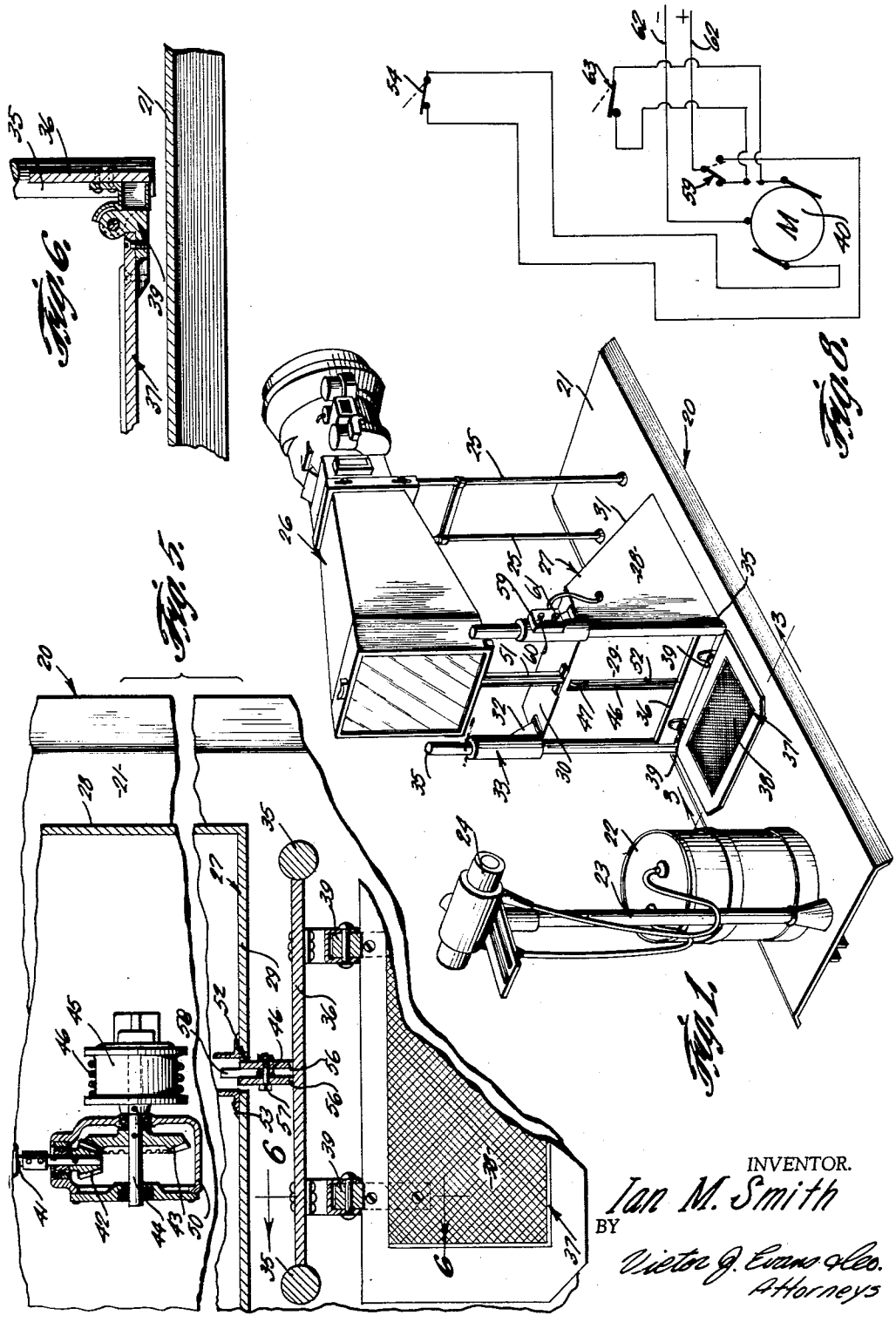
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PATIENT LIFT STAND

