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COMPLETE SPECIFICATION.

Improvements in Machinery or Arrangements for Lifting, Lowering, Carrying, or Transporting Loads Actuated by Electricity.

I, JOHN AUDLEY FREDERICK ASPINALL, of Horwich, in the County of Lancaster, Chief Mechanical Engineer of the Lancashire and Yorkshire Railway Co., do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to mechanism and arrangements for lifting, lowering and carrying or transporting loads, and has been more particularly designed for dealing with luggage and transferring it say from one railway platform across to other platforms, but may as will be obvious, be applicable for other purposes.

The machinery is actuated by electricity from some suitable source, such as a dynamo, and the man having charge of the machine and who drives or manipulates it (hereinafter called the driver) is carried along with the machine or apparatus. It will be most readily described by reference to the accompanying drawings, in which:—

Fig. 1, is an elevation partly in section in a plane at a right angle to the rails upon which the carriage of the machine works.

Fig. 1^A, is a sectional elevation of the upper part of Fig. 1, (which is omitted from Fig. 1) showing the staple frame and the mode of connecting it with the suspension rods.

Fig. 2, is a side elevation of parts or some of them shown in Fig. 1, in a plane at a right angle to Fig. 1, and parallel to the lengthway of the rails upon which the carriage works.

The rails for the carriage are carried or suspended in any convenient manner.

Fig. 3, is a front view detached (the edge view of which is shown in Fig. 2) of the mechanism for manipulating the carriage.

Fig. 4, is a flat view of a notched plate hereinafter mentioned.

Fig. 5, is a cross section of a part hereinafter referred to.

In the Figure 1^A, a , is a screwed suspension rod which is adjustably connected with a two legged strap of metal a^1 , each leg of which is bolted rivetted or otherwise secured to the upper part of a staple shaped frame a^2 .

These suspended frames a^2 , are suitably stayed to prevent lateral movement.

To each leg of each staple frame a^2 , which frames are placed at intervals, and are each suspended by a rod a a rail is secured by a stud b^2 there is thus one rail b , secured to one leg and a rail b^1 , to the other leg of each frame a^2 , forming a pair of rails for the wheels of the carriage c , to run upon. This suspended railway b, b^1 , is made to pass from any desired point, say a suitable platform to any other desired point in any required direction, the rails b, b^1 , being suitably curved when desired, taking care that the radius of the curve when required is not too small.

The studs b^2 , which carry the rails b, b^1 , are secured in the legs of the staple frame a^2 , and are insulated from such frame by wood or ebonite or other suitable non-conductor of electricity.

The carriage is formed by two suitable side frames c , connected by suitable cross stays, and in the upper part of the side frames there are bearings for two

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axles c^1 and c^2 . Upon each end of each axle outside the framing c , there is a wheel c^3 , secured, which wheels have a flange on each edge, the rails coming between these flanges of the wheels.

Between the boss of each wheel c^3 , and its tyre there is a wood disc which thus insulates the tyres of the wheels c^3 , from the axles c^1 or c^2 . 5

There is or may be a crank pin c^4 , in each wheel, the two crank pins on one side at a right angle to the two on the other side, and these crank pins c^4 , on each side are or may be connected by coupling rods c^5 .

One carrying rail b or b^1 , is connected up with one pole, say the outer current from the actuating dynamo, and the other carrying rail with the other pole, or backward current to the dynamo. 10

On the framing c , there are brackets d , carrying brushes or collectors, which are in contact with the tyres of the carrying wheels c^3 , on one side, which wheels take the electric current from the rails they work upon, and from these brushes or collectors the current is conducted by a suitable wire or wires 15 to the commutator and to the electro-motor on the carriage c , hereinafter referred to.

In the centre of the carriage between the two side frames c , there are bearings for a vertical shaft, as hereinafter explained, the lower end of which is coupled as hereinafter explained, with the upper end of the vertical shaft of the armature 20 of an electro-motor, which is or may be of any ordinary and well known construction; the side frames of which motor e , are secured to the side frames c , of the carriage, by screws or otherwise. The frame of the electro-motor has a cross bar e^1 , at its upper end, and another cross bar e^2 , at its lower end, these cross bars carrying the bearings of the armature shaft e^3 , of the motor. This motor is of such 25 kind as can be rotated equally well in either direction.

The upper end of the armature shaft e^3 , and the lower end of the shaft g , have each secured to them a boss having two arms with lateral projections e^4 . These projections come into corresponding holes or notches in a plate e^5 , (shown detached by Fig. 4) which comes between the arms, thus providing for any want of 30 true axial correspondence between the armature and vertical shafts.

