967,681.

J. R. SLOAN.

ELECTRICAL TRAIN SYSTEM.

APPLICATION FILED NOV. 16, 1906.

Patented Aug. 16, 1910.

7 SHEETS—SHEET 1.

Fig. 1

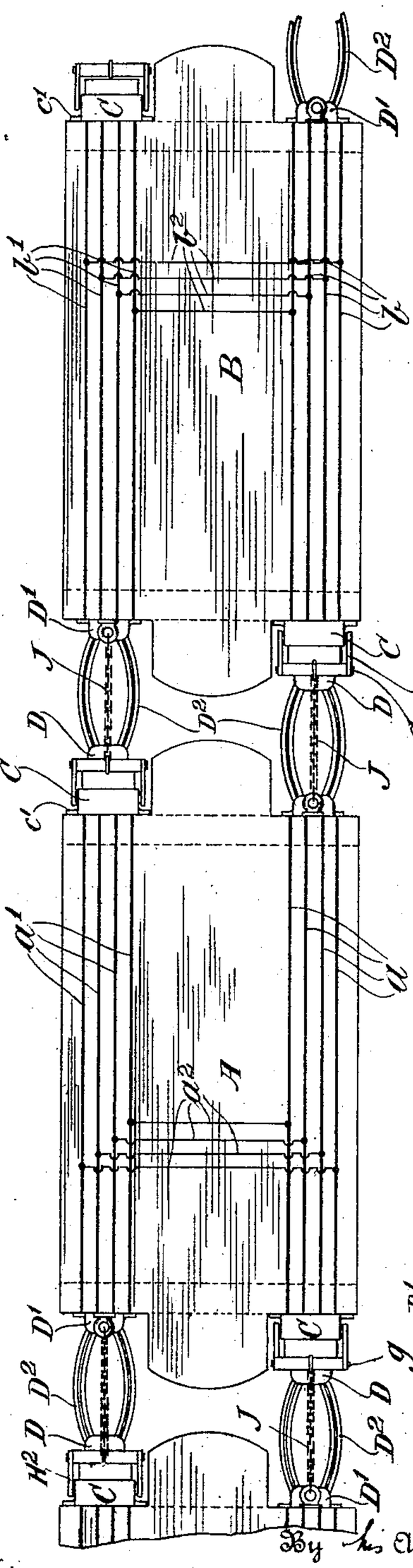
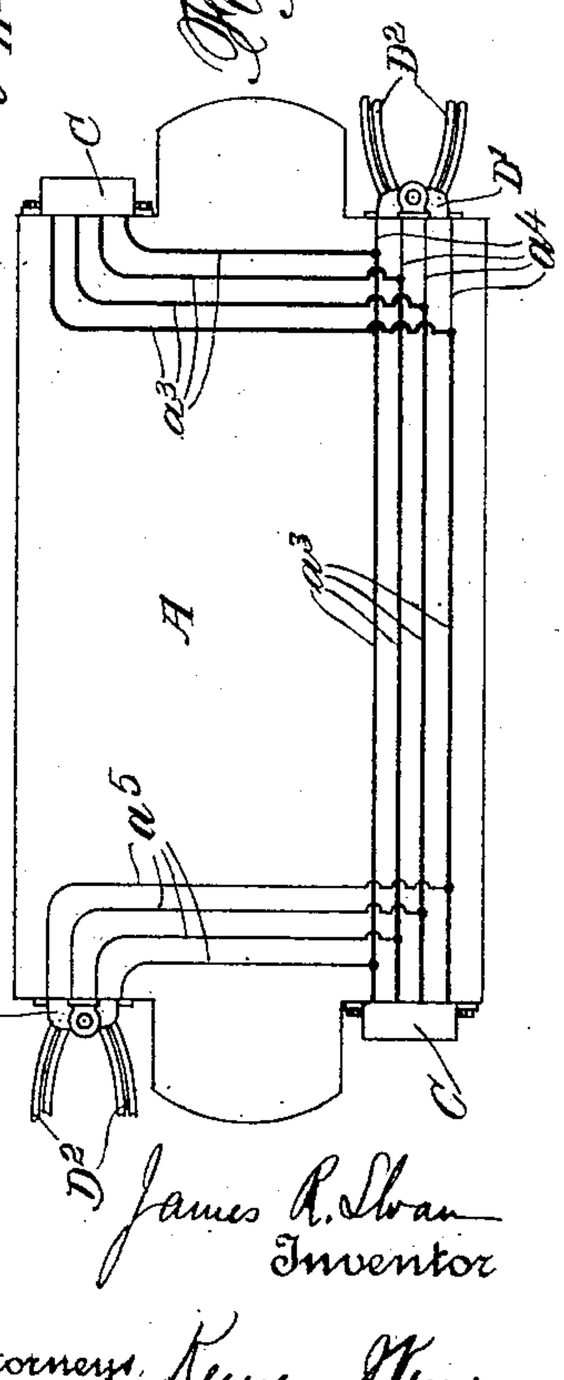



Fig. 2




Witnesses
Geo. H. Harris.
John O. Simpson.