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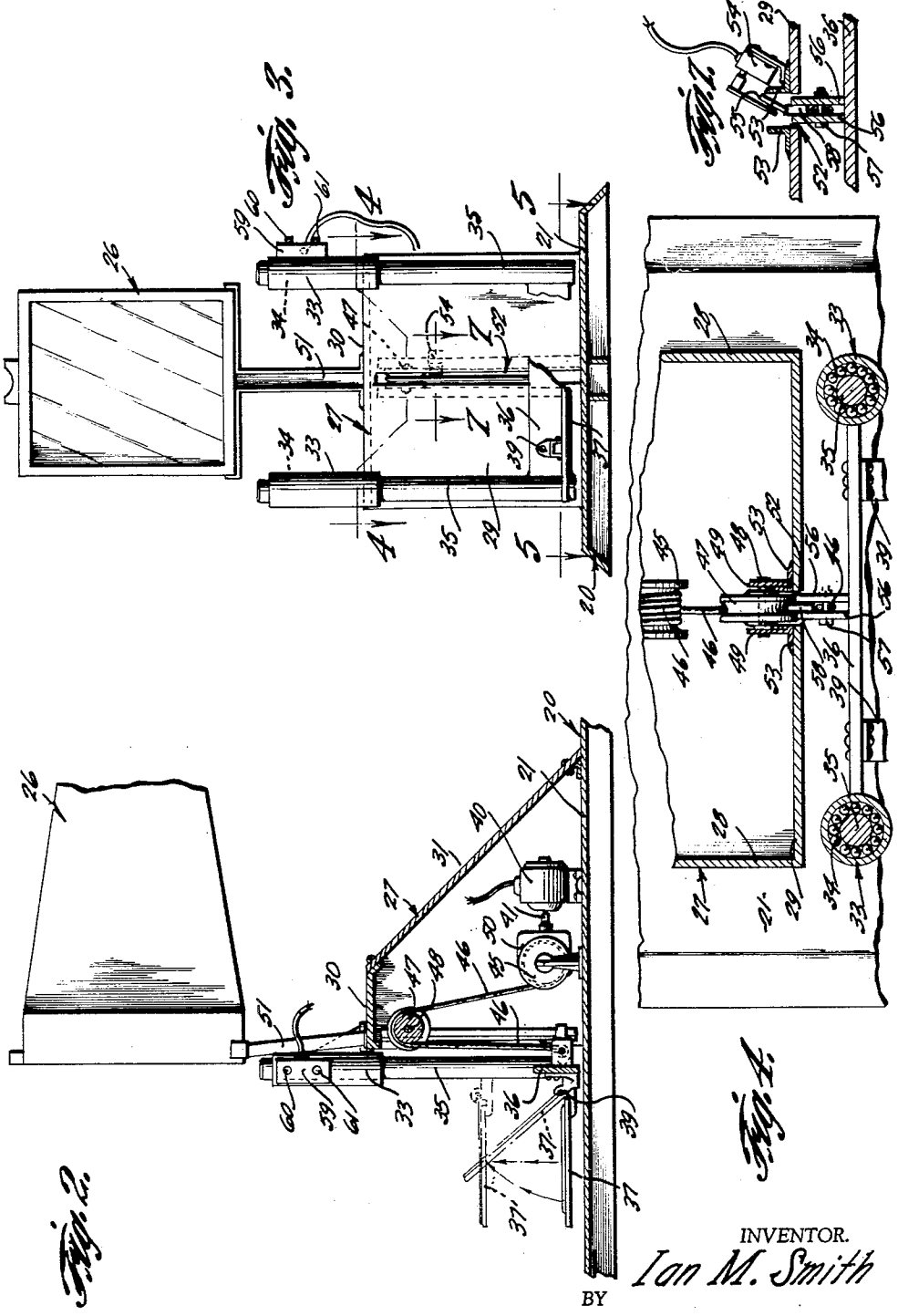


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PATIENT LIFT STAND

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5 Claims. (Cl. 250—50)

This invention relates to a patient lift stand or platform, and more particularly to such a patient lift stand for use with X-ray equipment, photographic cameras or the like.

The primary object of the present invention is to provide a patient lift stand which is especially suitable for use with transportable or mobile types of X-ray camera equipment and wherein according to the present invention instead of adjusting the X-ray camera and tube to the patient's height, the patient lift stand of the present invention provides a means whereby the patient can be elevated to the fixed height of the X-ray camera and tube installations, so as to permit advantageous use of the present invention in mobile units, stationary clinics, hospitals or the like.