The wires conducting the current to and from the electro-motor from the collectors pass through the commutator and are arranged in any ordinary manner.

In the framing of the carriage c , there are bearings for a vertical shaft f . 35

This shaft f , has a worm f^1 , formed or secured upon it that gears with a worm wheel f^2 , secured on the carrying axle c^1 , so that when the worm wheel f^2 , rotates, the carrying wheels c^3 , on axle c^1 , (and the wheels c^3 , on axle c^2 , are rotated by the coupling rods c^5) and cause the carriage c , to move along the rails in either 40 direction.

The lower end of the shaft f , has a disc f^3 , formed or secured upon it, which disc forms one side or half of a friction clutch. There is a corresponding disc or friction clutch g^3 , formed upon or secured to the end of the hollow axle or shaft g^6 , which hollow axle or shaft g^6 , works in a bearing g^7 in the framing of the carriage c . 45 The hollow axle or shaft g^6 , has a worm g^1 , formed upon or secured to it gearing with worm-wheels g^2 , on two axles or shafts g^4 , having bearings on the side frames c , of the carriage. Working through and having its bearings in the hollow axle or shaft g^6 , is another shaft g , on whose upper end is a double disc or friction clutch h ; each face of the disc or friction clutch h , forms the other part of the friction clutch for those on the shaft f , and hollow axle or shaft g^6 . 50

This double clutch h , before referred to, slides on the vertical shaft g , upwards or downwards, upwards to bring the upper side of the double clutch h , in contact with and so as to drive the disc or clutch f^3 , on the lower end of the upper shaft f , and thus rotate the carrying wheels c^3 , of the carriage, and downwards to bring the lower disc of the double clutch h , in contact and so as to drive the clutch disc g^3 , 55 on the upper end of the lower hollow axle or shaft g^6 , and thus rotate the shafts g^4 , for lifting and lowering as hereinafter explained.

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The double clutch h , is actuated by a lever h^1 , having its fulcrum h^2 , on the ends of two links h^3 , the other ends of which are jointed to the framing of the carriage.

When the double clutch h , is in its middle position it does not drive either disc f^3 or g^3 .

The manner of actuating this clutch lever h^1 , will be hereinafter described.

At the upper end of shaft f , a flanged pulley f^6 , is secured, partly round which a belt or strap passes, the ends of the belt or strap being attached to the upper end of a lever f^6 , having its fulcrum on the axle c^2 , of one of the carrying wheels, and to the lower arm of this lever f^6 , one end of a cord f^7 , is attached, the other end of which passes over a guide pulley f^8 , attached to the framing and its end comes conveniently to the hand of the driver. The object of this is to arrest the momentum of the carriage c , when the motor is stopped after the current of electricity is cut off.

There is a bracket i , extending across the back of plate l , attached to it and vertically adjustable, the ends of which forms the axles of the two small wheels i^2 . These small wheels i^2 , are insulated from the axles i , same as the carrying wheels c^2 , from their axles.

The underside of the small wheels i^2 , does not quite touch the surface of the carrying rails b or b^1 , in ordinary working, but comes against them when the momentum of the carriage would cause it to tilt, and these small wheels i^2 , provide against such tilting.

On each axle g^4 , driven by the worm wheel g^2 , there are two pulleys g^5 , one is a fixture, it does not rotate, and has one end of a chain j^1 , attached to it, which passes from the pulley downwards to a pulley block j , then up and over the pulley attached to the axle g^4 , then partly under this pulley g^5 , and against another pulley j^2 , mounted on a stud in a bracket from the side frames c , of the carriage.

This small pulley j^2 , acts to pinch the chain j^1 , between the two pulleys j^2 and g^5 .

When winding up the chain j^1 , the pulley block j , ascends, the other side of the chain j^1 , descends, and passes through a guiding tube j^3 , secured to a stud in the framing c , of the carriage.

The descending part of the chain j^1 , is received into a trough j^4 , suspended by a bracket j^5 , from each pulley block (see Fig. 1) as there is a corresponding pulley block for each of the two shafts g^4 , arranged as above described.

To the lower ends of the brackets j^5 , from the pulley blocks j , the upper ends of chains j^6 , are attached, the lower ends of which chains have hooks to hook upon the sides of the skip or box into which luggage or other articles are placed which are to be lifted, transported and lowered. These skips or boxes have wheels, below their bottoms upon which they may be moved about on the ground or floor upon which they may rest when unhooked from the chain j^6 , connected with the pulley blocks j .

There are arms c^6 , from the sides of the carriage c , to which one end of a broad belt k , is secured, the other end of which is secured to the bracket l^2 , which is attached to the two main frames c , the broad belt k passing through a loop c^8 , connected to the framing.