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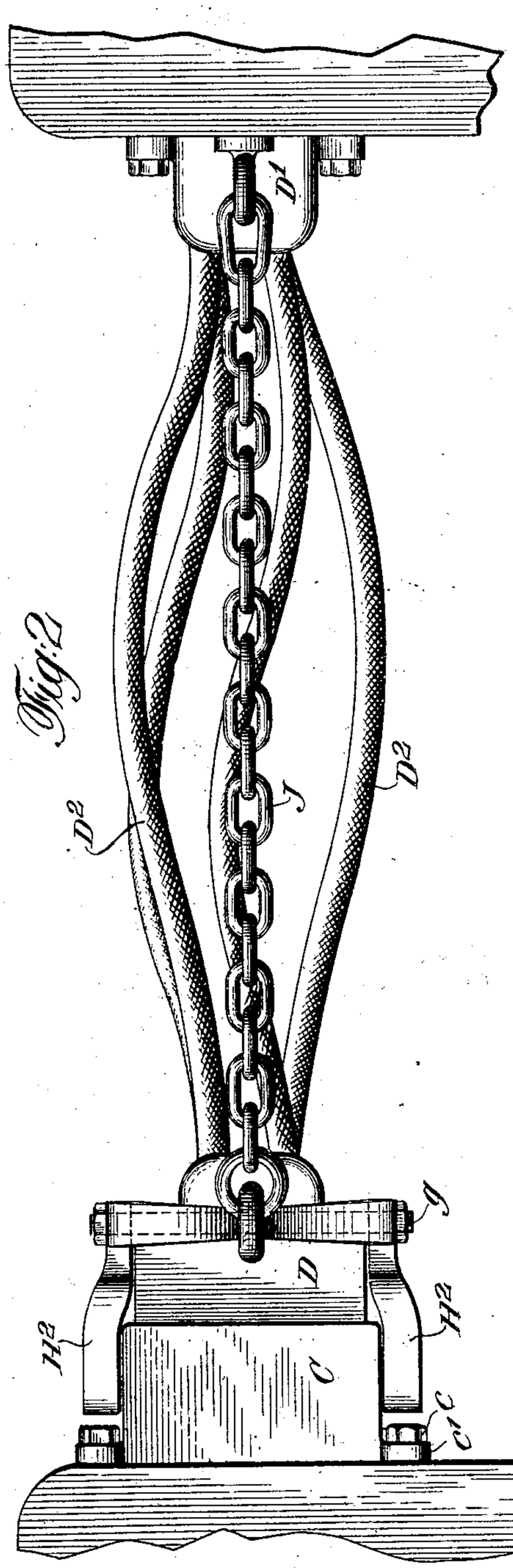
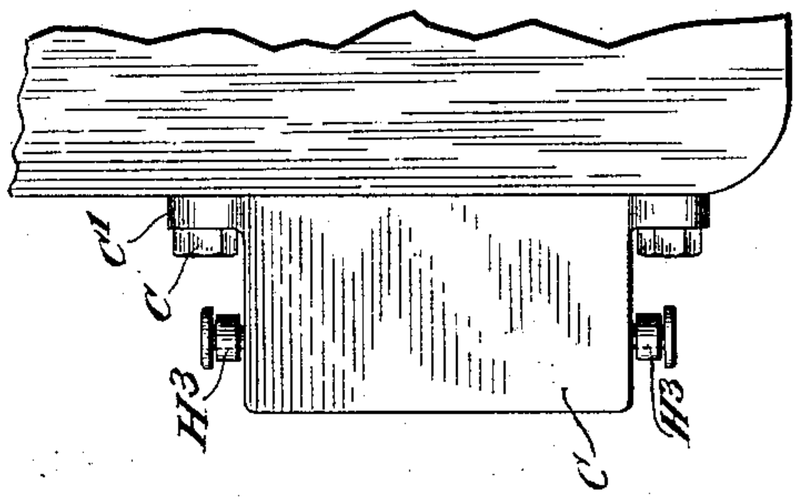
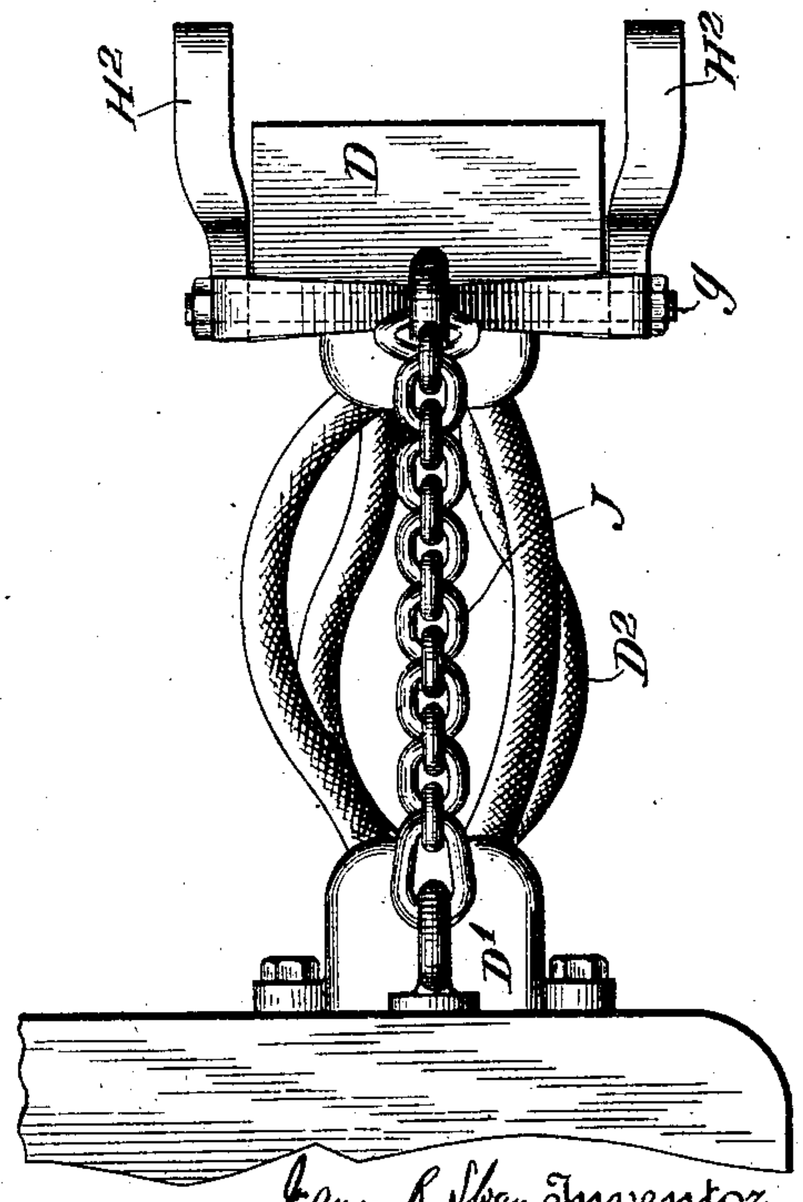



Fig. 2




Witnesses

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7 SHEETS—SHEET 3.

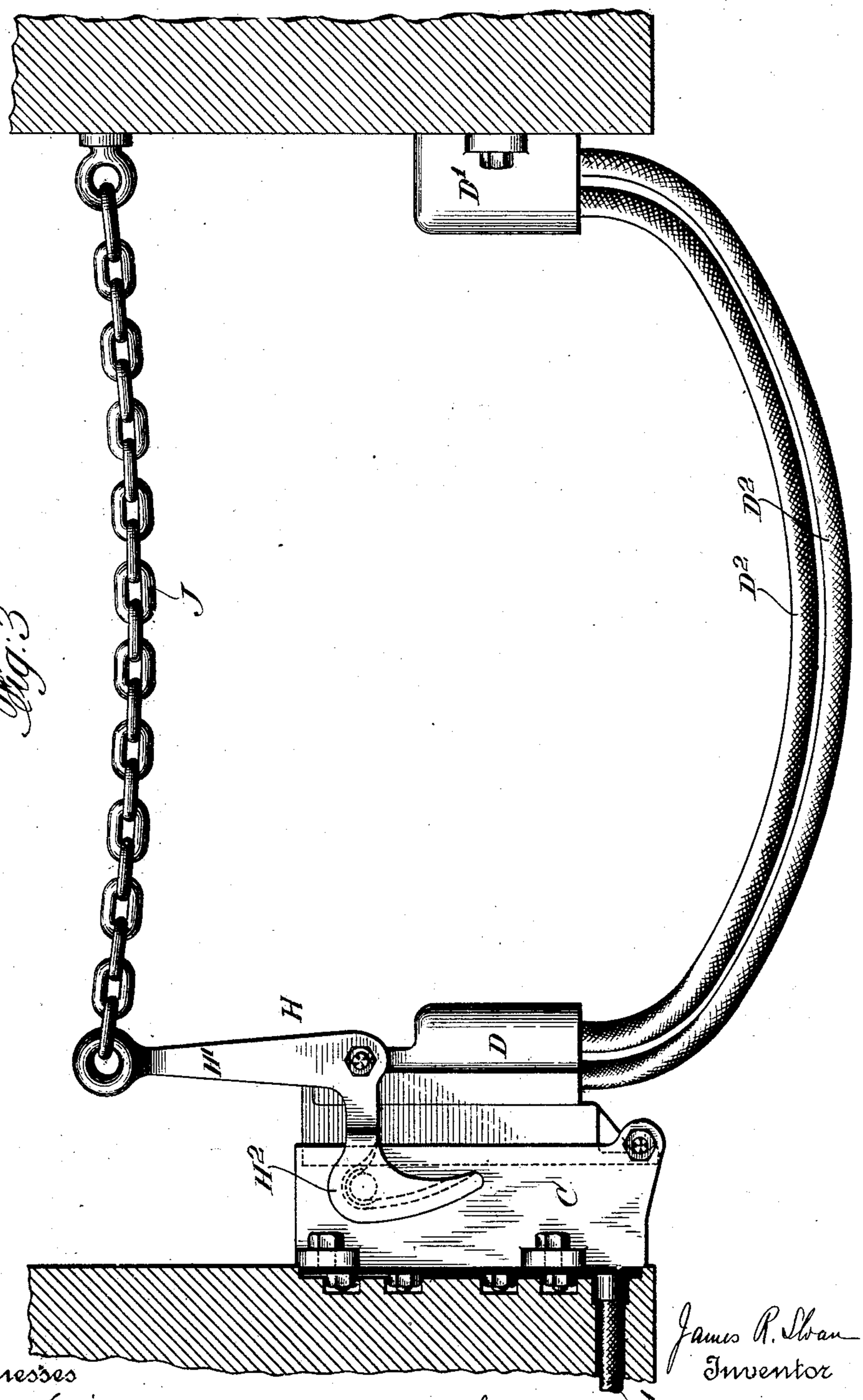


Fig. 3

Witnesses
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7 SHEETS—SHEET 4.