A further object of the present invention is to provide a patient lift stand of the type stated which insures maximum efficiency with the lowest possible initial cost, and wherein the patient lift stand is constructed so that there will be important and considerable savings in space, weight, and maintenance, the present invention being arranged and constructed so that the entire mechanism can be readily transported or secured as a retractable unit within a sedan delivery or similar chassis.

A still further object is to provide a patient lift stand which is capable of advantageous and efficient use in various applications and for example it can be used within line or angle hood camera, and wherein the present invention can be used for photo-fluorographic chest surveys in hospitals, health centers, mobile units, private clinics or the like, the patient lift stand of the present invention including an adjustable motorized platform which permits patients to be readily raised and lowered at a comfortable speed, and wherein up and down movement of the elevating platform is conveniently controlled by a suitable switch mechanism, and wherein there is further provided an automatic cutoff limit switch mechanism for controlling movement of the platform.

Still another object of the present invention is to provide such a patient lift stand that is economical to manufacture and efficient in operation and which is rugged in structure and foolproof in use.

These and other objects of the invention will become apparent from a reading of the following specification and claims, together with the accompanying drawings, wherein like parts are referred to and indicated by like reference characters and wherein:

FIGURE 1 is a perspective view of the patient lift stand of the present invention.

FIGURE 2 is a fragmentary side elevational view, with parts broken away and in section showing certain construction and details of the patient lift stand of the present invention.

FIGURE 3 is a sectional view taken on the line 3—3 of FIGURE 1.

FIGURE 4 is a sectional view taken on the line 4—4 of FIGURE 3.

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 3.

FIGURE 6 is a sectional view taken on the line 6—6 of FIGURE 5.

FIGURE 7 is a sectional view taken on the line 7—7 of FIGURE 3.

FIGURE 8 is a view illustrating schematically the wiring diagram of the present invention.

Referring in detail to the drawings, the numeral 20 indicates the patient lift stand of the present invention which is shown to comprise a horizontally disposed base 21, and a conventional transformer 22 is adapted to be supported on one end of the base 21, FIGURE 1. The numeral 23 indicates a post or upright member which is suitably secured adjacent an end of the base 21, and a fixed X-ray tube 24 is supported on the post 23.

As shown in the drawings, spaced apart legs or frame members 25 extend upwardly from the base 21 for supporting a conventional camera 26. The numeral 27 indicates a hollow casing or housing which is supported on the base 21 below the camera 26, and the housing 27 embodies a pair of vertically disposed spaced parallel side walls 28 as well as a vertically disposed end wall 29, and the housing 27 further includes a horizontally disposed top portion 30 as well as an inclined wall member 31.

The numeral 32 designates each of a pair of brackets which are suitably affixed to the upper portion of the housing 27, and a pair of bearings 33 are secured to the brackets 32, and the bearings 33 are adapted to have roller or ball bearings 34 therein, FIGURE 4. The pair of bearings 33 are arranged in spaced apart vertically disposed relation with respect to each other, and the numeral 35 designates each of a pair of spaced parallel vertically disposed rods which are slidable or adjustable in the bearings 33. A horizontally disposed crosspiece 36 extends between the lower ends of the pair of rods 35 and is secured thereto in any suitable manner, as for example by welding. As shown in the drawings, there is provided a platform 37 which includes an intermediate portion 38 that may be roughened or knurled so as to provide an anti-slipping surface for a patient standing thereon, and the platform 37 is hingedly connected to the crosspiece 36 by means of hinges 39. Due to the provision of the hinges 39, when the device is not being used, the platform 37 can be pivoted or swung upwardly from its horizontal position as for example to a vertical position so as to insure that the platform 37 will be out of the way when it is not being used, whereby there will be less likelihood of a person accidentally tripping or stumbling over the platform.

The numeral 40 indicates a reversible electric motor that is arranged in the lower portion of the housing 27, and the motor 40 drives a shaft 41 which has a gear 42 thereon, the gear 42 being arranged in meshing relation with respect to a gear 43, and these gears 42 and 43 are adapted to be encased in a protective box or casing 50, FIGURE 5. The shaft 44 is suitably affixed to the gear 43, and the numeral 45 indicates a drum or reel which is secured to the shaft 44. A cable 46 has one end thereof affixed to the drum 45. The cable 46 is also trained over a pulley 47 which is supported on a pin 48, and the pin 48 is adapted to be supported by spaced apart elements 49, FIGURE 4.