The driver sits on this broad belt with one leg on one side and the other leg on the other side of the carriage, and the calves of his legs rest on curved supports c^9 , secured to the carriage as shown in Fig. 1.

The driver manipulates the carriage when seated as explained by four handles or "pulls" in addition to the brake cord or band f^7 , and the arrangement of these handles and their action on the clutch lever h^1 , and commutator will be next explained more particularly by reference to the Figures 2 and 3.

The driver when on his seat k , and with his legs on the rests c^9 , faces and sees the mechanism as shown in Fig. 3.

This mechanism consists of a plate frame, attached to brackets or arms l^1 and l^2 ,

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the frame being formed by a plate l and the top and bottom brackets or arms l^1 , and l^2 , which are connected with the two sides c , of the carriage frame.

In the middle of the top bracket or arm l^1 , there is an eye bolt l^3 , which is insulated from the bracket or arm l^1 , and a similar eye bolt l^4 , in the lower bracket or arm l^2 , the latter adjustable in length also insulated from the bar.

One end of the helical springs l^5 , is hooked into the eye of the bolts l^3 and l^4 , the other end of each spring l^5 , is hooked to a hole in the end of a rod m or m^1 , connected with a part m^8 , which parts m^8 , are secured to a swivel part m^4 .

This swivel part m^4 , is secured from coming off the end of the lever h^1 , by a pin m^8 , through a hole across the end of the lever h^1 .

This swivel part is formed of three separate parts, the middle part m^4 , having an arm m^6 and m^7 , from each side with an eye in it for cords to be attached to, the other two parts m^8 , (connected with the rods m and m^1) one above and one below bolted to the central part m^4 , by two bolts, but material is placed between the parts to insulate the parts m^8 , from the central part m^4 .

There are four contact pins or studs, n , n^1 , n^2 and n^3 , secured in and insulated from the framing l , and on the back of each stud n , n^1 , n^2 and n^3 , there is a screw nut n^4 , by which the conducting wires can be firmly pinched between the screw nut and a washer on the stud and the end of the screw nut securing the stud in the framing l .

The front end of each stud has a tube n^5 , upon it, closed at one end except for a hole for a screw n^6 , to pass through and screw into the screw tapped end of the stud (see stud n^3 , Fig. 2, shown in section with the tube n^5 , upon it) and by this screw n^6 , the tube n^5 , may be held when turned round on the stud in any required position.

The rods m and m^1 , have each the end of a contact stud m^2 , screwed in them and each stud m^2 , has a hole in its end in the lengthway of the stud for the end of the conducting wire, which is secured in this hole by a screw in the side of the stud. The rods m and m^1 , are cased on three sides with a sheath m^9 , secured by split pins m^a , as shown in Fig. 5.

This arrangement of the contact studs n , n^1 , n^2 and n^3 , and the connecting conducting rods m and m^1 , is to provide against the effect of "sparking" which digs holes into the metal coming in contact and by constructing the parts as described, the tubular surfaces n^5 , on the contact studs may be turned when required to present a new surface and may then be secured by the set screw n^6 .

The surfaces of the conducting rods m and m^1 , may also be readily renewed by replacing the sheathings m^9 , when required.

Two cords p and p^1 , are attached one to the eye of each arm m^6 , and m^7 , each cord passes downwards through a guide eye secured to the framing l , and is then attached to a handle q . On the underside of the guide eye for the cord of one handle q , a name plate p^2 , secured to framing l , has the word "Lift" upon it and that for the other handle q^1 , a name plate p^6 , secured to framing l , has the word "Lower" upon it.

Cords p^3 and p^4 , are also attached to the eyes in the arms m^6 , and m^7 , and then pass upwards each to a pulley p^5 , on a stud in the framing l , then each of them passes downwards through guide eyes and each to a handle q^2 or q^4 . On the underside of one of the guide eyes a name plate p^7 , secured to framing l , has the word "Backward" and on the underside of the other a name plate p^8 , secured to the framing l , has the word "Forward" upon it.

If the handle q , is pulled down, the side of the lower connecting rod m^1 , is pressed against the contact stud n^3 , and the side of the upper connecting rod m , against the stud n , and if the handle q^1 , is pulled the sides of those connecting rods are pressed against the other contact studs n^2 and n^1 .

The same contacts are made when the handles q , and q^4 , are pulled and the reverse contacts are made when the handles q^2 and q^1 , are pulled.

By the first pull of the handles the contacts are made and the current passes to

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the electro-motor driving it in one direction, and when the motor is to be reversed, it is done by pulling the desired handle.

Handle "Backward" and "Lower" causes the motor to rotate one way and handle "Lift" and "Forward" causes it to rotate the contrary way.

