Aug. 4, 1936. C. B. HORSLEY ET AL 2,049,807

PORTABLE TUBE STAND

Filed Aug. 27, 1935

2 Sheets-Sheet 1

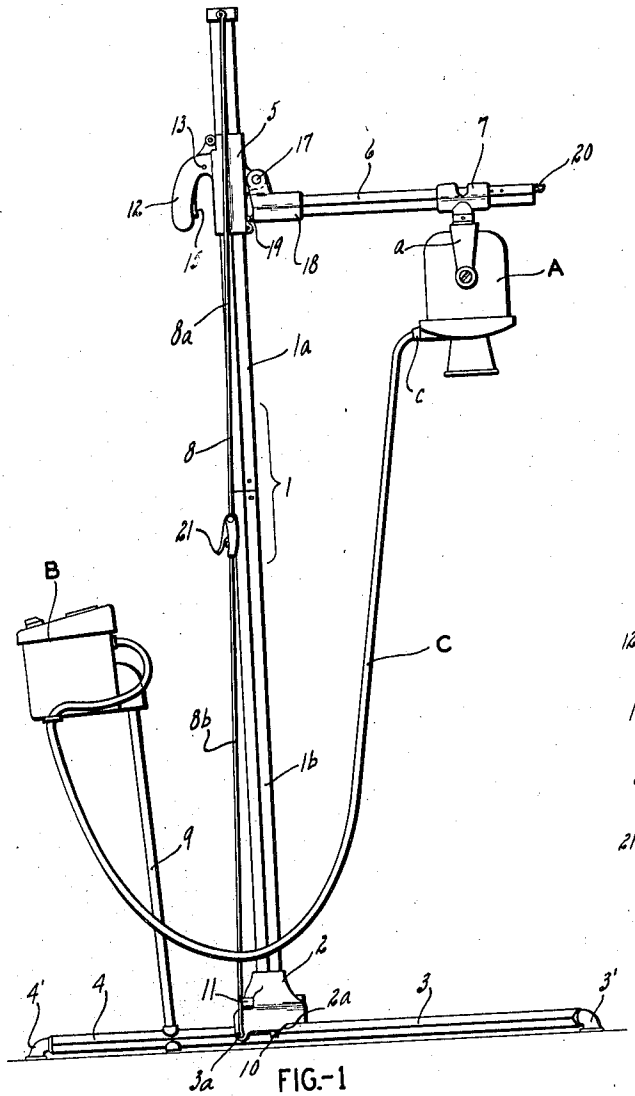



FIG.-1

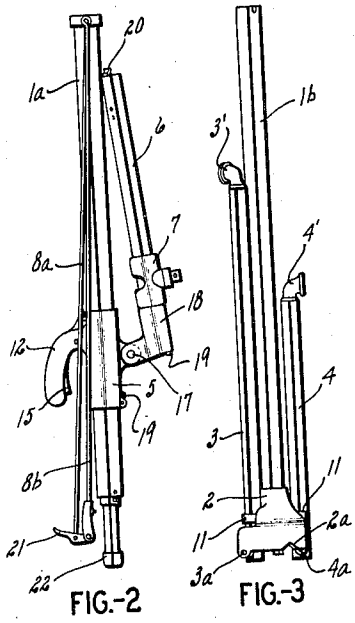



FIG.-2




FIG.-3

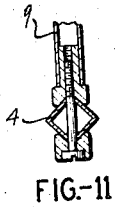



FIG.-11

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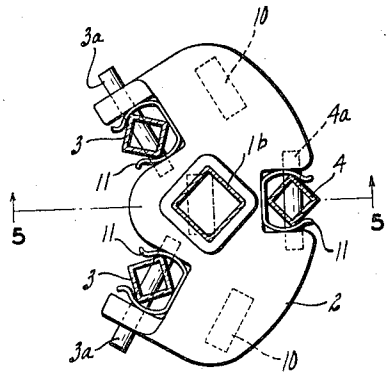