The numeral 51 designates upstanding braces which are interposed between the top portion 30 of the housing 27 and the camera 26 so as to help support the camera 26 in its proper location.

As shown in FIGURE 7 for example, the end wall 29 of the housing 27 is provided with an elongated slot or opening 52, and angle irons or bars 53 are arranged on opposite sides of the slot 52, and these bars 53 are secured as by welding to the inner surface of the end wall 29. The numeral 54 indicates a limit switch which is suitably secured to one of the bars 53, and the limit switch 54 includes a projecting member 55 that is adapted to be engaged by a tongue 58 so as to automatically control operation of the motor 40 as later described in this appli-

cation. The tongue 58 is adapted to be secured in any suitable manner as for example by welding to a pair of lugs 56, and the lugs 56 are suitably affixed or secured to the crosspiece 36. The numeral 57 indicates a pin or securing element which extends between a pair of lugs 56, and one end of the cable 46 is connected to the pin 57.

As shown in the drawings, there is provided a switch mechanism which is indicated generally by the numeral 59, and the switch mechanism 59 includes manually operable members such as pushbuttons 60 and 61 which can be manually operated in order to control rotation or actuation of the motor 40 so that the platform 37 can be selectively moved upwardly or downwardly as desired. As shown in FIGURE 8 the switch 59 is connected in an electrical circuit, and the numeral 62 indicates wires or conductors that are adapted to be connected to a suitable source of electrical energy whereby current can be provided for actuating the motor 40.

As a modification or alternative arrangement, instead of using the cable 46, a chain type of connection can be utilized and when such a chain connection is used, a lower limit switch as indicated by the numeral 63 is adapted to be used for opening the circuit when the platform 37 reaches the lowermost position.

From the foregoing, it is apparent that there has been provided a patient lift stand, and in use with the parts arranged as shown in the drawings, it will be seen that the entire unit as indicated by the numeral 20 may be arranged in a suitable location as for example in a truck, trailer or the other piece of mobile equipment. When a patient is to be X-rayed, for example, the patient is adapted to stand on the portion 38 of the platform 37, and then for example with the parts arranged as shown in FIGURE 1, the pushbutton 60 of the switch mechanism 59 can be manually actuated so as to energize the motor 40, whereby the drum 45 can be rotated due to the provision of the intermeshing gears 42 and 43, FIGURE 5. As the drum 45 rotates in the proper direction, the cable 46 will be wound thereon so that tension will be applied to the cable 46 which is trained over the pulley 47, and since the cable 46 is connected to the pin 57, and since the pin 57 is secured between the lugs 56 which are suitably fastened to the crosspeice 36, and with the crosspiece 36 connected as at 39 to the platform 37, it will be seen that as the cable 46 is wound on the drum 45 the platform 37 can be elevated. Thus with the patient standing on the platform, the patient can be elevated to the proper height or location in order to permit the patient to be X-rayed by the camera 26 in conjunction with the fixed X-ray tube 24. The switch 59 may be of the type that causes the motor 40 to stop when pressure is released on the pushbutton 60 so that the platform 37 can be stopped at a desired elevation and the patient can be held stationary in a desired location in order to permit proper taking of the X-ray.

When it is desired to lower the patient, the pushbutton 61 can be manually depressed and since the motor 40 is of the reversible type, the cable 46 can have slack therein due to the opposite rotation of the motor 40 whereby the weight of the patient on the platform 37 can return the platform patient to a lower position in order to permit the patient to step off the platform. The switch control for the motor may be such that the rate of ascent or descent can be controlled or regulated as desired so that the platform patient will not move up and/or down too fast or too slow.