5 Thus the rotation of the motor is started by the first pull of the handle and almost at the same time the friction clutch lever h^1 , brings one or the other clutch into gear.

As shown in Figs. 1, 2 and 3, the motor is motionless, there are no contacts between the connecting rods m or m^1 , and contact studs and the friction clutch lever h^1 , is in the middle position.

10 The handles "Lift" and "Lower" actuate the lower or hoisting and lowering clutch, and the handles "Backward" and "Forward" the upper clutch for moving the carriage c , to and fro along the rails b and b^1 .

When the handles are released the springs l^b , bring the clutch lever h^1 , into its middle non-acting position and breaks the electric contacts.

15 The necessary electric connections can be made by any electrician and do not embody any novelty.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination of mechanism substantially as and for the purpose hereinbefore described and illustrated by the drawings.

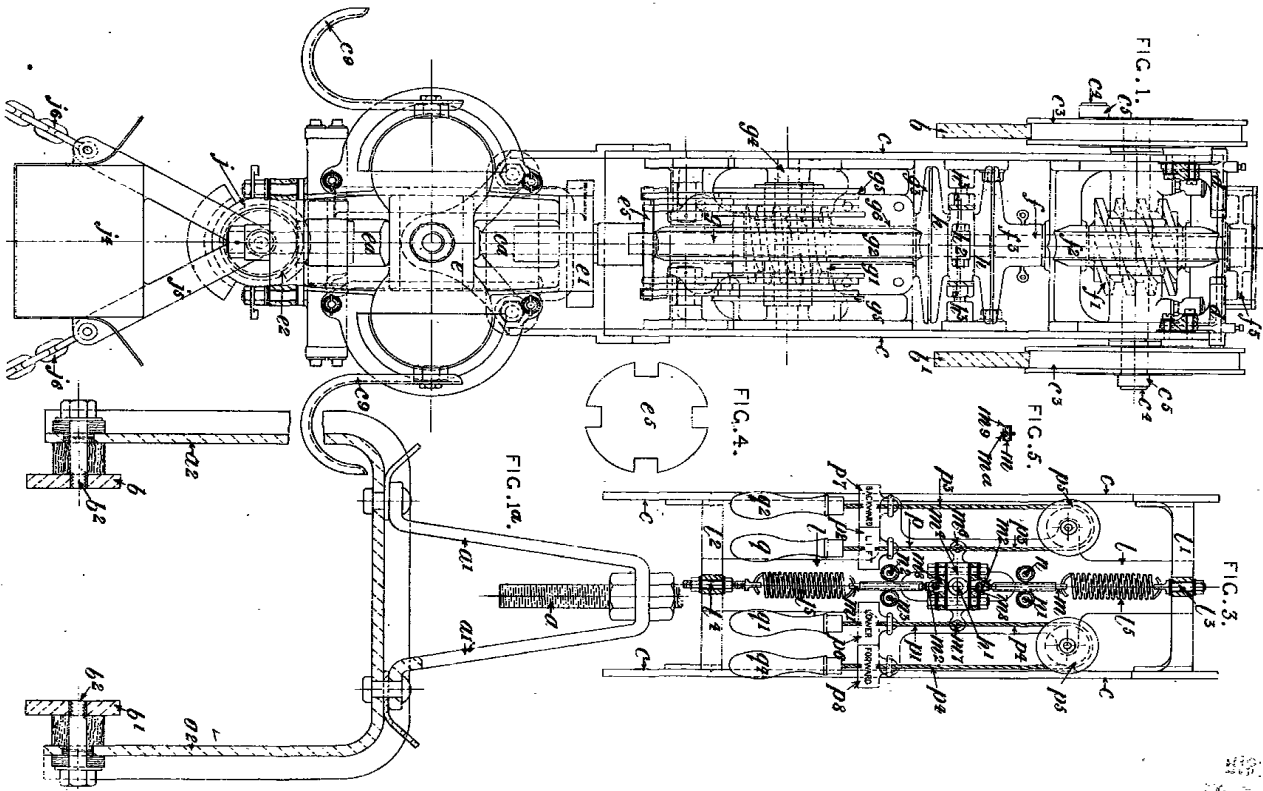
2. The combination of motor shaft, with two shafts one having a worm to drive the carrying wheels, the other a worm to drive the lifting and lowering axles, substantially as and for the purpose hereinbefore described and illustrated by the drawings.

3. The combination of the actuating handles with the clutch lever so that the required electrical contacts and clutches will be brought into connection by pulling one of the four handles, substantially as hereinbefore described and illustrated by the drawings.

