

March 7, 1944.

G. A. MITCHELL

2,343,693

CURRENT COLLECTING APPARATUS

Filed July 16, 1942

3 Sheets-Sheet 1

Fig. 1.

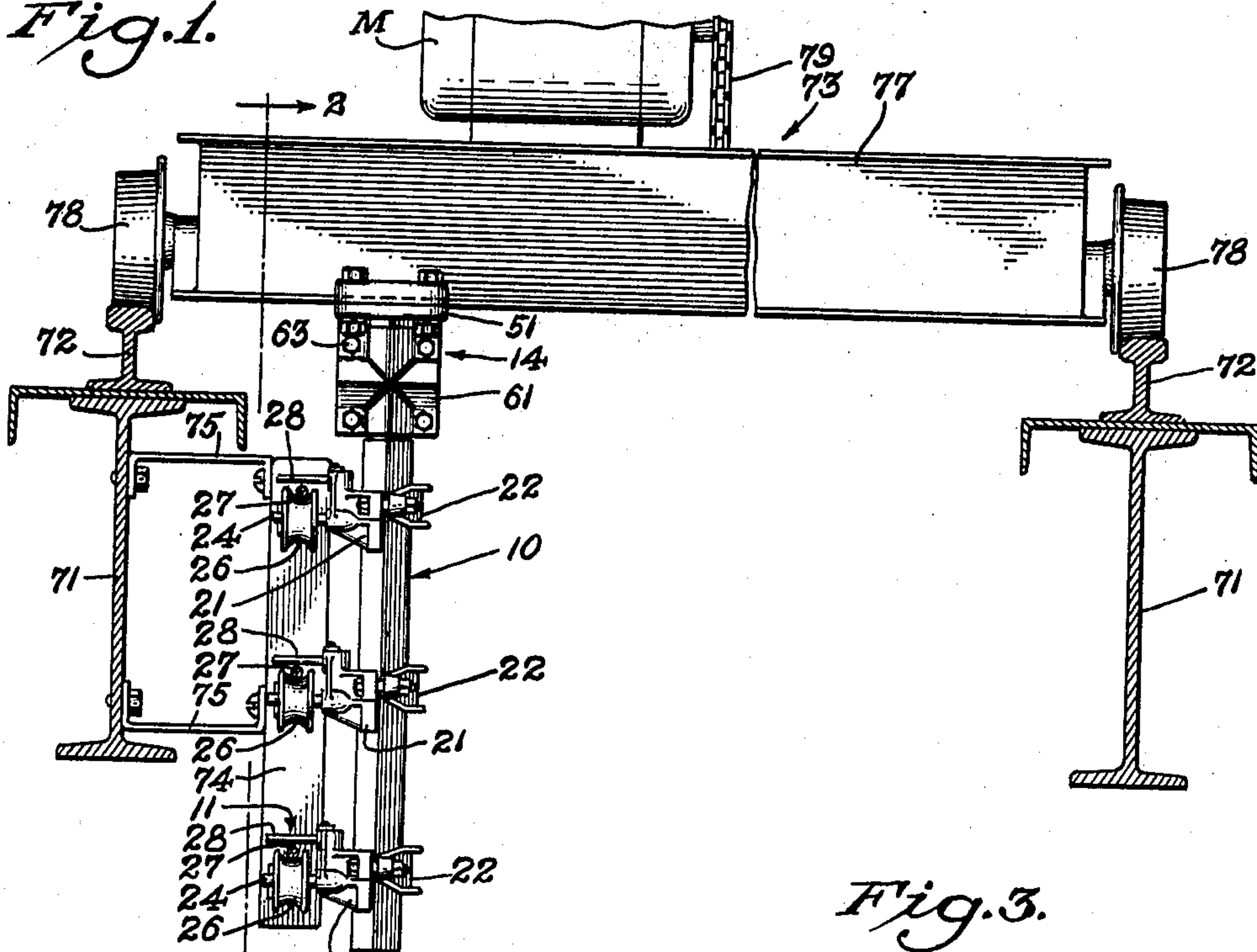


Fig. 2.