FIG.-4

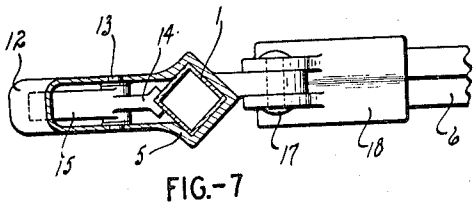



FIG.-7

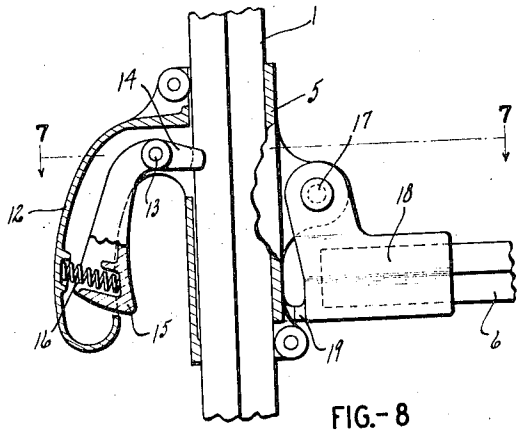



FIG.-8

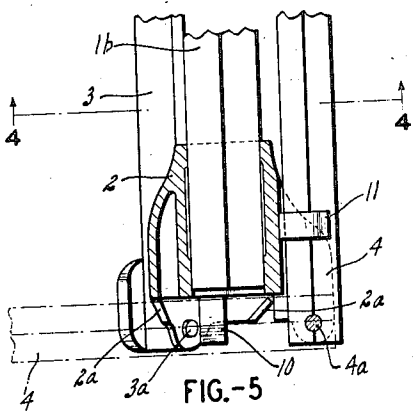



FIG.-5

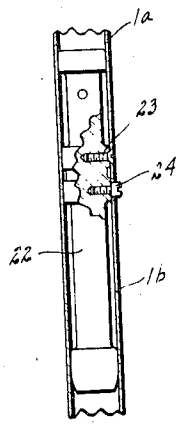



FIG.-9

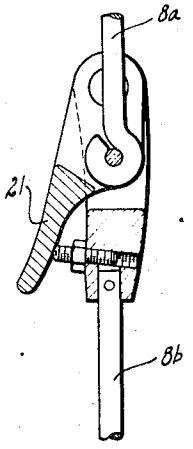



FIG.-10

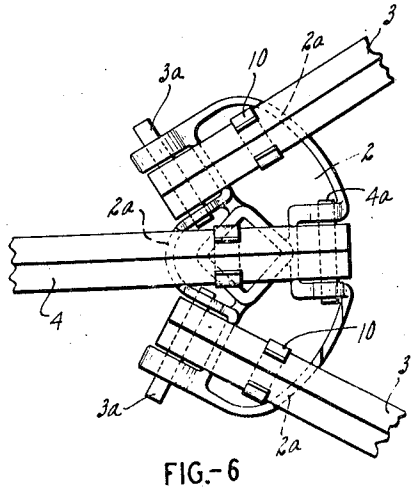



FIG.-6

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# UNITED STATES PATENT OFFICE

2,049,807

## PORTABLE TUBE STAND

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Application August 27, 1935, Serial No. 38,076

3 Claims. (Cl. 248—170)

This invention relates to portable X-ray tube stands for use where more standard X-ray equipment is not available. The objects of the invention are to provide a stand for the purpose which shall have the maximum strength for its weight, and shall adequately provide for necessary manipulation of the X-ray apparatus, yet be collapsible into a minimum space for transportation. More particularly, the invention provides a stand which comprises a pair of separable principal units each having foldably interconnected members so that the erection and collapsing of the stand may be accomplished in the most convenient manner.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a side elevation of the complete apparatus as assembled for use;

Figs. 2 and 3 are views of the two principal parts of the stand in disassembled relation and with their members collapsed;

Figs. 4 and 5 are enlarged sectional details of the parts at the base of the stand, these parts being shown in collapsed position, the section of Fig. 4 being as in the transverse plane of line 4—4 Fig. 5, and the section of Fig. 5 being as in the longitudinal plane of line 5—5, Fig. 4;

Fig. 6 is a bottom view of the parts appearing in Figs. 4 and 5 but with these parts in extended relation;

Figs. 7 and 8 are details of the carriage employed, Fig. 7 being in transverse section as indicated line 7—7, Fig. 8, and Fig. 8 being generally in elevation but with parts broken away to show details of construction;

Fig. 9 is a detail of the joint between mast sections, parts being broken away to show the construction;

Fig. 10 is a sectional detail at the joint between stay sections, the parts appearing in extended relation; and

Fig. 11 is an enlarged sectional detail showing the mounting of the control box post.