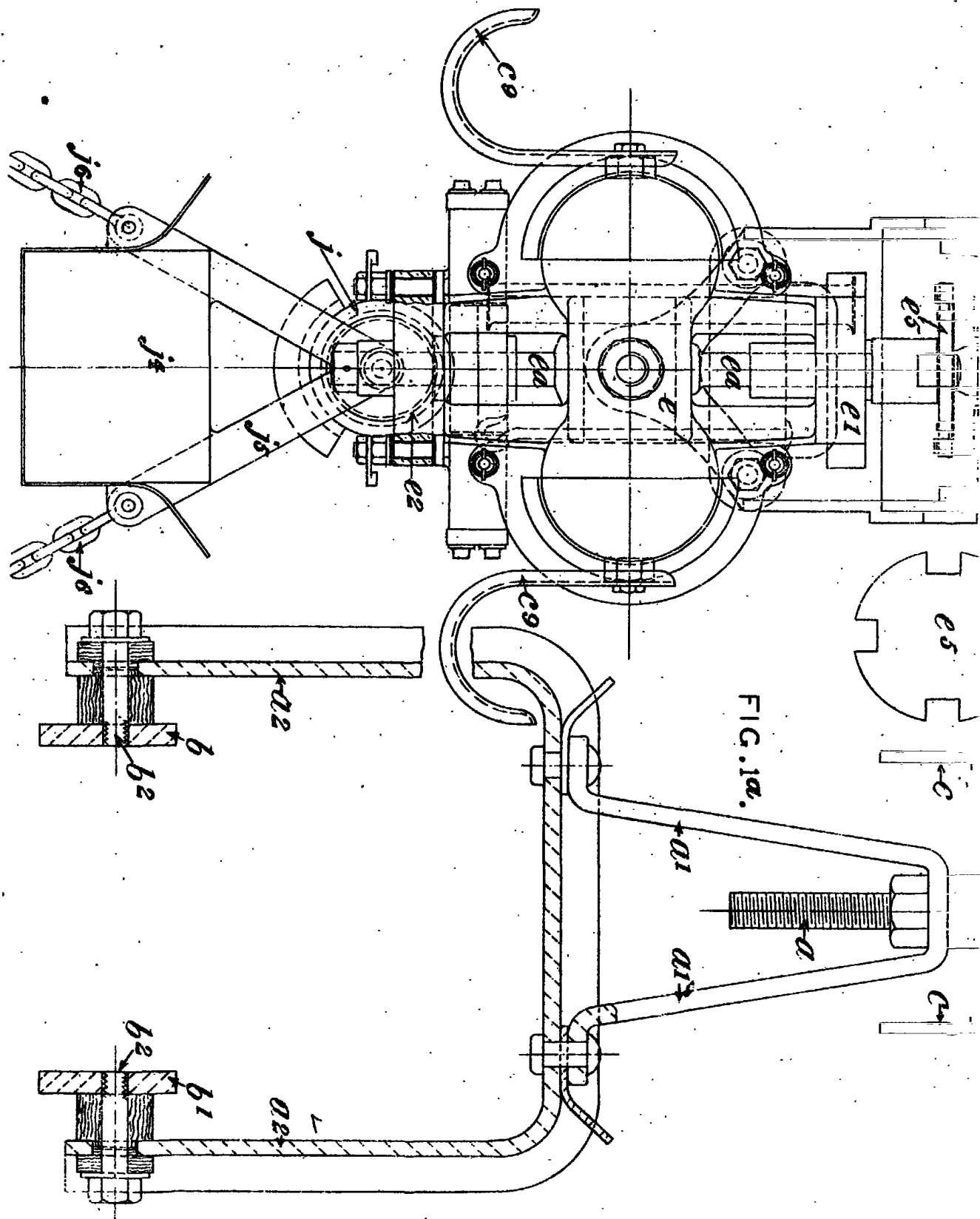
4. The arrangement of the contact studs with tubes which can be adjusted and the contact connecting bars (m , m^1) with changeable sheaths, substantially as and for the purpose hereinbefore described and illustrated by the drawings.

Dated this 13th day of September 1895.