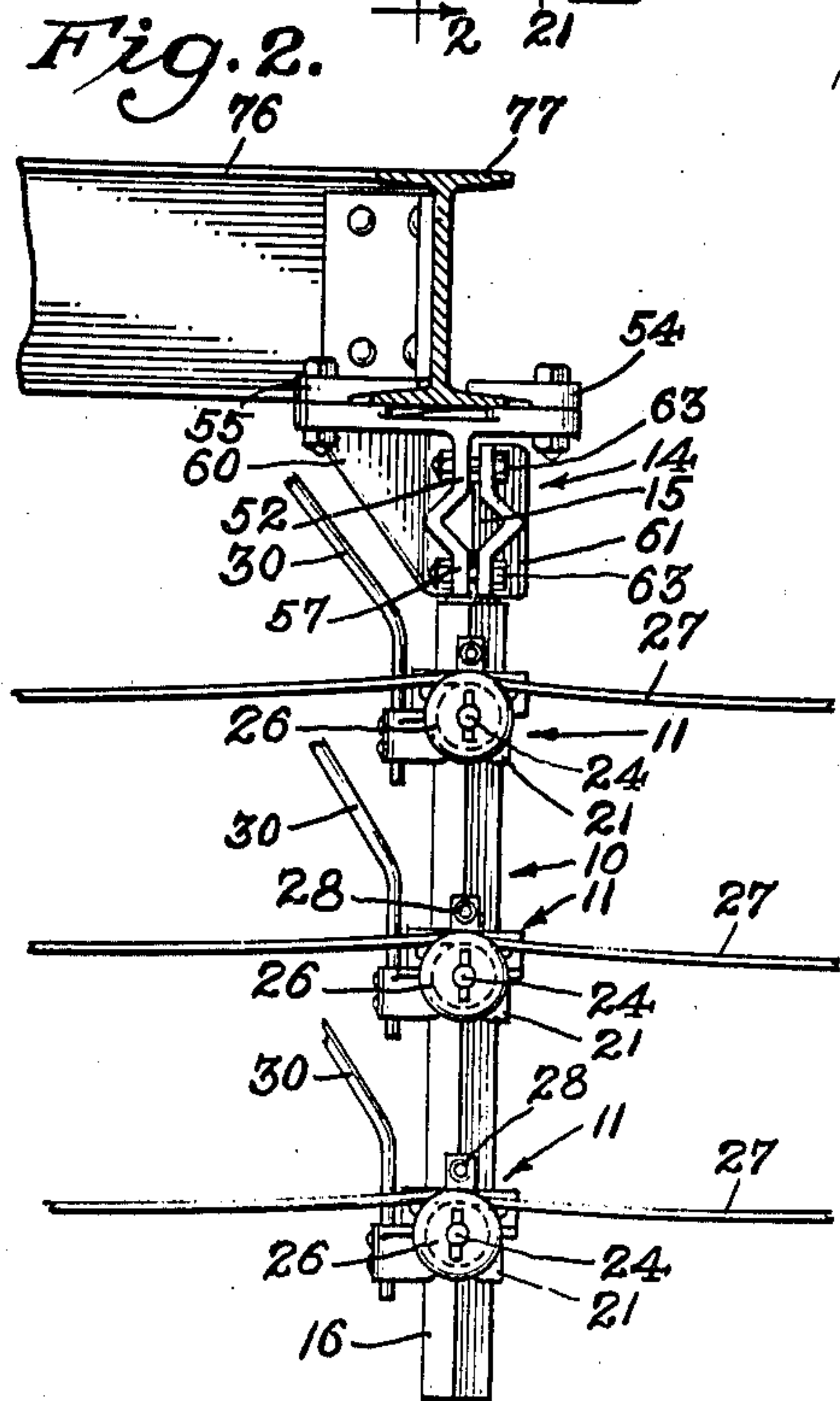
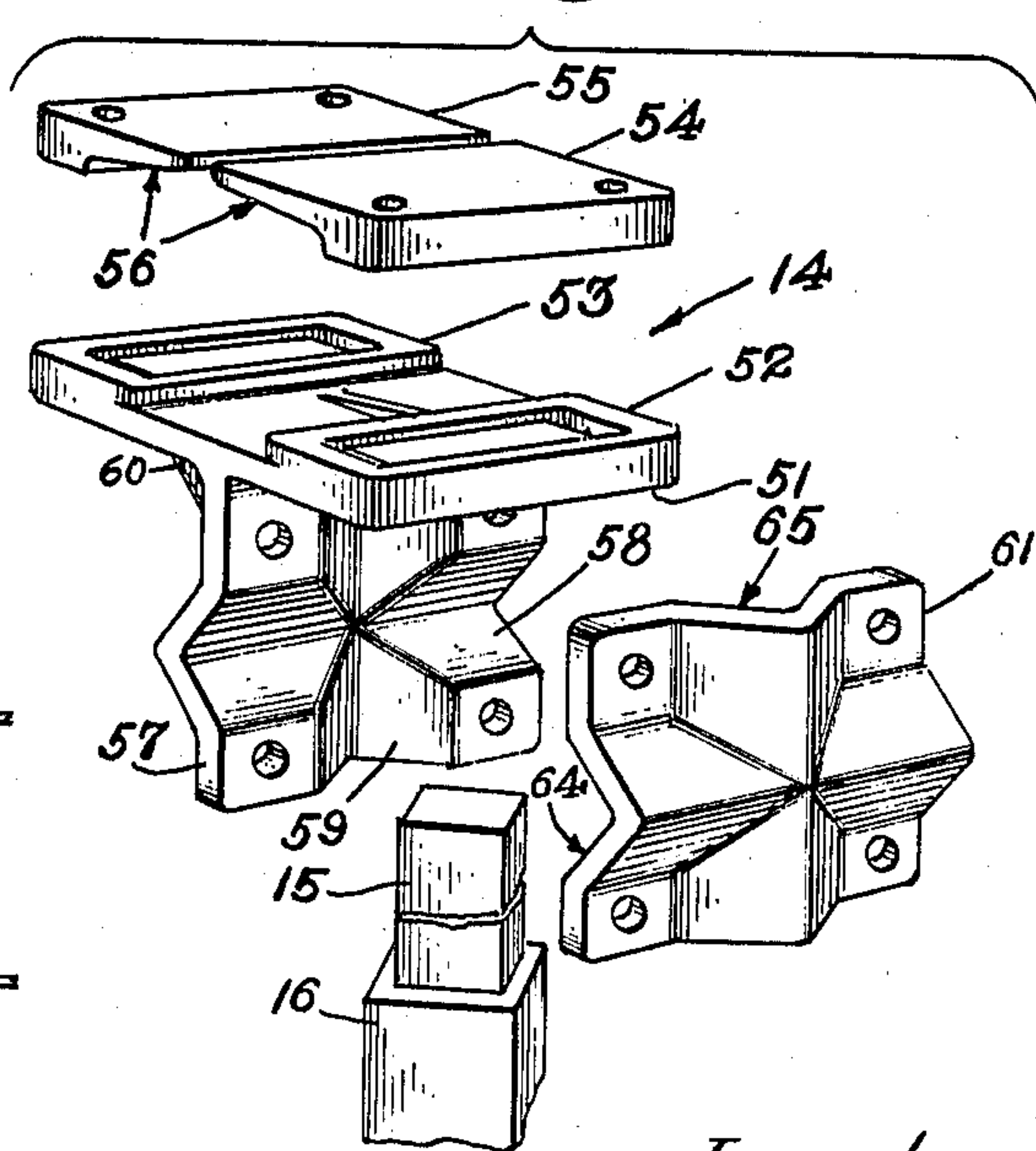