With reference now to the drawings, the principal parts of the stand comprise an upright mast 1 jointed intermediate its ends to provide a pair of separable sections 1*a* and 1*b*, the lower mast section having a base part including a base proper 2 and outstanding legs 3 and 4 hinged thereto, a carriage 5 slidably adjustable along the mast, an outstanding arm 6 hinged on the carriage, a slide 7 adjustable along the arm 6, stays 8 extending from the top of the mast to its base, and a post 9. The purpose of the stand is to adjustably support an X-ray tube unit A, which may include the usual X-ray tube and transformers therefor, and also to support a control box B for the tube unit A, connected to the latter as by the low tension control cable C.

The tube unit A is immediately carried by a yoke *a* on which the unit is tiltable in the plane of Fig. 1, the yoke *a* being removably mounted on the slide 7 by a connection providing swiveling of the yoke *a* about an upright axis, Fig. 1. The control box B is removably mounted on the upper end of the post 9, and the cable C is severable as from the unit A at *c*.

While the control box B is here shown as mounted upon the post 9, which in turn is mounted upon the rear leg 4 of the base of the stand, the post 9 may be omitted from the apparatus and the control box supported upon any suitable object which may be convenient when the apparatus is in use. If the post 9 be provided, its removable connection with the leg 4 may be as illustrated in Fig. 11.

The lower mast section 1*b* is permanently connected to the base proper 2. There are three legs, the legs 4 extending rearward from the base 2 opposite the arm 6, and two legs 3 extending divergently forwardly from the base part 2, as illustrated, Fig. 6. All of these legs have hinged connection as by pins 3*a*, 4*a* with the base part 2 to swing thereon between outstanding position as shown, Figs. 1 and 6, and in dotted lines, Fig. 5, through an art of approximately 270° to a collapsed position alongside the lower mast section 1*b* as illustrated, Figs. 3, 4 and 5. The legs have feet 3', 4' at their free extremities so that the stand has 3-point contact with the floor surface which supports it, yet the legs are disposed closely adjacent the floor surface when in extended position so that the forward legs, for example, may extend under a low bed or the like when the apparatus is to be employed for a patient in recumbent position. The base 2 is notched as at 2*a* to receive the legs in extended position so that the latter are extremely rigid when the stand is being used.

The mast sections, arm 6 and legs of the base are preferably of tubing of rectangular section, as indicated in the drawings, for lightness and other reasons which will become apparent.

Spring clips 10 are mounted on the base part 2, one for each leg, as illustrated, Figs. 5 and 6, for yieldably maintaining the legs in extended position so that the latter will not be accidentally collapsed should the stand be lifted. Similar

spring clips 11 are provided on the base part 2, as illustrated, Figs. 3, 4 and 5, to engage the legs and yieldably retain them in collapsed position alongside the lower mast section 1b.

The carriage 5 has a vertical opening of rectangular section fitting about the mast 1 as illustrated, Figs. 7 and 8, by which the arm 6 is maintained against motion about the mast, and in elevated position between the forward legs 3 of the base so that the weight of the tube unit A is supported with maximum stability. A handle 12 of pistol grip type is provided on the carriage 5 opposite the arm 6 for convenient adjustment of the carriage along the mast 1. That the carriage may be maintained in positions to which it has been adjusted, a lever is mounted as upon a pin 13, within the handle 12, which is hollow for the purpose, the lever having an arm 14 engageable with the mast, and an arm 15 engageable by the hand of the operator manipulating the grip 12. The lever is yieldably urged to engage its arm 14 with the mast as by a spring 16. The parts are so proportioned and arranged that the lever frictionally engages the mast to automatically maintain the carriage in adjusted positions along the mast, and the carriage may be lowered on the mast by depression of the arm 15 of the lever, which has trigger relation with the piston grip 12.

The arm 6 is hingedly mounted on the carriage 5 as by a pin 17 to swing upwardly alongside the mast, as in Fig. 2, from its normal horizontal position, as in Fig. 1. The arm is prevented from swinging downwardly below horizontal position as by cooperative stops 19 on the carriage 5 and bracket 18 respectively, which latter connects the arm with its hinge pin 17.