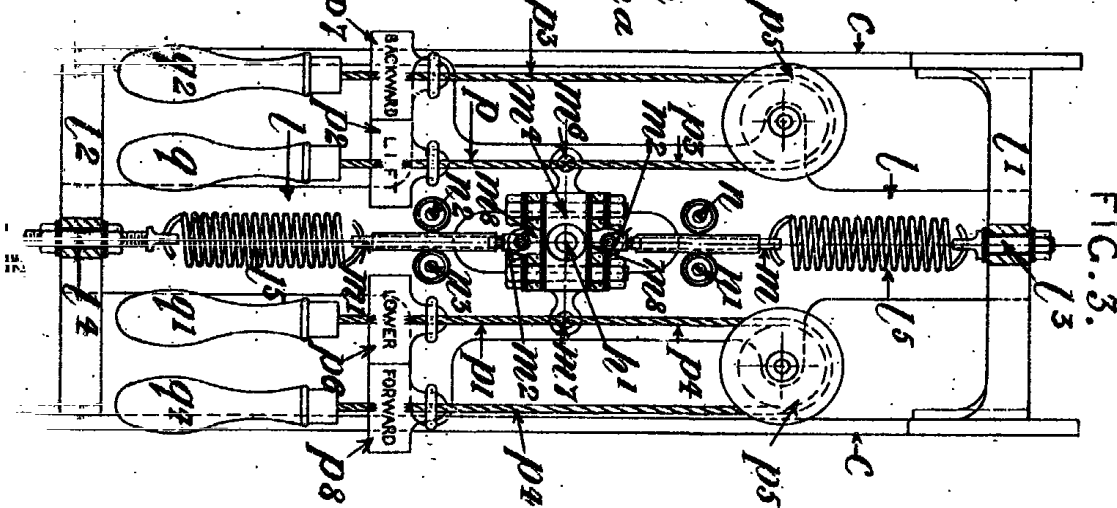
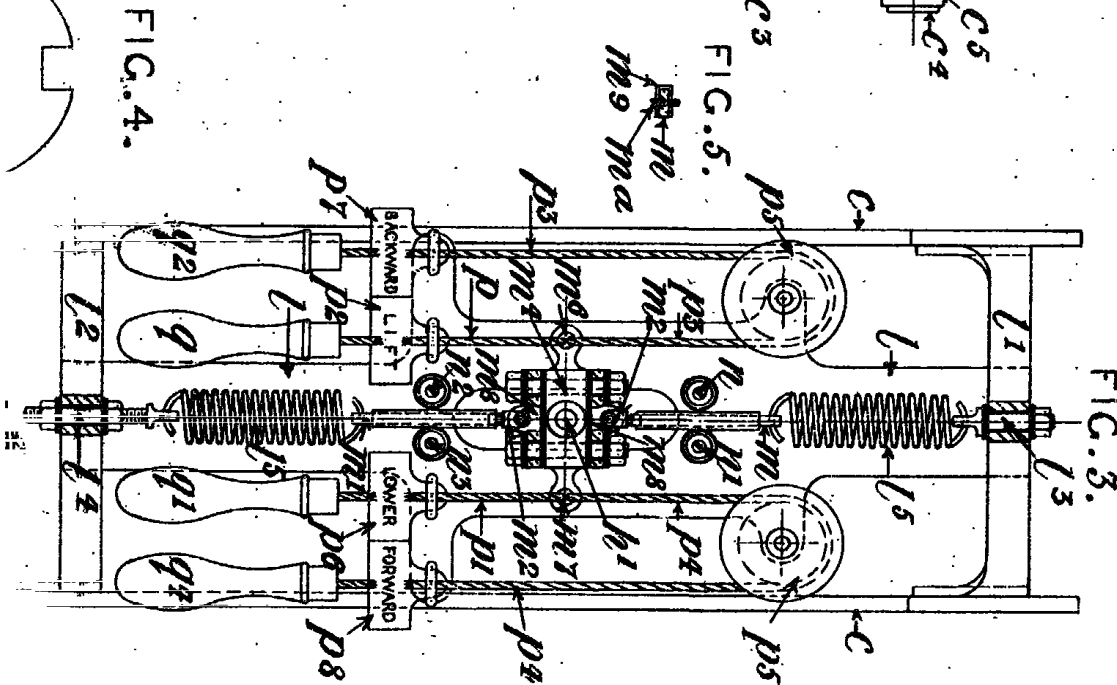