Fig. 3.



Inventor
George A. Mitchell
BY
Parker, Gaudin, Pittman & Holland
Attorneys.

March 7, 1944.

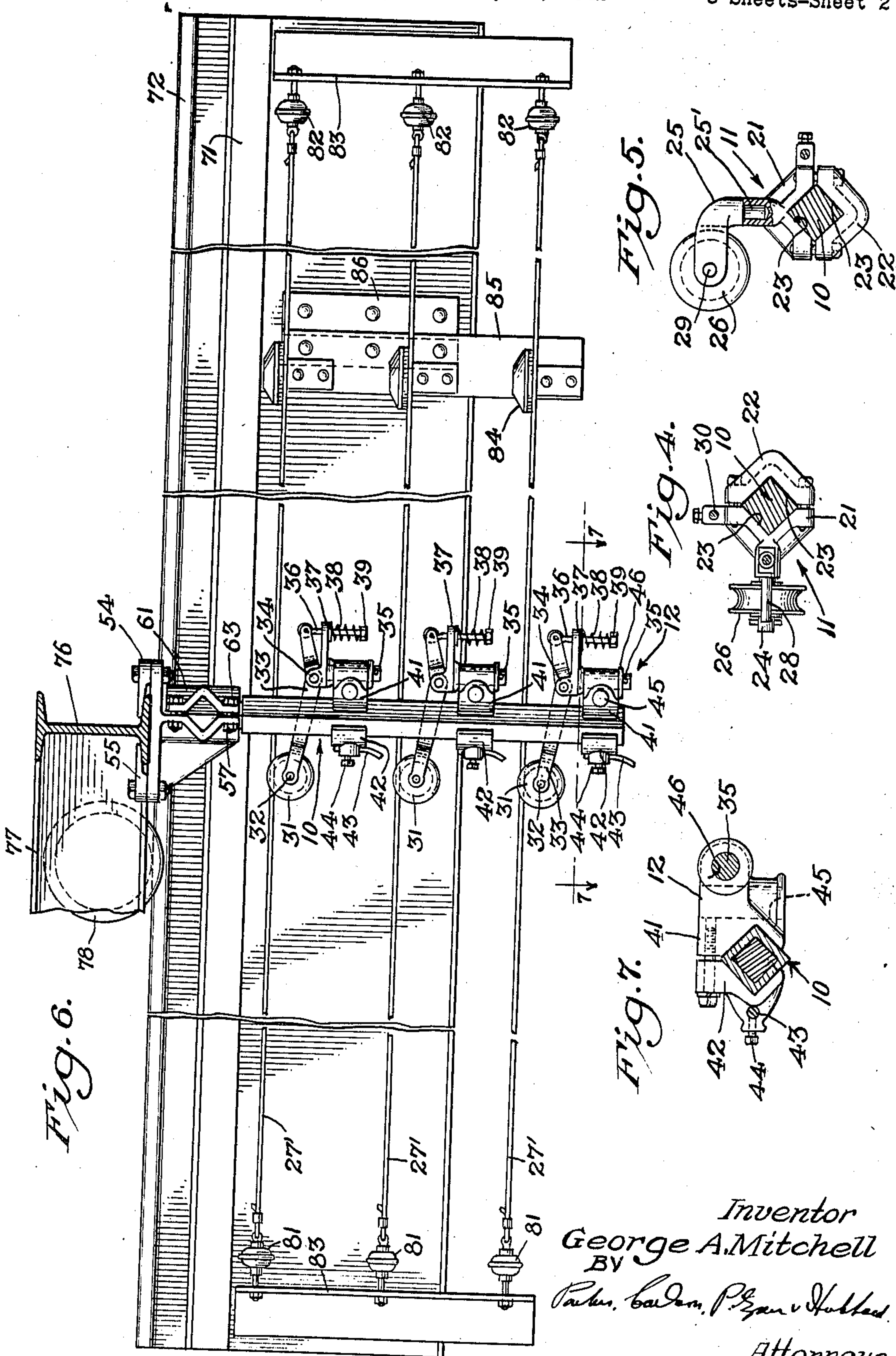
G. A. MITCHELL

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CURRENT COLLECTING APPARATUS

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3 Sheets-Sheet 2



Inventor
George A. Mitchell
BY
Rachner, Gaudin, P. Egan & Hultberg
Attorneys

March 7, 1944.