Fig. 4

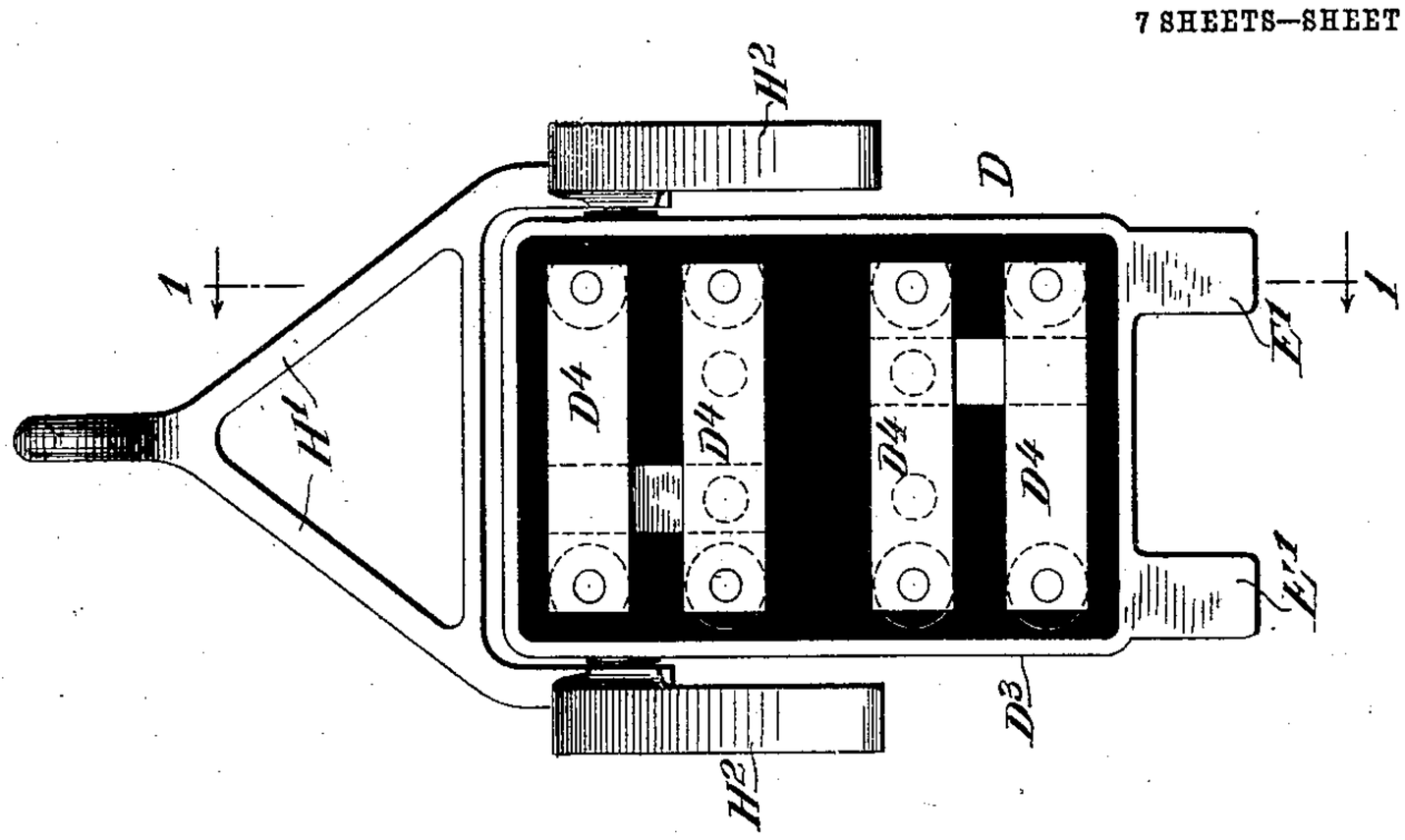



Fig. 5

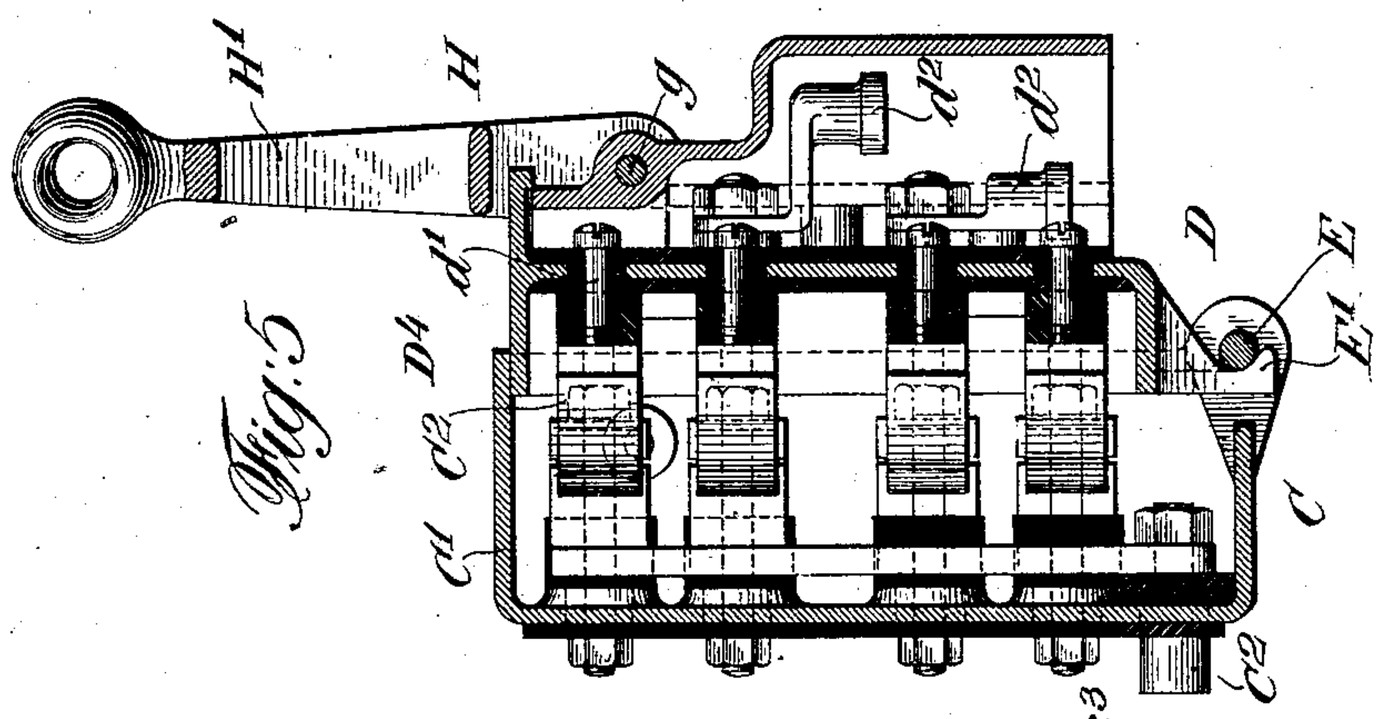
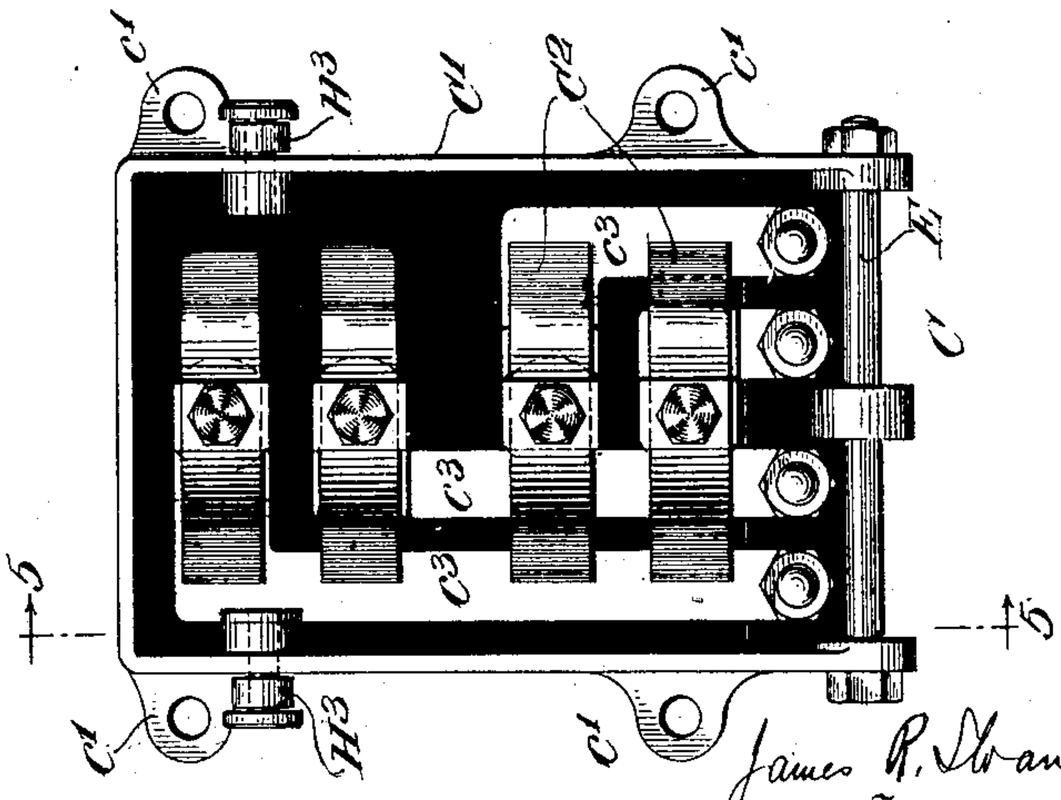