In addition there is provided the safety switch 54 which serves to automatically open the circuit to the motor 40 when the platform 37 reaches the upper limit of its travel and this takes place due to the provision of the tongue 58 which is secured between the lugs 56, since as the platform moves upwardly, the tongue 58 can travel or move through the slots 52 in the wall 29 of the housing and continue its upward movement of the platform to cause the tongue 58 to move into engagement with the portion

55 of the limit switch 54. The limit switch 54 is of the type that opens the electrical circuit when the element 55 is engaged by a member such as the tongue 58, and when the platform moves downwardly, the tongue 58 will move out of engagement with the element 55 so as to permit the switch 54 to automatically close the circuit to the motor 40 as for example when a pushbutton of the switch 59 is properly actuated. Electrical energy for the motor 40 can be supplied from any suitable source of supply as for example to the input wires or conductors 62, and when the present invention is being used as part of mobile equipment, such electrical energy may be supplied from a portable generator or the like. Or, when the present invention is being used in a fixed installation, the electrical energy can be supplied from a conventional source of current.

The platform 37 is hingedly connected to the crosspiece 36 by means of the hinges 39, and this construction permits the platform 37 to be readily and conveniently moved or swung from a horizontal to a vertical position or vice-versa and this arrangement permits the platform to be swung upwardly from its horizontal position when the platform is not being used so that there will be less likelihood of the platform causing a person to trip thereover or stumble thereon since when the pltaform is not in use it can be moved to the out of the way vertical raised position contiguous to the crosspiece 36.

The slot 52 in the wall 29 of the housing 27 provides clearance for the cable 46 to extend therethrough, and in addition this slot 52 provides an opening through which the tongue 58 can move in order to actuate the limit switch 54 as previously described.

In certain instances a lower limit switch 63 is adapted to be used, and such a lower limit switch 63 may have the same general construction and operation as the upper limit switch 54 and the switch 63 can be used for automatically opening the circuit when the platform reaches its lowermost position so that the motor will be automatically turned off when the limit of travel is reached by the platform in order to prevent damage to the parts.

While the present invention has been described for use in connection with X-ray type of equipment, it is to be understood that it is susceptible and capable of being used in connection with other types of equipment besides X-ray equipment and with the present invention a patient can be readily elevated to a desired location in order to permit the patient to be photographed, X-rayed or the like. The rods 35 slide in the bearings 33 and this construction serves to insure that the rods and platform and associated parts will be maintained in their proper aligned position as the platform with the patient thereon moves up and down.

The parts can be made of any suitable material and in different shapes or sizes.

As previously stated, a cable such as the cable 46 can be used as part of the means for raising and lowering the lift stand platform, or a chain drive or the like can be used instead of such a cable arrangement. Suitable bearings, braces and the like can be used wherever desired or required. The switch 59 functions as a control unit for regulating the up or down movement of the platform. The patient lift stand of the present invention can be used in mobile or stationary installations. With the present invention a patient can be X-rayed in comfort, safety and convenience, and various types of accessories are adapted to be used with the patient lift stand of the present invention and for example when the present invention is being used as part of a mobile clinic or the like, an electric generator can be provided for supplying the necessary power, and the unit may be wired for operation off local power sources where available. The patient lift stand can be mounted in a vehicle so as to provide a walk through mobile medical clinic which is especially suitable for bringing modern clinic facilities directly to areas where they are needed most, and in addi-

tion such a mobile unit can serve as a health center for community, school or rural programs, as well as function advantageously as disaster and/or emergency clinic facilities, field laboratory, health education units or the like. Such a unit may be staffed by a physician with one or more technicians, and suitable accessories or miscellaneous items can be utilized in order to insure privacy for the patient during registration, health examinations or the like. The patient lift stand can be advantageously used as part of a completely equipped, self-contained mobile health examination center, and the parts are arranged and constructed so that there will be a compact, efficient and versatile mechanism. In addition the present invention is especially suitable for use as part of the equipment in a transportable X-ray installation which will facilitate mass chest surveys, or the like, and the compact arrangement of the parts permits the rapid processing of patients at minimum costs as for example in large cities and isolated rural communities. The compact motorized platform and adjustable mechanisms can be used with in-line or angle hood cameras and it has application for photo-fluorographic chest surveys in hospitals, health centers, mobile units and private clinics. When installed in a mobile X-ray clinic type of vehicle, mass chest survey programs can be brought directly to the people regardless of terrain at the lowest possible cost. In addition the present invention can be used in conjunction with emergency radiography, and it is also adaptable for mass chest or emergency radiography. The patient lift stand of the present invention can be used in a mobile clinic for various purposes as for example in connection with health education in disseminating public health information directly in those areas where such information is most desirable, and such a mobile clinic will have a relatively low initial cost as well as a minimum amount of expense in connection with upkeep or maintenance, and such equipment is especially suitable for emergencies as for example as emergency hospital units or the like. The present invention can be mounted in a trailer or a self propelled vehicle and lead lined partitions may be provided for offering protection for the operator and patient in various types of units. The patient lift stand of the present invention can be permanently located or it can be transported in a vehicle and may be supplied as a complete integral unit, and it can also be supplied coupled to existing X-ray generators. The numeral 59 indicates the forward and reverse motor switch, and the numeral 27 indicates the power plant housing. The casing 50 is adapted to have the gear reduction unit enclosed therein. The raising mechanism for the motorized patient elevating stand is adapted to be controlled by a technician or other person operating the equipment.