G. A. MITCHELL

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3 Sheets-Sheet 3

Fig. 8.

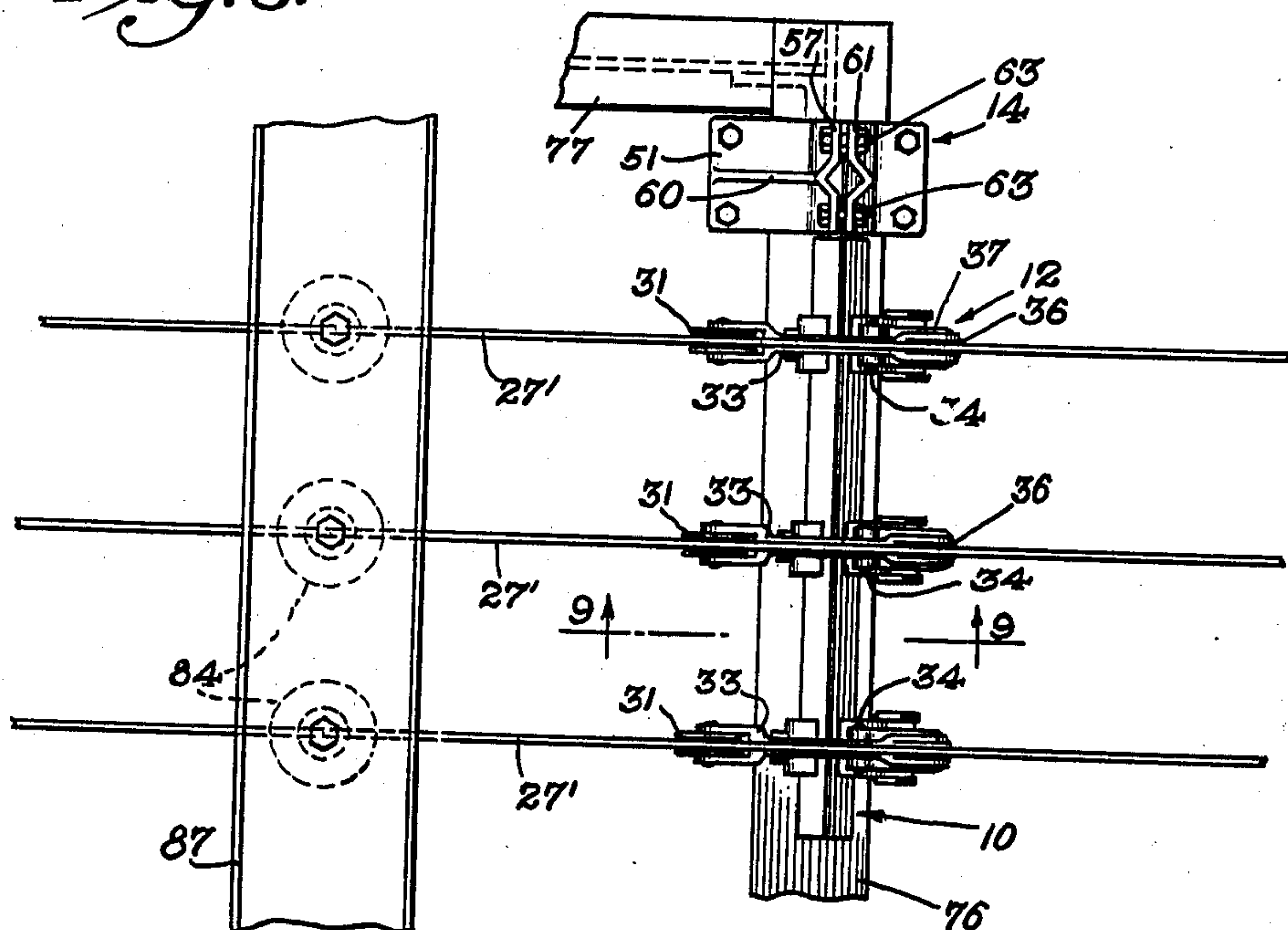
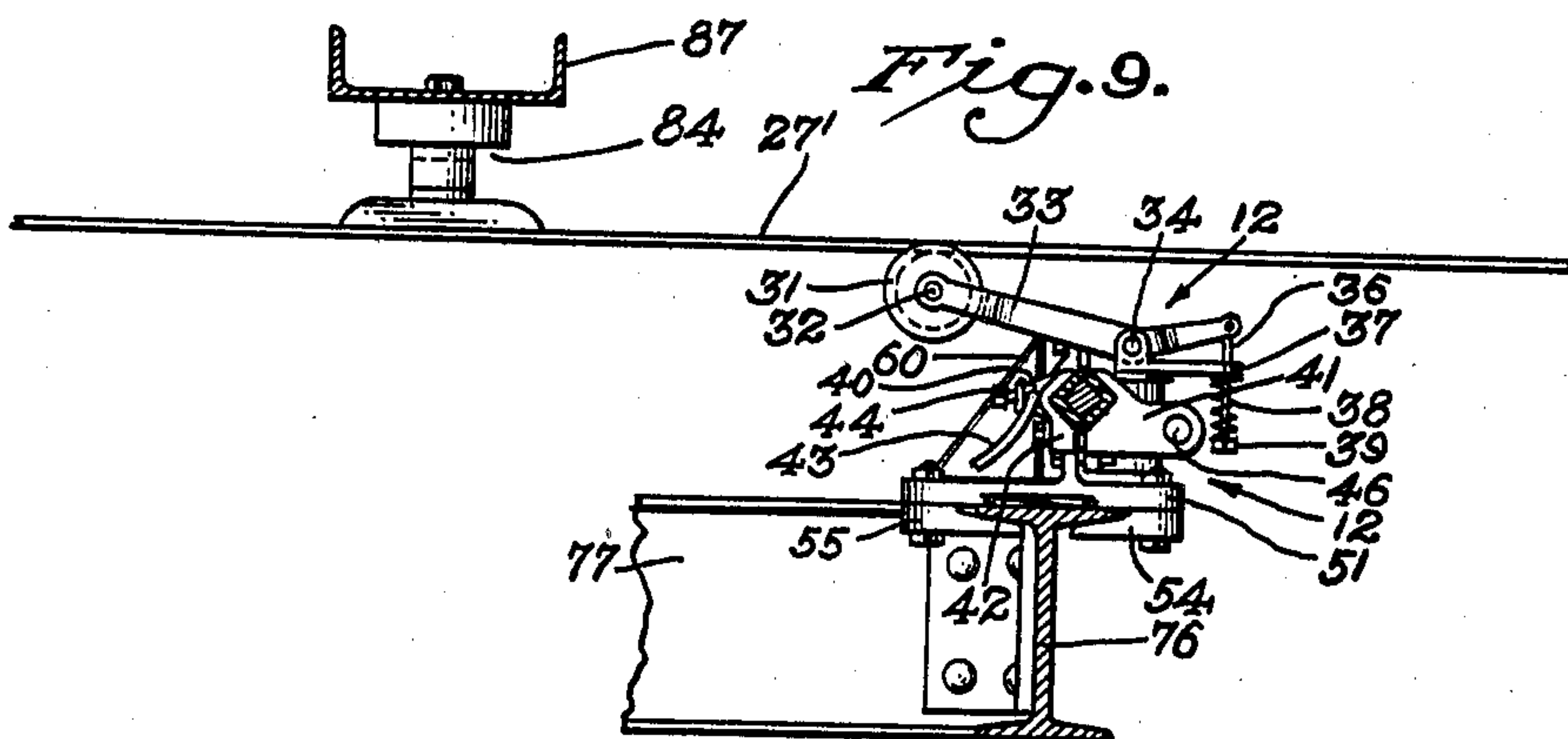