Fig. 6

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7 SHEETS—SHEET 5.

Fig: 7

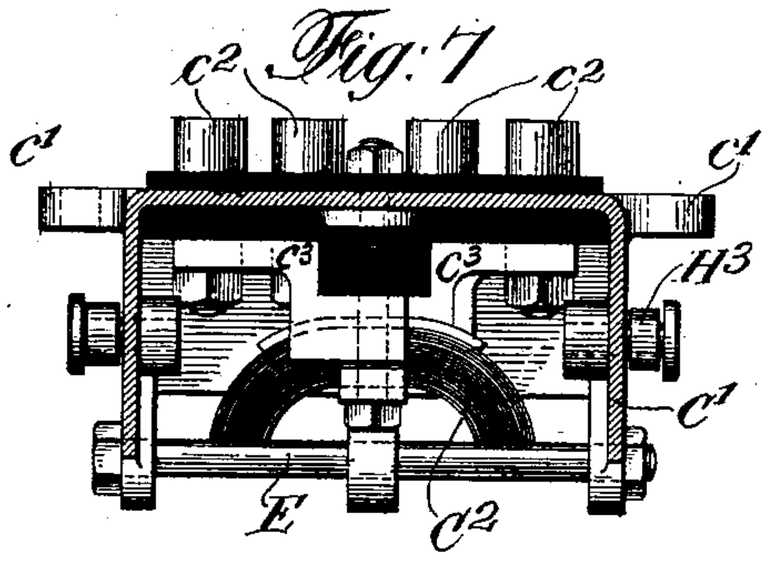



Fig: 8

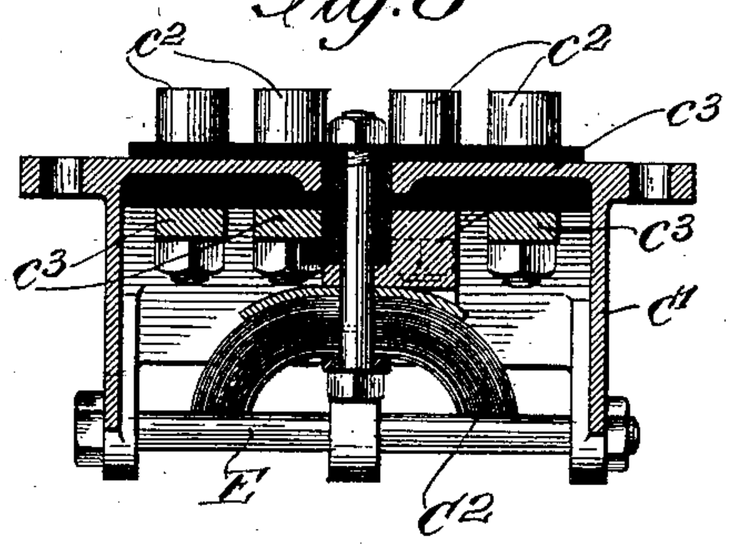



Fig: 9

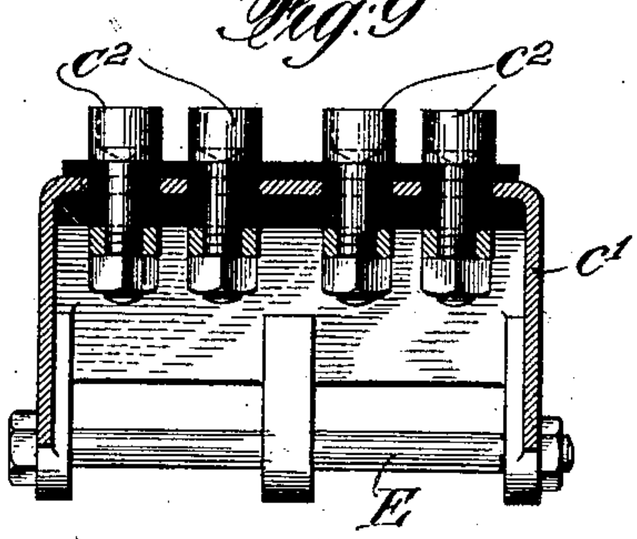



Fig: 10

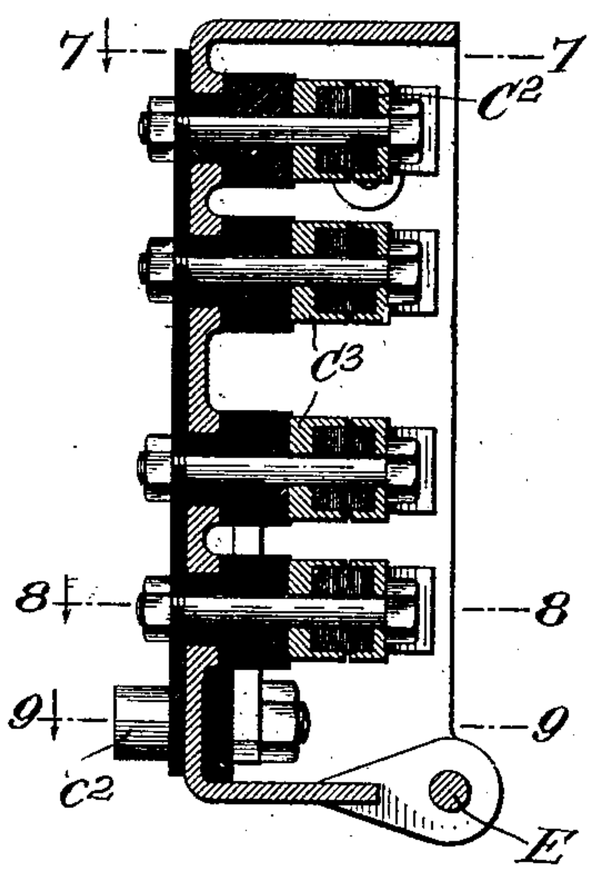
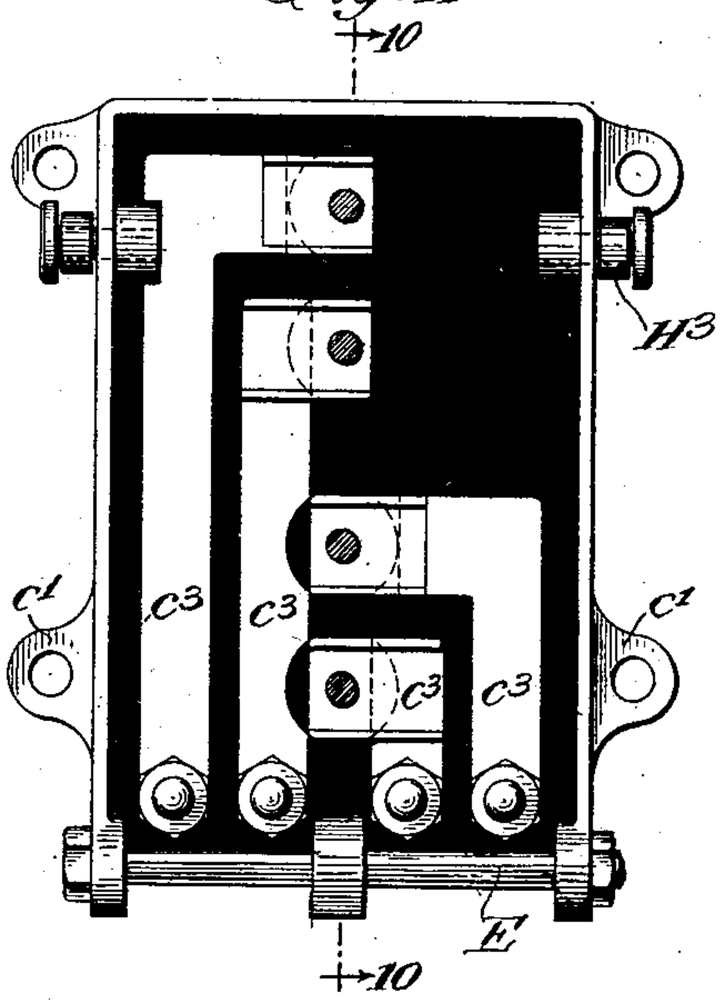



Fig: 11




Witnesses
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**967,681.**

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7 SHEETS—SHEET 6.