A spring clip 20 is provided at the free end of the arm 6 to limit outward motion of the slide 7, yet permit removal of the slide from the arm when depressed by the operator. Thus, the slide may be positioned on the arm as in Fig. 1, with the X-ray tube unit A dependent below the arm, or by removal and suitable replacement of the slide, the unit A may be positioned above the arm. Similarly, and should it become necessary, the slide may be positioned on the carriage to locate the unit A at either side of the arm.

There are two stays 8 each extending from connection with the top of the mast to connection with the base part 2, as illustrated in Fig. 1. One of these connections is removable, as preferably the lower one, and the stays are jointed adjacent the joint between mast sections to fold alongside the mast section to which they are permanently connected when the parts are disassembled. Preferably, the permanent connection is with the upper mast section, as shown in Figs. 1 and 2, and the lower stay sections 8b are connectible with the pins which interconnect the upper stay sections with the upper mast section, as illustrated in Fig. 2. The cooperative stay sections are interconnected by toggle joints including links 21 having handles as indicated, so that by depressing these links when the stay parts are connected in extended relation, as in Fig. 1, the stays are tightened to strengthen the mast in resistance to a load on the arm 6. For the latter purpose, the stays are disposed at the base part 2 somewhat rearwardly of the arm 6, and they are also spread sufficiently laterally to provide clearance of the carriage 5 therebetween for travel the full length of the mast.

The mast sections 1a and 1b are removably jointed as illustrated in Fig. 9, a part 22 extending partly within the upper mast section 1a and there permanently secured as by the screw 23, and having a part projecting therefrom as shown, Fig. 2, to fit within the lower mast section 1b, as in Fig. 9. A pin 24 is arranged in the projecting part of the member 22 and one face of the lower mast section 1b is slotted to receive this pin, whereby the mast sections may be assembled only with the arm 6 properly positioned forwardly extending over the long legs 3 of the base.

Commencing with the parts assembled, as in Fig. 1, knockdown of the stand will be as follows: the tube unit A with its yoke *a* and its control box B, together with the post 9, if the latter be used, all having been first removed. The stays 8 are loosened by the toggle links 21. The lower ends of the lower stay sections 8b are unhooked from their pins on the base part 2, folded upwardly, and hooked onto the pins at the top of the mast which support the upper stay sections 8a. The carriage 5 is lowered to a point adjacent the lower end of the upper mast section 1a and the arm 6 folded upwardly alongside the upper mast section. The upper mast section with its interconnected parts as shown, Fig. 2, may then be lifted from the lower mast section and removed.

The lower mast section is then raised and its three legs folded first downwardly and then upwardly to position alongside the lower mast section where the legs are held by the clips 11, as in Fig. 3.

The stand, when thus knocked down, comprises two units each of interconnected members, which members are in collapsed relation alongside each other, the parts being proportioned and arranged as indicated, with suitable locations of the joints between mast sections and stay sections substantially medial of the extended lengths of these parts. The collapsed units are of equal length and may be carried together in one long container. Such container may also house the post 9 if the latter be used. Or, the container itself being of suitable length for support of the control box B, the post 9 may be preferably omitted so that the entire stand comprises merely the two units.

The tube unit A and control unit B, together with the cable C, are conveniently carried in a separate container of more compact form. Two containers only, therefore, may enclose the entire apparatus, which may thus be transported by a single person.

What we claim is:

1. In a portable X-ray tube stand, an upright mast and a base therefor having legs hinged thereto said base and hinge connection being so constructed and arranged that said legs may fold through substantially 270° between a supporting position outstanding from said base and a collapsed position alongside said mast.

2. In a portable X-ray tube stand, an upright mast and a base therefor having legs hinged thereto to fold through a path of substantially 270° between a supporting position beneath and outstanding from said base and a collapsed position alongside said mast, the material of said base being cut away along said path about said hinge to permit said folding, and means cooperative between said base and legs to yieldably maintain the latter in either of said positions.

3. In a portable X-ray tube stand, an upright mast jointed intermediate its ends to provide a pair of separable sections, a base for said mast having outstanding legs hinged to fold along-

side the lower mast section, a carriage slidable along said mast, and an outstanding arm on said carriage adapted to support an X-ray tube unit, said carriage and both mast sections having means cooperative to maintain said arm indexed against movement about said mast, said base legs being disposed relative to said lower mast section to provide maximum stability in one direction from said mast, and said mast sections having means cooperative at their joint to prevent assembly in any but the position in which said X-ray tube unit has maximum stability of support from said base.

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EDWIN R. GOLDFIELD.