Fig. 9.



Inventor
George A. Mitchell
BY
Parker, Gordon, Fitzgerald & Hobbs
Attorneys

UNITED STATES PATENT OFFICE

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CURRENT COLLECTING APPARATUS

George A. Mitchell, Muskegon, Mich., assignor to
Manning, Maxwell & Moore, Inc., Muskegon,
Mich., a corporation of New Jersey

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6 Claims. (Cl. 191—40)

This invention relates to current collecting apparatus particularly suitable for use with traveling cranes and similar bridge structures having a carriage or other traveling member which requires a supply of electrical current for its operation.

Traveling cranes may be equipped with any one of a number of different types of runway conductor systems depending upon the specific requirements of each installation. Thus, in some instances it may be desirable to arrange the conductors of the system in a vertical plane, that is, with the conductors spaced apart vertically, while in other systems the conductors may be arranged in a horizontal plane. With either conductor arrangement the system may be of the so-called "loose wire" type in which the conductors are supported only at their ends. Alternatively the conductors may be supported at one or more intermediate points in which case the conductors are generally stretched relatively taut. The latter systems will be referred to hereinafter as "tight wire" systems. Moreover, while the conductors of the runway system always extend generally parallel to the path of the traveling member they may be located either above or below or at one side of the bridge structure which carries the tracks for the traveling member.

One object of the present invention is to provide an improved current collecting apparatus adapted for use with any of the runway conductor systems mentioned above.

A more specific object is to provide a current collecting apparatus made up of a relatively small number of standardized parts constructed and arranged for assembly in various relationships to adapt the apparatus for use with any of the runway conductor systems commonly employed in traveling crane installations.

Another object is to provide a current collecting apparatus utilizing interchangeable parts which, by reason of their universal adaptability for use with any of the commonly used runway conductor systems, materially reduce the number of different parts which must be manufactured and carried in stock and thereby make it practicable to produce this type of equipment by mass production methods with a consequent reduction in the cost thereof.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings in which:

Figure 1 is a front elevational view of current collecting apparatus embodying the features of

the invention wherein the parts are assembled for use with a vertical "loose wire" runway conductor system as installed in a traveling bridge crane, the crane bridge being shown in transverse section.

Fig. 2 is a side elevational view of the current collecting apparatus shown in Fig. 1.