Fig: 12

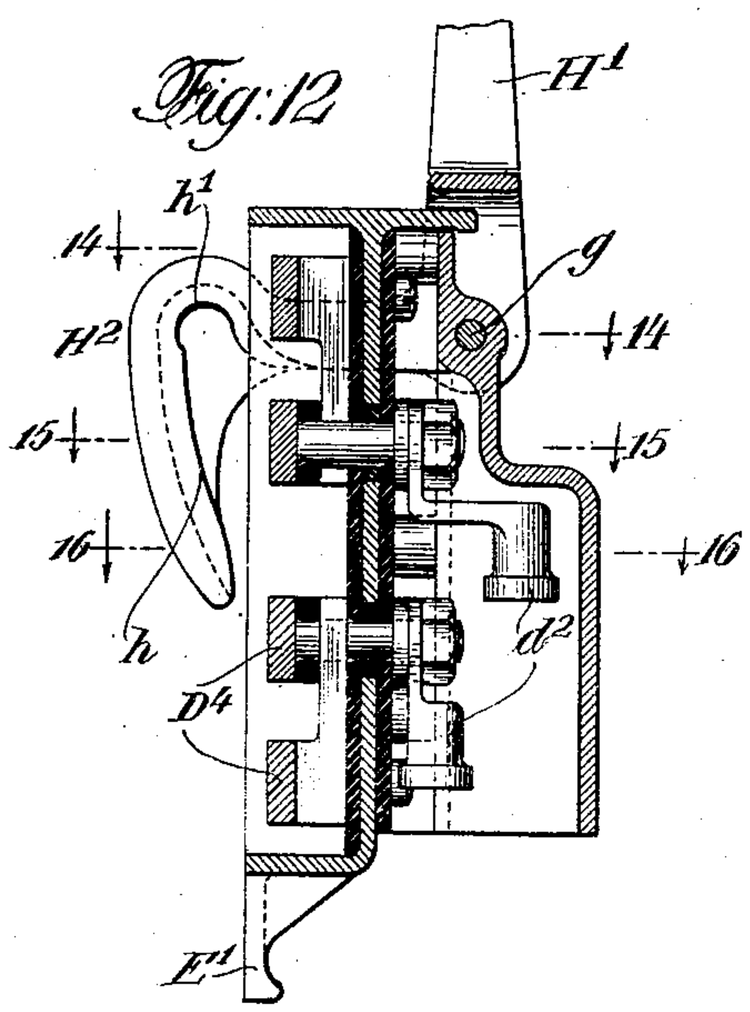



Fig: 14

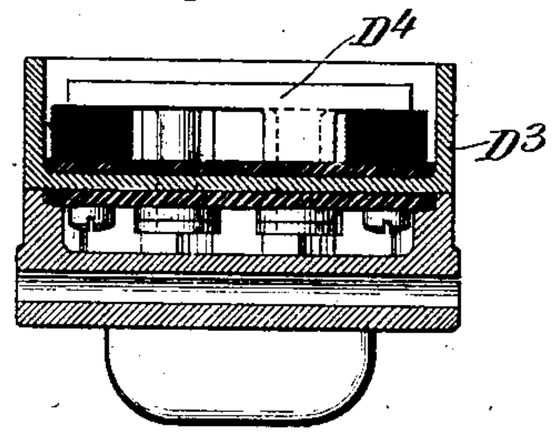



Fig: 15

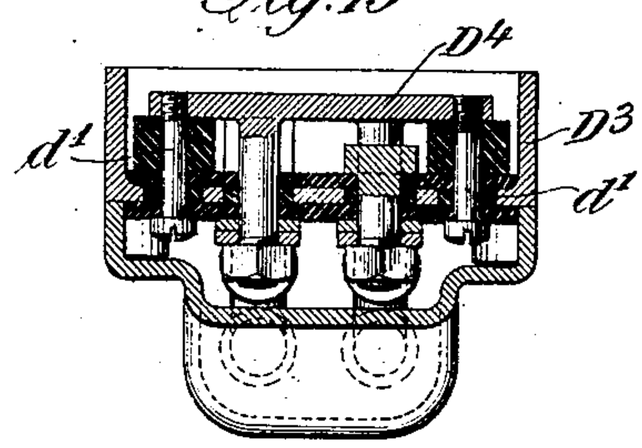



Fig: 13

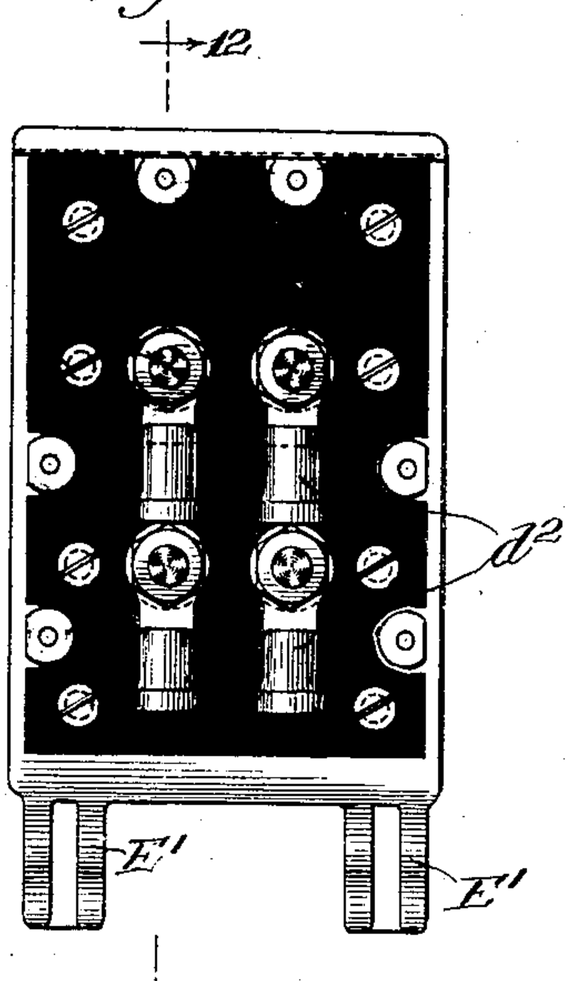
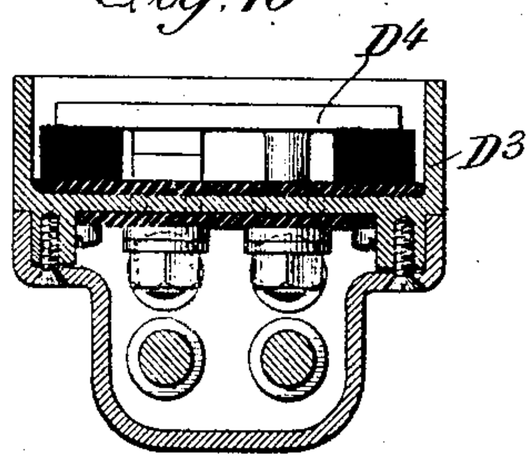



Fig: 16




