprising two cylinders; pistons slidable in the respective cylinders; a rocking plate in operative relation to said pistons, followers in the respective pistons; and connecting devices connecting the respective followers with the rocking plate in such manner that it may cause the depressing of either follower without raising the other.

8. A pump unit comprising two cylinders in juxta-position to each other, pistons operating in the respective cylinders and piston-actuating means effective to actuate each piston independently of the other.

9. A pump unit comprising two cylinders, parallel to each other; a rocking beam having its axis intermediate relative to said cylinders; means for actuating said rocking beam; means supplying fluid in said cylinders; pistons slidable in the respective cylinders; and means connecting the rocking beam with the respective pistons in such manner that upon the descent of either piston the complemental piston will be ineffective.

In witness whereof I have hereunto signed my name at Peoria, Illinois, this 17th day of September, 1923.

CHARLES W. BUTTRICK.

Witnesses:
HILA M. BROWN,
RUDEL MCKINNEY.