Fig. 3 is a perspective view of the mounting bracket forming a part of the current collecting apparatus with the individual elements of the bracket shown in separated relation.

Fig. 4 is a top view of the contactor assembly shown in Figs. 1 and 2.

Fig. 5 is a view of the contactor assembly arranged for use with a horizontal "loose wire" runway conductor system.

Fig. 6 is a side elevational view of the current collecting apparatus assembled for use with a vertical "tight wire" runway conductor system.

Fig. 7 is a horizontal sectional view taken along the line 7—7 of Fig. 6 showing details of the contact roll supporting structure.

Fig. 8 is a top view of the current collecting apparatus with the parts assembled for use with a horizontal "tight wire" runway conductor system.

Fig. 9 is a side view of the apparatus, partly in section, taken along the line 9—9 of Fig. 8.

While I have shown and will hereinafter describe a preferred form of the invention and its application to a specific type of traveling crane, it will be understood that the invention may be employed with other types of cranes and similar structures and that various changes and modifications may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention as defined by the appended claims.

In carrying out the invention I provide a related series of standardized parts adapted to be assembled in various relationships for use with the different types of runway conductor systems hereinbefore referred to. This series of parts, as herein shown, comprises an insulated collector pole 10 adapted to support a plurality of contactors 11 (Figs. 1, 2, 4 and 5) or 12 (Figs. 6—9) and a mounting bracket 14 by which the collector pole may be supported on a crane structure in any one of a plurality of positions.

The collector pole 10 as herein shown comprises a metal bar 15 (Fig. 3) of generally rectangular cross section encased in a sheath 16 of suitable insulating material. The sheath effectively insulates the contactors from the pole and from each other and makes it unnecessary

to provide insulation in the individual contactors. The cross sectional shape of the pole simplifies positioning of the various parts in the assembly of the apparatus and insures maintenance of proper position at all times.

In general it is desirable to provide contactors of somewhat different construction for "loose wire" and "tight wire" runway conductor systems, respectively. Each installation, of course, requires a plurality of these contactors, three being shown in the exemplary apparatus. The contactors for any given installation are all alike so a description of one of each type will suffice.

The contactor 11 for the "loose wire" system, as shown in Figs. 1, 2, 4 and 5, comprises a rigid bracket 21 having a transversely disposed cap 22 bolted or otherwise removably secured thereto. The bracket and cap are formed with complementary triangular grooves 23 (Figs. 4 and 5) which cooperate to define a square aperture adapted to snugly receive the insulated section of the collector pole 10. The bracket may thus be rigidly clamped to the pole in either of two selected positions.

As will be seen by reference to the drawings the bracket 21 is formed with a socket adapted to receive a roller supporting stud 24 (Figs. 1 and 4) or the shank 25' of a roller supporting member 25 (Fig. 5). A grooved roller 26 journaled on the stud 24 is thus positioned for contact with a conductor 27 disposed at one side of the pole 10 when the latter is arranged in a vertical position as shown in Fig. 2. A guard pin 28 set in the bracket 21 and extending over the roller 26 but spaced therefrom prevents accidental disengagement of the conductor from the roller. To adapt the contactor 11 for use with a horizontal runway conductor system, the stud 24 is replaced by the supporting member 25 (Fig. 5). This member is bifurcated to provide spaced bearings for a shaft 29 on which the contact roller 26 is journaled for rotation about an axis parallel to the longitudinal axis of the collector pole 10.

With either of the two types of mountings above described the roller 26 provides a rolling contact with one of the conductors of the runway conductor system. The weight of the conductor insures adequate contact at all times. The current picked up by the roller is transmitted by the stud 24 or by the shaft 29 and member 25 to the bracket 21. A conductor 30 suitably anchored to the bracket carries the current to the motor or other electrical device on the traveling member with which the current collecting apparatus is associated.

In runway conductor systems of the type in which the conductors are rigidly supported, that is, the so-called "tight wire" systems, it is desirable to provide means for holding the contact roller against the conductor with sufficient pressure to insure efficient current pick-up while permitting yielding movement of the roller to compensate for irregularities in the conductor. The contactor assembly 12 supplied for use with this type system is accordingly provided with a grooved contact roller 31 (Figs. 6, 8 and 9) journaled on a shaft 32 supported in the bifurcated end of a lever 33. This lever is pivoted intermediate its ends between a pair of lugs 34 projects axially from one end of a cylindrical stud 35. The other end of the lever 33 is preferably inclined at an angle with respect to the roller supporting end and is bifurcated for the reception of an I-bolt 36 which is pivotally at-

tached thereto by a pin or other suitable means. The free end of the I-bolt 36 projects substantially parallel to the stud and through an aperture in an arm 37 rigid with the stud 35 and extending radially therefrom adjacent the base of the lugs 34. A coiled compression spring 38 interposed between the underside of the arm 37 and a nut 39 threaded onto the end of the bolt tends to rock the roller supporting lever (in a clockwise direction as viewed in Fig. 6) and thus hold the roller in firm contact with the wire of the runway conductor system.

The contact roller assembly is mounted on the collector pole 10 by means of a bracket 41 having a cap member 42 bolted or otherwise removably secured thereto as shown in Fig. 7. Adjacent surfaces of the bracket and cap member are grooved to define a square aperture for the reception of the collector pole. A wire 43 anchored to the cap member as by a set screw 44 conducts current from the contactor assembly to the motor or other device with which the apparatus is associated.