Witnesses.
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Patented Aug. 16, 1910.

7 SHEETS—SHEET 7.

Fig: 18

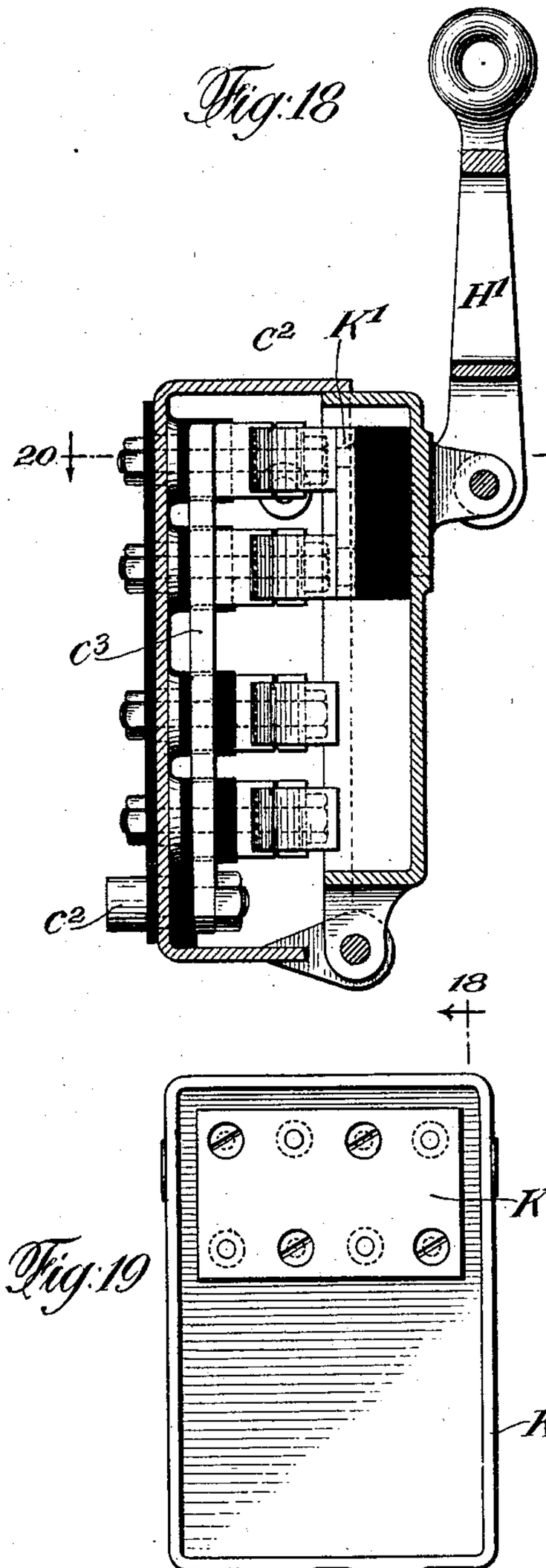



Fig: 19

Fig: 17

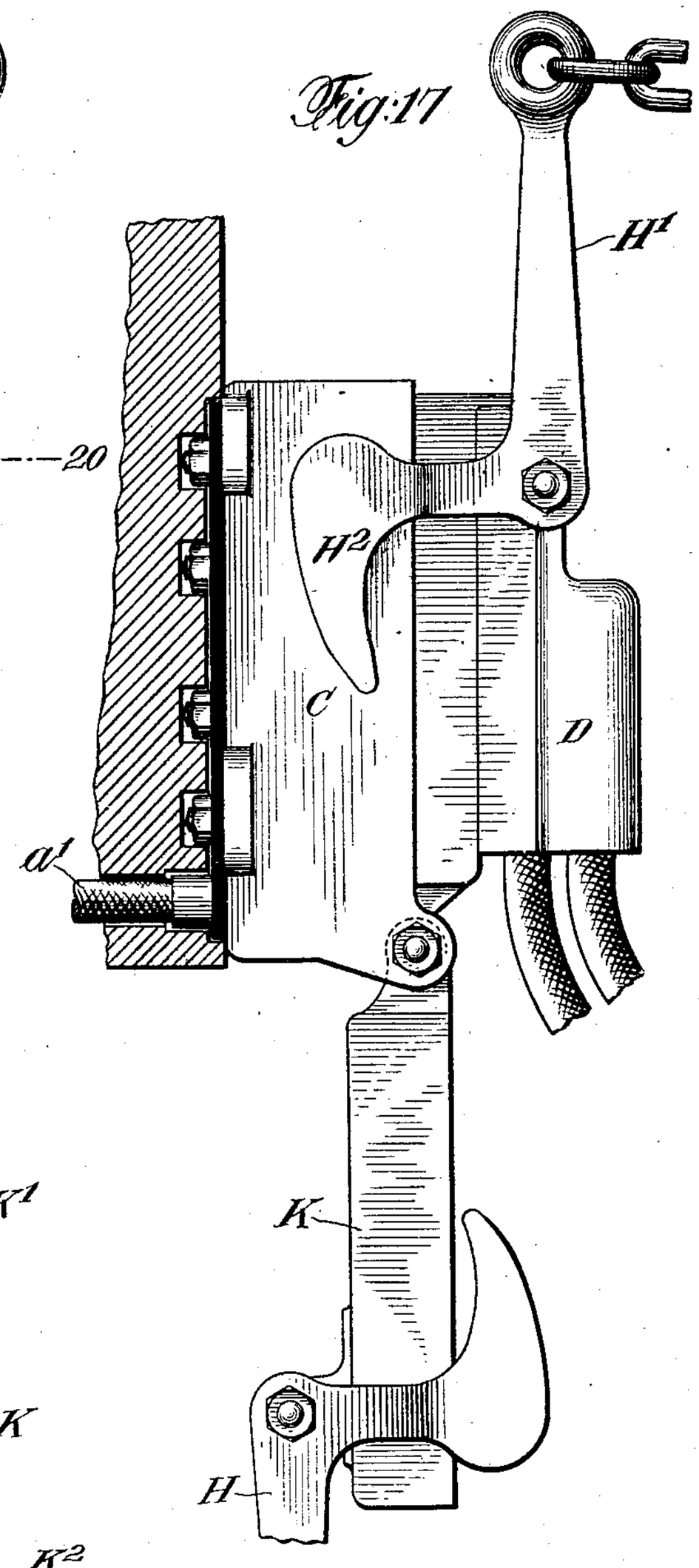
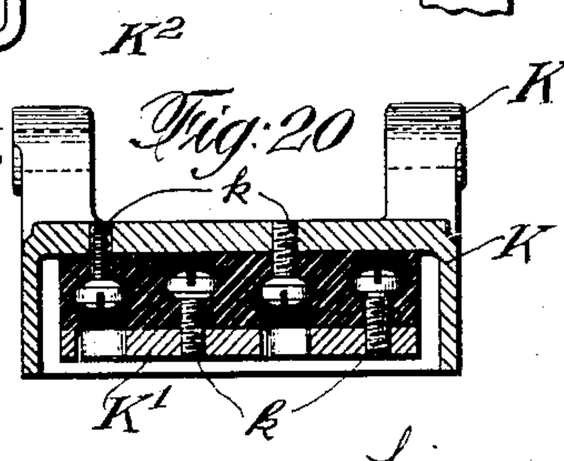