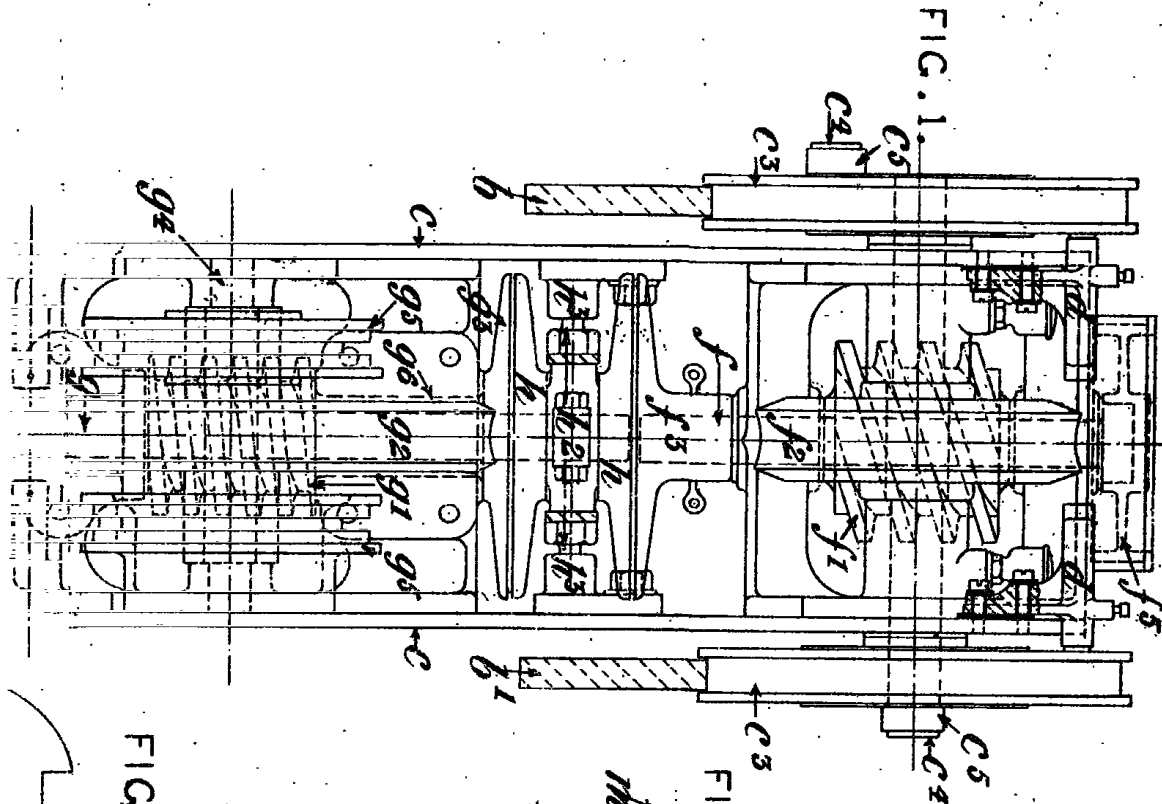
PETER J. LIVSEY,
Agent.