The motorized platform of the present invention permits the raising and lowering of patients even though such patients may be quite heavy, and wherein the platform can be moved at a comfortable speed such as two inches per second. Up and down movement of the elevating platform is controlled by the conveniently located two-way switch 59, and the platform 37 stops at the extreme raised and lower positions to the provision of the automatically cutoff limit switches. The tube 24 may be adjusted as desired, and the base 21 provides a convenient support for the transformer 22. The complete transportable installation is mounted on the full length base 21 and the base 21 may be made of a suitable material such as a suitable metal and the parts can be readily assembled or disassembled for clinic or field service.

Primarily according to the present invention, there is provided a patient lift stand whereby patients can be elevated to the fixed height of the X-ray camera and tube installation and this application permits use thereof in mobile units and stationary clinics or hospitals. Heretofore X-ray equipment has generally embodied a construction whereby the patient is stationary and the X-ray camera and tube are adjusted to the patient's height, but the patient lift stand of the present invention permits greater efficiency at lower initial cost with a considerable savings in space, weight, and maintenance. The patient lift stand is adapted to be operated by the electric motor 40 which has associated therewith reduction gearing and the cable drum 45. By means of the pulley system, the hinged patient platform can be raised or lowered as for example within a thirty-six inch range, and the hinged patient platform is connected to the metal columns or rods 35 which ride through the stationary bearings 33. The top of the housing 27 not only has the bearing brackets 32 secured thereto, but in addition the top of the housing helps support the camera 26 due to the provision of the members 51. By mounting the motor, reduction gear and cable drum on a wheeled metal platform which supports the X-ray hood and camera, the entire mechanism can be made transportable or secured as a retractable unit within a sedan delivery or similar chassis. The present invention can operate from the rear of a vehicle, or on a wheeled platform beneath a tent canopy, or it can be readily wheeled into a clinic or hospital. The platform can be raised or lowered the desired distance in a very short period of time, and the apparatus can be made portable so that it can be moved from room to room or building to building where adequate electric power sources are available.

The present invention thus provides an improved means for X-raying patients especially those X-rays pertaining to the lungs and chest, and while the present invention is primarily for use in mobile X-ray units which enable a minimum amount of operators or technicians to take a large number of X-rays in a short period of time, it can also be utilized as a clinical X-ray apparatus in field hospitals, emergency mobile clinics, disaster units, established hospitals in any place an X-ray unit is needed.

The present invention is constructed so that the parts have a minimum amount of weight and size, and the parts can be readily dismantled and transported, and in order to have a completely transportable unit, a base plate may be provided and wherein such a base plate can be extended below and out from the actual elevating platform for the installation of an X-ray tube on a sliding device for the adjustment of tube target distance as well as providing a support for the X-ray transformer such as the transformer 22. In addition, the supports for the rods 35 may include a hinge arrangement so as to permit these rods or column supports to be swung up to a horizontal position in order to facilitate transporting of the patient elevating lift stand. The speed of the platform up and down is controlled and held constant by means of the reduction gear assembly which is operatively connected to the motor and cable drum. The present invention is such that can be readily arranged in small spaces such as in a panel truck, small trailer or other device. Also, with the present invention the camera face, photo-fluorescent screen, platform and X-ray table head can protrude from the side, front or back of a small truck, trailer or other conveyance so as to permit the bulk of the X-ray camera and stand to remain within the conveyance proper. Also, the entire X-ray apparatus can be removed from the truck, trailer or other vehicle, so as to permit the mobile X-ray unit to be used in a field clinic, hospital or other suitable area as a clinical X-ray and permanent installation.