Fig: 20




Witnesses

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James R. Sloan

Inventor

By his Attorneys Kenyon & Kenyon.

# UNITED STATES PATENT OFFICE.

JAMES R. SLOAN, OF ALTOONA, PENNSYLVANIA, ASSIGNOR TO GOULD STORAGE BATTERY COMPANY, A CORPORATION OF NEW YORK.

## ELECTRICAL TRAIN SYSTEM.

967,681. Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed November 16, 1906. Serial No. 343,653.

*To all whom it may concern:*

Be it known that I, JAMES R. SLOAN, a citizen of the United States, residing in Altoona, in the county of Blair and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Train Systems, of which the following is a specification.

My invention relates to systems of electrical distribution for railway trains and has been specially devised with reference to train lighting systems in which the current for the lights is distributed from one car of the train or from the locomotive to the various cars, batteries being provided on the several cars to operate in conjunction with the apparatus on the generator car. My invention, is not, however, limited to this specific system of distribution.

My invention involves an arrangement of wiring for the several cars and the means for connecting the wires of one car with those of another regardless of the order or direction of the cars. It also relates to the particular construction of the terminals and their connection to the cars whereby the terminals may be automatically separated when the cars separate, without, however, requiring an inferior type of switch or straining the electrical portions of the terminals.

According to one feature of my invention I provide terminals which are latched together preferably by a lever hinged upon one member and adapted to catch over suitable projections on the other terminal while the latch is so connected with one of the cars, independently of the electrical connections to that car, that a separation of the car causes a releasing of the latch before any strain is thrown upon the terminals tending to separate them. At least one of the terminals must be a terminal that is flexibly connected with its car and the releasing connection with the latch must necessarily be connected to the same car. The releasing connection should be shorter than the electrical flexible connection in order that the first strain tending to release the terminals should be thrown upon the latch and not upon the electrical connections.

My invention also involves as another feature the provision upon each end of each car of a flexibly connected terminal and a fixedly attached terminal, the two fixedly attached terminals being on opposite sides of the longitudinal center of the car, while the flexibly attached terminals are also on opposite sides of the longitudinal center of the car, and the connecting of each fixed terminal directly to the flexibly connected terminal at the same side of the center. By this arrangement the cars can all be identically wired and with their terminals identically arranged but regardless of the relative direction of the cars or of the order of position the electrical connections between the cars may be established between a flexible terminal and a fixed terminal on each side of the longitudinal center of the car.

Another feature of my invention involves the employment of a bridging contact movably attached to the fixed terminals of such cars as are ordinarily used at the rear ends of trains in order to connect two or more of the wires of the last car together, as, for example, where there is a loop conductor to be used as one side of the main circuit. This bridge may be thrown out of the way to permit the attachment of the ordinary flexible terminal when the car is not used at the end of the train, or it may be moved into operative position when the car is to be so used, a latch being provided on the bridging contact to secure it in operative relation with the fixed terminal.

Other features of my invention involve more detailed features of construction, arrangement and wiring, as will appear more fully in the course of the following description.

Referring to the drawings, Figure 1 is a diagrammatical view of two cars with their wiring and their terminals. Fig. 2 is a plan view of the end sills of two cars with their terminals. Fig. 3 is a side view showing the end sills of two neighboring cars in section and the terminals at one side of the two cars in operative position. Fig. 4 is a plan view of the flexibly connected terminal looking at it from its open end. Fig. 5 is a longitudinal section of the two terminals engaged together on the line 5—5 of Fig. 6. Fig. 6 is a plan view of the fixed terminal looking at it from its open end. Figs. 7, 8 and 9 are cross-sections of the fixed terminal on the lines 7—7, 8—8, 9—9 of Fig. 10. Fig. 10 is a longitudinal section of the fixed terminal on the line 10—10 of Fig. 11. Fig. 11 is a plan view of the fixed terminal

with the contact springs removed to show the connection from the binding posts of the terminal to the contact springs. Fig. 12 is a cross-section of the flexibly connected terminal taken on the line 12—12 of Fig. 13. Fig. 13 is a plan view of the top of the flexible terminal, the upper casing being removed. Figs. 14, 15 and 16 are cross-sections of the flexibly connected terminal taken on the lines 14—14, 15—15 and 16—16 of Fig. 12. Fig. 17 is a side elevation of the two terminals in engagement with the bridging contact used generally on the last car of the train in inoperative position. Fig. 18 is a section on the line 18—18 of Fig. 19 showing a fixed terminal and the said bridging contact in operative engagement. Fig. 19 is a plan showing the inside of one of the bridging contact terminals. Fig. 20 is a section of one of said terminal bridging contacts taken on the line 20—20 of Fig. 18. Fig. 21 shows a modification of the wiring of each car.

A and B represent two cars of a train, it being understood that there may be any number of cars thus wired and connected.

C represents fixed terminals secured at the ends of each car, the two fixed terminals for each car being arranged at diagonally opposite portions of the car so that they are on opposite sides of the longitudinal center of the same.

D represents terminals, two for each car, which are located on opposite diagonals. Each terminal D is connected to a fixed member D′ by flexible electrical connections $D^2$.

Figs. 1 and 21 (both on Sheet 1) each show modifications of the method of wiring.