The bracket 41 is adapted to hold the contactor assembly in either of two positions for cooperation alternatively with a vertical or horizontal runway conductor system. To this end the bracket is provided with one stud receiving socket 45 disposed substantially perpendicular to the longitudinal axis of the collector pole and a similar socket 46 extending generally parallel to the pole. The axis of the latter socket is displaced laterally with respect to the collector pole aperture as shown in Figs. 6 and 7 to provide sufficient clearance for the roller supporting lever 33. When used with a vertical runway conductor system the contactor supporting stud 35 is seated in the socket 46 with the roller carrying lever 33 projecting along one side of the pole as shown in Fig. 6. Alternatively for use with a horizontal runway system, the stud 35 is seated in the socket 45, thus positioning the roller carrying lever 33 as shown in Figs. 8 and 9. In either case, the contactor assembly is free to swivel or pivot on an axis perpendicular to the wire with which it cooperates. Moreover, the contact roller 31 is yieldably held against the wire 27' by the action of the spring 38 thus enabling the roller to maintain contact with the wire regardless of any irregularities therein.

Having in mind the construction and mode of operation of the contactors 11 and 12 above described it will be appreciated that the collector pole 10 must be rigidly supported and accurately located with respect to the runway conductor system with which it is intended to operate. Novel supporting structure is provided for this purpose, the support in this instance comprising the bracket 14 which performs the function of supporting and positioning the collector pole and contactors carried thereby. Due to the novel form of the bracket, the pole may be mounted in the proper position for use with any of the conventional runway conductor systems hereinbefore mentioned.

Referring now to Fig. 3 of the drawings the bracket 14 in its preferred form comprises a generally rectangular base 51 formed on one side with spaced pads 52 and 53 adapted to bear against the flange of an I-beam or other structural element to which the bracket is to be attached. These pads likewise provide seats for flat, generally rectangular clamping members 54 and 55 which engage the flange of the beam to secure the bracket thereto. These clamping

members may be recessed on their undersides as at 56 to conform to the contour of the flange and the opposite edge is suitably apertured for the reception of bolts by which the members are removably secured to the base 51.

Projecting from the side of the base opposite the pads 52 and 53, substantially perpendicular to the plane of the base, is a rigid plate 57 formed with crossed triangular grooves 58 and 59 in its front face. A gusset plate 60 (Figs. 2 and 8) extends between the rear face of the plate and the adjacent end of the base to strengthen the plate and to assist in holding it rigid. The grooves 58 and 59 are preferably disposed at right angles to each other, one being perpendicular to the plane of the base and the other parallel to said plane.

Cooperating with the plate 57 is a cap member 61 of substantially the same external dimensions as the plate and adapted to be removably secured thereto as by bolts 63 engaging in apertures adjacent each of the four corners of the cap member and plate. The cap member is likewise formed with crossed triangular grooves 64 and 65 adapted to register respectively with the grooves 58 and 59 to form square sockets for receiving the unsheathed end of the collector pole. Thus by tightening the bolts 63, the pole may be securely clamped in place on the bracket.

It will be apparent that the bracket may be clamped in various positions on a crane or other structure with which it is associated and that when so clamped it is capable of holding the collector pole in either a horizontal or vertical position as desired. Thus, only one form of mounting bracket is required regardless of the type of runway conductor system with which the current conducting apparatus is to be used.

By way of illustration, the installation of the collecting apparatus on a bridge crane equipped with a vertical "loose wire" runway conductor system is shown in Fig. 1. The particular crane illustrated comprises a bridge formed by spaced, horizontally disposed I-beams 71 equipped with rails 72 forming a track for a traveling member or carriage 73. The conductors 27 of the system are attached to uprights 74 supported at opposite ends of the bridge structure by means of brackets 75 bolted to the inner face of one of the I-beams 71.

The carriage 73, as herein shown, includes a rectangular frame consisting of side beams 76 joined by cross beams 77. Conventional flanged wheels 78 journaled on the side beams support the carriage on the track rails 72. An electric motor M mounted on the carriage is arranged to drive the wheels through the medium of a chain 79 and associated apparatus of well-known construction. The current collector system serves to conduct current from the runway conductor system for the operation of this motor. Accordingly, in order to position the contactors 11 for cooperation with the conductors 27, the supporting bracket 14 is clamped to the lower flange of the beam 76 forming a part of the frame of the carriage.

For use with a horizontal "loose wire" runway conductor system the supporting bracket may be clamped either to the upper or lower flange of the beam 76 depending upon the location of the conductors either above or below the plane of the carriage. In this case the collector pole is inserted in the horizontal socket formed between grooves 58 and 64.

Figs. 6 and 9 illustrate a crane structure of

the same general type as that shown in Fig. 1 equipped with a runway conductor system of the tight wire type. In this system the runway conductors 27' are anchored at opposite ends to insulators 81 and 82 secured to angle bracket 83 rigidly attached to the bridge member 71 at opposite ends. The conductors are additionally supported at one or more intermediate points by insulated supporting members 84 fixed to upright channel supports 85 suitably attached to the bridge member as by an angle bracket 86.