It is to be understood that the present invention embraces or includes the concept of the transportability feature of this stand, and in addition the patient lift stand permits X-ray equipment to be carried in boxes for interisland or field clinic service.

Minor changes in shape, size and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

What is claimed is:

1. In a patient lift stand, a horizontally disposed base, a transformer on said base, a post extending upwardly

from said base, a fixed X-ray tube supported on said post, frame members extending upwardly from said base, a camera supported by said frame members, a housing on said base below said camera, said housing including spaced parallel vertically disposed side walls, a vertically disposed end wall, a horizontally disposed top portion and an inclined wall portion, brackets affixed to the top portion of said housing, a pair of spaced parallel vertically disposed stationary bearings secured to said brackets, a pair of spaced parallel vertically disposed rods slidably mounted in said bearings, a horizontally disposed crosspiece extending between the lower ends of said rods and secured thereto, a platform hingedly connected to said crosspiece, a motor arranged in the lower portion of said housing, a drum spaced from said motor, a gear reduction unit operatively connecting said motor to said drum, a pulley supported in the upper portion of said housing, and means operatively connecting said crosspiece to said drum and said means including a cable engaging said pulley.

2. In a patient lift stand, a horizontally disposed base, a transformer on said base, a post extending upwardly from said base, a fixed X-ray tube supported on said post, frame members extending upwardly from said base, a camera supported by said frame members, a housing on said base below said camera, said housing including spaced parallel vertically disposed side walls, a vertically disposed end wall, a horizontally disposed top portion and an inclined wall portion, brackets affixed to the top portion of said housing, a pair of spaced parallel vertically disposed stationary bearings secured to said brackets, a pair of spaced parallel vertically disposed rods slidably mounted in said bearings, a horizontally disposed crosspiece extending between the lower ends of said rods and secured thereto, a platform hingedly connected to said crosspiece, a motor mounted in the lower portion of said housing, a drum spaced from said motor, a gear reduction unit operatively connecting said motor to said drum, a pulley supported in the upper portion of said housing, and means operatively connecting said crosspiece to said drum and said means including a cable engaging said pulley, an electrical circuit including a manually operable switch for controlling operation of said motor, limit switch means also in said electrical circuit for controlling movement of the platform, and braces

interposed between the top portion of said housing and said camera.

3. The structure as defined in claim 2 wherein said motor is reversible and further switch means for controlling the direction of operation of said motor.

4. In a patient lift stand according to claim 3, wherein there is a slot in the vertically disposed end wall of said housing, vertically disposed spaced parallel bars affixed to the inner surface of the vertically disposed end wall of said housing on the opposite side of said slot, a pair of spaced parallel lugs affixed to said crosspiece and said lugs projecting through said slot, a pin extending between said lugs and said pin having said cable connected thereto, and a tongue affixed to said lugs for selectively actuating the limit switch mechanism.

5. A patient lift sand comprising a horizontally disposed base mounted in a mobile clinic, a fixed X-ray tube and a camera supported above said base, a housing supported on said base below said camera, brackets affixed to the top portion of said housing, stationary bearings secured to said brackets, vertically disposed spaced parallel rods slidable in said bearings, a crosspiece extending between the lower ends of said rods and secured thereto, a platform hingedly connected to said crosspiece, a reversible motor mounted in said housing, and means operatively connecting said motor to said crosspiece, including means comprising a drum driven by said motor, a cable connected to said drum, a pulley supported in the upper portion of said housing and said pulley having said cable trained thereover, lugs affixed to said crosspiece, there being a slot in an end of said housing for the projection therethrough of said lugs, a pin connected to said lugs and said pin having said cable affixed thereto, a tongue affixed to said lugs, a limit switch mechanism for selective engagement by said tongue and a manually operable switch mechanism for controlling actuation of said motor.

References Cited in the file of this patent

UNITED STATES PATENTS

2,051,411	Kuntke et al.	Aug. 18, 1936
2,646,514	Noschis	July 21, 1953
2,913,582	Collins et al.	Nov. 17, 1959
2,972,681	Lusby et al.	Feb. 21, 1961