In Fig. 1 I have shown duplicate sets of wires, one set on each side of the longitudinal center of the car. $a$, $a'$ represent the duplicate sets of wires on car A, while $b$, $b'$ represent the corresponding wires on car B. In the case of Fig. 1 it will be noted that each of the fixed terminals is connected directly by the conductors with the flexible terminal belonging to the same side of the car but on the other end thereof. In this way there is therefore no necessity for any crossing of wires, yet the cars are all identically wired and therefore may be coupled regardless of their order of position and direction. The duplicate sets of wires may each be of full capacity or each of half capacity, as desired. For most systems it is desirable that the two sets should be permanently connected together as shown by the conductors $a^2$, $b^2$. I consider, however, the arrangement of Fig. 21 preferable inasmuch as it permits the use of only one bridging member at the end of the train, said bridging member to be hereinafter described. In this case the conductors $a^3$, $a^4$, $a^5$, connect the four terminals together, while there is only one set of conductors extending from one end of the car to the other. With this arrangement it is only necessary that the conductors $a^3$ be large enough to carry the entire current, while the conductors $a^4$, $a^5$, as indicated, may be lighter since they never need to carry more than half the current. It will be noted that this modification also permits the cars to be identically wired and coupled regardless of their order or direction and that, as before, each fixed terminal is directly connected with the flexible terminal on the same side of the car.

The permanent terminal C is attached to the car by bolts $c$ passing through orifices in lugs $c'$ extending from the casing C′ of the terminal. The four wires to be connected to this terminal are brought in to the posts $c^2$, which are electrically connected by strips $c^3$ to the laminated spring contacts $C^2$, these strips and the contacts being suitably insulated as indicated in the drawings.

The four flexible conductors $D^2$ are secured within the casing D′ within which they connect with the several wires of the car in any suitable way. The other ends of these conductors $D^2$ are secured to binding posts $d^2$ which are fastened to the casing $D^3$ of the flexibly secured terminal D. These binding posts are connected to the several plates $D^4$ by strips properly insulated from each other. The contact plates $D^4$ are suitably secured to the casing by the bolts $d'$ which are properly insulated from the casing.

The laminated spring contacts $C^2$ bear with their ends upon the contact plates $D^4$ when the two terminals are brought into engagement as clearly shown in Fig. 5. Of course such a contact can only be made by forcing the terminals together against the pressure of the contact springs $C^2$ so that the contacts tend to constantly separate the two terminals. I force these terminals together by a lever hinged upon the flexibly connected terminals having curved surfaces of such form as to adapt them to engage projections on the fixed terminal and hold them firmly against the spring pressure of the contacts and the constant vibration of the cars. Upon one end of the fixed terminal is a shaft E over which the lugs E′ carried by the flexibly connected terminal are adapted to pass, said lugs having curved surfaces which engage upon the under side of the shaft E, thus constituting a means for holding the terminals from disengagement at one end provided the other ends of the terminals are latched.

$g$ is a pivot carried by the casing $D^3$ of the flexibly connected terminal. Upon this pivot is a latch H. Part of this member is an arm H′ which extends vertically above the pivots when the parts are in operative relation and is triangular or forked so as to

embrace the terminal C. Beyond the pivotal point of the latch H the said latch comprises two hooks $H^2$ constituting the prongs of a fork having surfaces *h* (see Fig. 12) which take over and engage the rollers $H^3$ carried on pins secured to the casing C′ of the fixed terminal. These surfaces act as cams to force the terminals into engagement. The angle of the hook is formed with an inward curve *h′* adapted to firmly seat upon the roller $H^3$.

When the two terminals are to be secured together it is only necessary to slip the lug E′ back of the shaft E and then, after moving the flexible terminal nearly to operative position, move the latch H to a forward position so that the curved surface *h* on the projection of the latch will engage the rollers $H^3$ and force the hooks over the rollers so that the rollers are seated in the recess *h′*. In order to separate the terminals it is only necessary to move the latch H by pulling on the lever H′ and as soon as the latch has become disengaged the terminals will fall apart. In order to effect this unlatching automatically when the cars separate and to do so without any strain on the more delicate parts of the apparatus, the top of the lever H′ is connected by a chain J with the same car to which the terminal D is flexibly connected. The chain, in order to obtain the best results should be shorter than the connections $D^2$ so that the latch will be separated and the terminals fall away from each other without putting the electrical connections under tension.

K is a member carrying an insulated conductor K′ by the screws *k*. This member K is used upon the ends of the cars which are ordinarily employed as end cars—for example, observation cars. For this purpose it is provided with two orificed lugs $K^2$, the orifices of which surround the shaft E of the fixed terminal. To the member K is hinged a latch H similar to those carried by the flexible terminals. When the car is used as an end car the bridging contact K′ engages two of the contacts $C^2$, as shown in Fig. 18, whereas when this car is used in any other position in the train the member K is thrown back as shown in Fig. 17 and the usual flexible connector D connected to the next car is employed.

In the foregoing description of a specific embodiment of the various features of my invention I have illustrated the construction of the various terminals and bridging contact member in exact detail to illustrate complete working devices. It is to be understood, however, that the specific details thus described are not necessarily involved in my invention, but may be varied in any suitable way by those skilled in the art. It is also to be understood that my invention, as above set out, involves various features of novelty and while I prefer to use these together in one system it is not essential that they should be all used.

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

1. In an electric system of distribution for trains, the combination of terminals, one of which is a flexible electrical conductor carried by separate cars, contacts thereon, said contacts being constructed to bear against each other with a spring pressure tending to separate the terminals, means for retaining said contacts in operative relation, and means, independent of the electrical connections, for automatically releasing said retaining means.

2. In an electric system of distribution for trains, the combination of terminals carried by separate cars, a contact plate on one of said terminals, laminated spring contacts carried by the other of said terminals and adapted to contact at their ends with said plate, means for retaining said contacts in operative position, and means independent of the electrical connections to said terminals for automatically releasing said retaining means.

3. In an electric system of distribution for trains, the combination of terminals carried by separate cars, contacts thereon, said contacts being constructed to bear against each other with a spring pressure tending to separate the terminals, a movable member carried by one of said terminals and adapted to engage the other to hold said contacts in engagement, and a separate releasing connection hanging loosely from said member to one of the cars.

4. In an electric system of distribution for trains, the combination of terminals carried by separate cars, contact plates on one of said terminals, laminated spring contacts carried by the other of said terminals and adapted to contact at their ends with said plates, a movable member carried by one of said terminals and adapted to engage the other to hold said contacts in engagement, and a separate releasing connection from said member to one of the cars.

5. Two cars, a terminal fixedly connected to one car, a terminal flexibly connected to the second car, contacts carried by such terminals, one set of contacts being laminated spring contacts, bearing at their ends upon the contacts of the other terminal, a movable member carried by one terminal and adapted to engage the other to hold said contacts in engagement and a separate releasing connection from said movable member to said second car.

6. In an electric train connector, a terminal, a forked lever hinged upon the same and provided with curved surfaces on each prong of the fork, and a second terminal

adapted to pass between the prongs of the fork and provided with surfaces to be engaged by the surfaces carried by said prongs.

7. In an electric train connector, a terminal, a forked lever hinged upon the same and provided with curved surfaces on each prong of the fork, a second terminal adapted to pass between the prongs of the fork and provided with surfaces to be engaged by the surfaces carried by said prongs, and a mechanical connection extending from said fork for operating the same.

8. Two cars, a terminal connected to each car, a member hinged to one of the terminals and having a cam surface, a projection on the other terminal adapted to be engaged by said cam surface, and a recessed seat at the end of said cam surface.

9. In an electric system of distribution for trains, electrical conductors on each car, a terminal secured to a car of the train and having contacts in connection with the conductors of said car, a contact adapted to engage and bridge some of the aforesaid contacts, a suitable support for the same hinged to said terminal, and means for securing said terminal and support in operative position.

10. In an electric system of distribution for trains, electrical conductors on each car, a terminal secured to a car of the train and having contacts in connection with the conductors of said car, a contact adapted to engage and bridge some of the aforesaid contacts, a suitable support for the same hinged to said terminal, and a latch hinged to the said support and adapted to engage said terminal.

In testimony whereof, I have signed my name to this specification, in the presence of subscribing witnesses.

JAMES R. SLOAN.

Witnesses:
J. HOMER REED,
RODERICK POWELL,
GEO. G. MILNES.