A similar type system with the conductors arranged in a horizontal plane is illustrated in Fig. 9. In this instance the intermediate supports 84 are carried on a horizontal member 87 which may be mounted on the bridge structure in any suitable manner. In the particular installation shown in Fig. 9 the conductors are positioned above the plane of the carriage and consequently the collector pole supporting bracket is conveniently clamped to the upper flange of the beam 76 forming a part of the carriage frame. The collector pole, in this instance, is engaged in the horizontal socket provided for its reception while the contactors 12 are assembled in the manner previously described for use with horizontal runway conductor systems.

It will be apparent from the foregoing that the invention provides a current collecting apparatus of novel and advantageous form. The apparatus consists of a relatively small number of standardized parts constructed and arranged for assembly in various relationships to adapt the apparatus for use with any of the conventional runway conductor systems employed in traveling crane installations. The parts making up the apparatus are interchangeable for the different types of installations and materially reduce the number of different types of parts that must be manufactured and kept in stock. This permits the parts to be manufactured in quantity with a consequent reduction in the manufacturing costs.

I claim as my invention:

1. A contactor assembly for traveling cranes and the like having, in combination, an elongated collector pole, a series of contactors adjustably mounted on said pole for cooperation with the individual wires of a runway conductor system, and a bracket operative to support said pole on the crane structure for operation with either a horizontal or a vertical runway conductor system, said bracket comprising a rectangular base, clamping members secured to one side of said base for removably securing the bracket to the crane structure, a plate projecting outwardly from the opposite side of said base, a cap member adapted to be assembled with said plate in face-to-face relation, said member and said plate having registering grooves defining angularly disposed apertures for receiving the collector pole, and means removably securing said cap member to said plate to clamp the collector pole rigidly in a selected position.

2. A universal supporting structure for a collector pole having a series of contactors mounted thereon to cooperate with the wires of a runway conductor system, said supporting structure comprising, in combination, a rigid base, means operative to clamp said base detachably to the flange of a beam constituting a part of a crane or the like, a member rigid with said base projecting outwardly therefrom opposite the side engaging the beam, a second member adapted to be removably secured to said first member in face-to-face relation, and two pairs of registering

grooves in the abutting faces of said members defining sockets adapted to receive and clamp the collector pole in a selected position, the grooves of the respective pairs being disposed substantially at right angles to each other and positioned so that the sockets are enabled to hold the pole either parallel or perpendicular to the beam to which said base is clamped.

3. A universal bracket for supporting a collector pole having a plurality of contactors mounted thereon to cooperate with the wires of a runway conductor system, said bracket comprising, in combination, a rigid generally rectangular base, clamping members adapted to be secured to said base and having sections extending over the flange of the beam to rigidly clamp the bracket thereto, a member projecting substantially at right angles from the base opposite the side engaging the beam, a second member adapted to be removably secured to said first member in face-to-face relation, said members having two pairs of registering grooves in their abutting faces defining sockets adapted to receive and clamp the collector pole, the respective pairs of grooves being disposed substantially at right angles to each other and in a position to adapt said sockets for holding the collector pole either parallel or perpendicular to the plane of the base, and a gusset plate extending from the rear surface of said first member to the base operative to hold the members rigid.

4. Current collecting apparatus for traveling cranes comprising, in combination, a bracket adapted to be rigidly clamped to an elongated collector pole, a unitary contactor assembly mounted on said bracket, said assembly including a cylindrical stud, a pair of spaced lugs projecting axially at one end of said stud, an arm projecting radially from said stud adjacent said one end thereof, a lever pivoted intermediate its ends between said lugs, a contact roller journaled on one end of the lever, and means yieldably urging the other end of the lever toward said arm, said bracket having a pair of sockets adapted to re-

ceive said stud for pivotally supporting the contactor assembly, one of said sockets extending generally parallel to the longitudinal axis of the collector pole and the other socket extending generally perpendicular to the axis of the pole.

5. Current collecting apparatus for traveling cranes comprising, in combination, a bracket carried by an elongated collector pole, a unitary contactor assembly mountable in different positions on said bracket, said assembly including a cylindrical stud, a rigid arm projecting radially from one end of the stud, a lever pivoted at an intermediate point at said one end of the stud and having one end projecting over said arm, a contact roller journaled on the other end of the lever, and spring means connecting between said one end of the lever and said arm effective to yieldably hold the lever in predetermined relation to the arm, said bracket having a plurality of sockets adapted to receive said stud for pivotally supporting the contactor assembly, at least one of said sockets extending generally parallel to the longitudinal axis of the collector pole and another of said sockets extending at an angle to said one socket.

6. Current collecting apparatus for traveling cranes comprising, in combination, an elongated supporting member adapted to be mounted on a crane structure in either a horizontal or a vertical position, a bracket carried by said supporting member and having a pair of sockets disposed in perpendicular relation to each other, one of said sockets being disposed in a vertical position when the supporting member is horizontal and the other of said sockets being disposed in a vertical position when the supporting member is vertical, a unitary contactor assembly including a stud adapted to be mounted in the vertically disposed socket, a contact carrying lever mounted on said stud, and spring means yieldably holding said lever in predetermined position with respect to the stud.

GEORGE A. MITCHELL.