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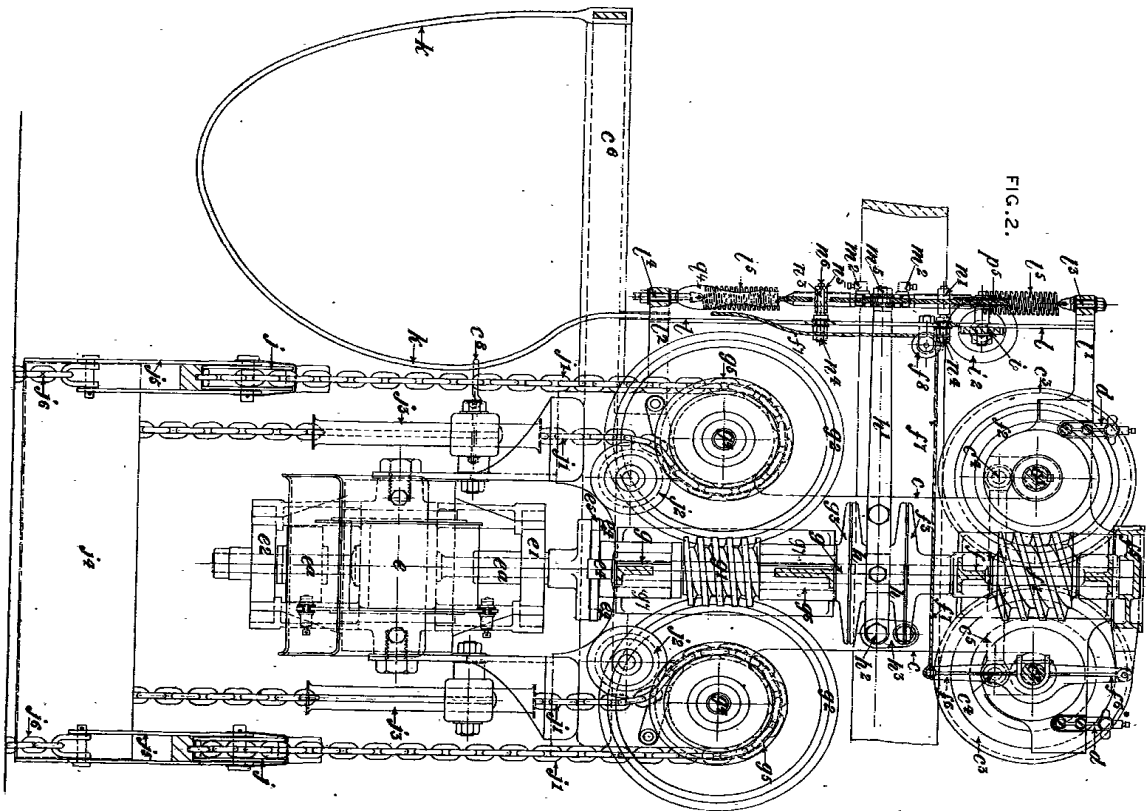
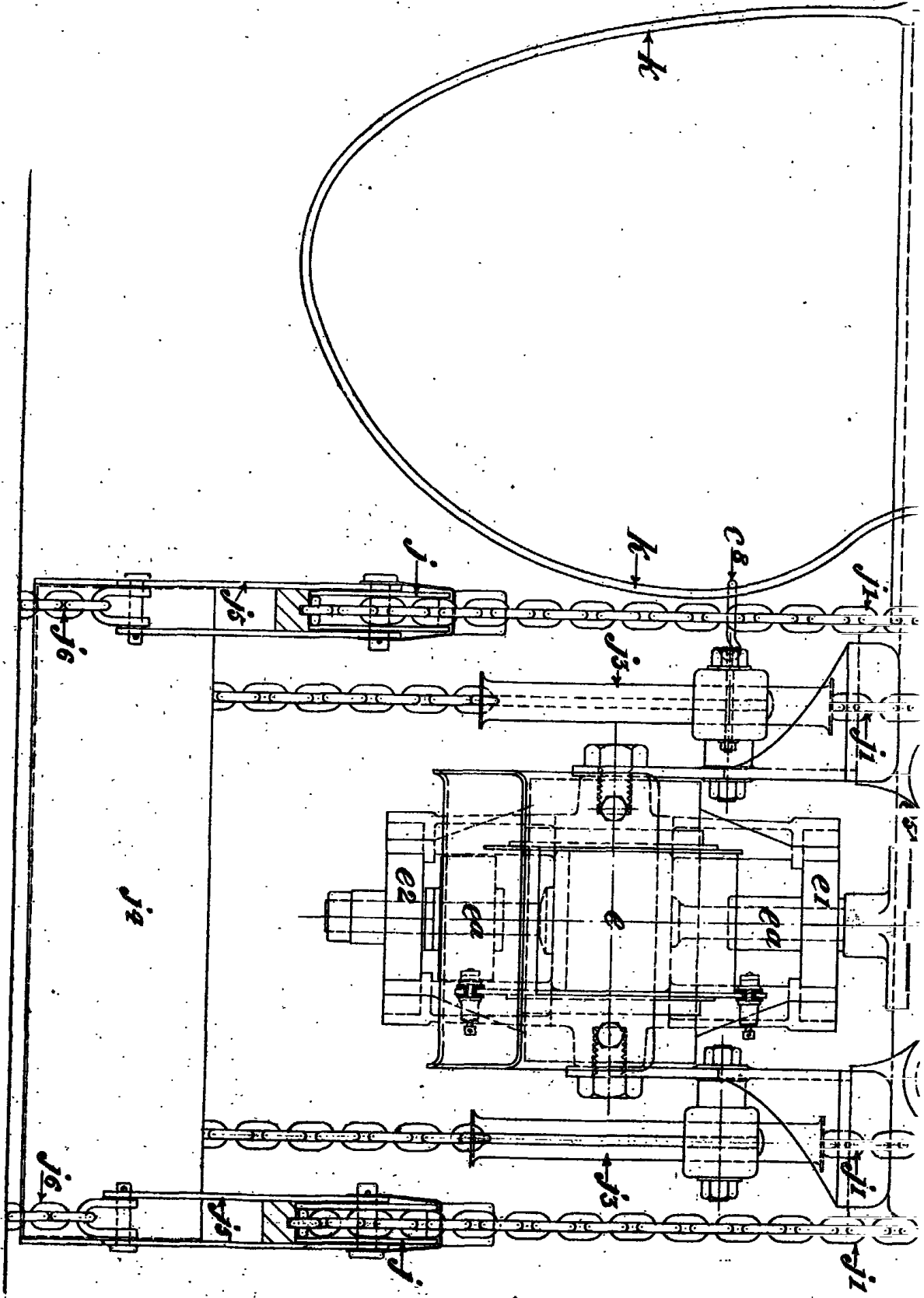


FIG. 2.

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FIG. 2.

