Sept. 8, 1942. H. B. PHILIPS 2,295,006

INVALID SUPPORT

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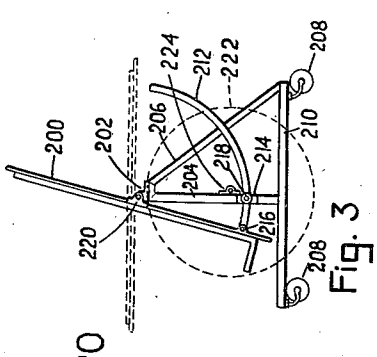

Fig. 20

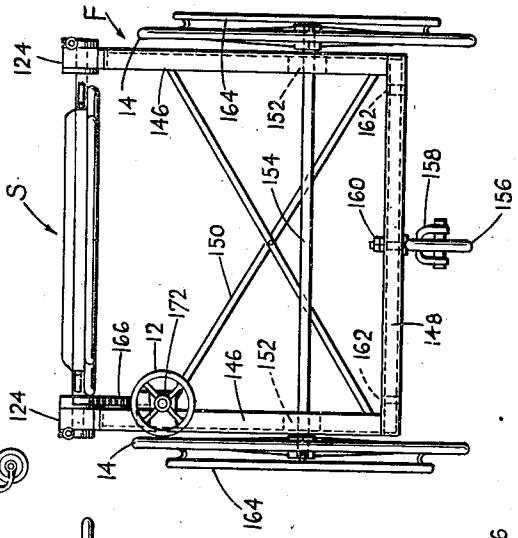

Fig. 3

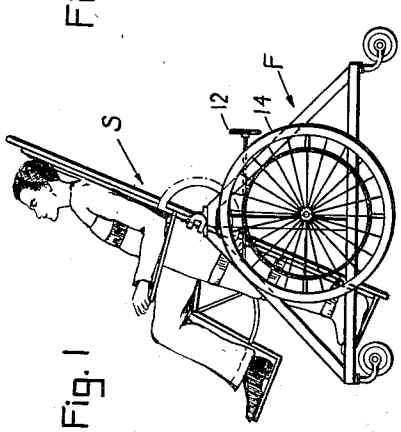

Fig. 1

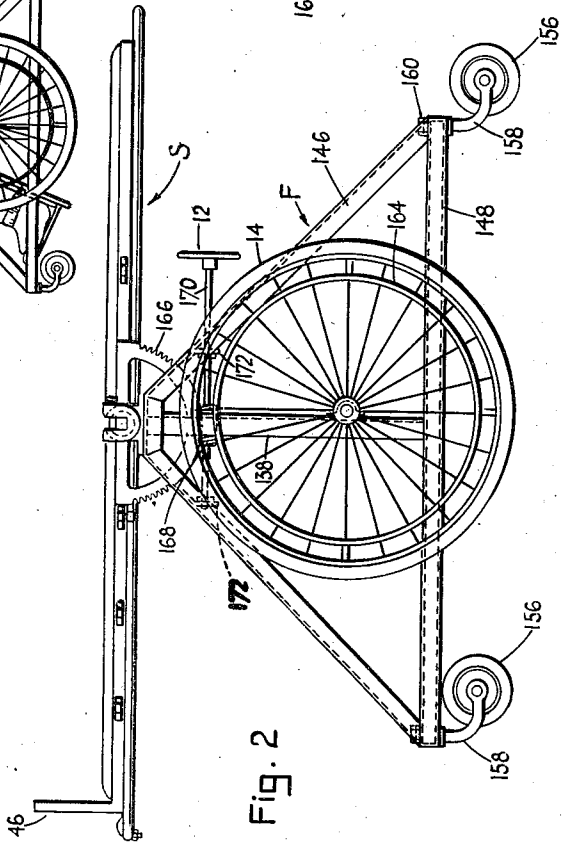

Fig. 2

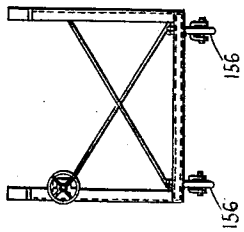

Fig. 19

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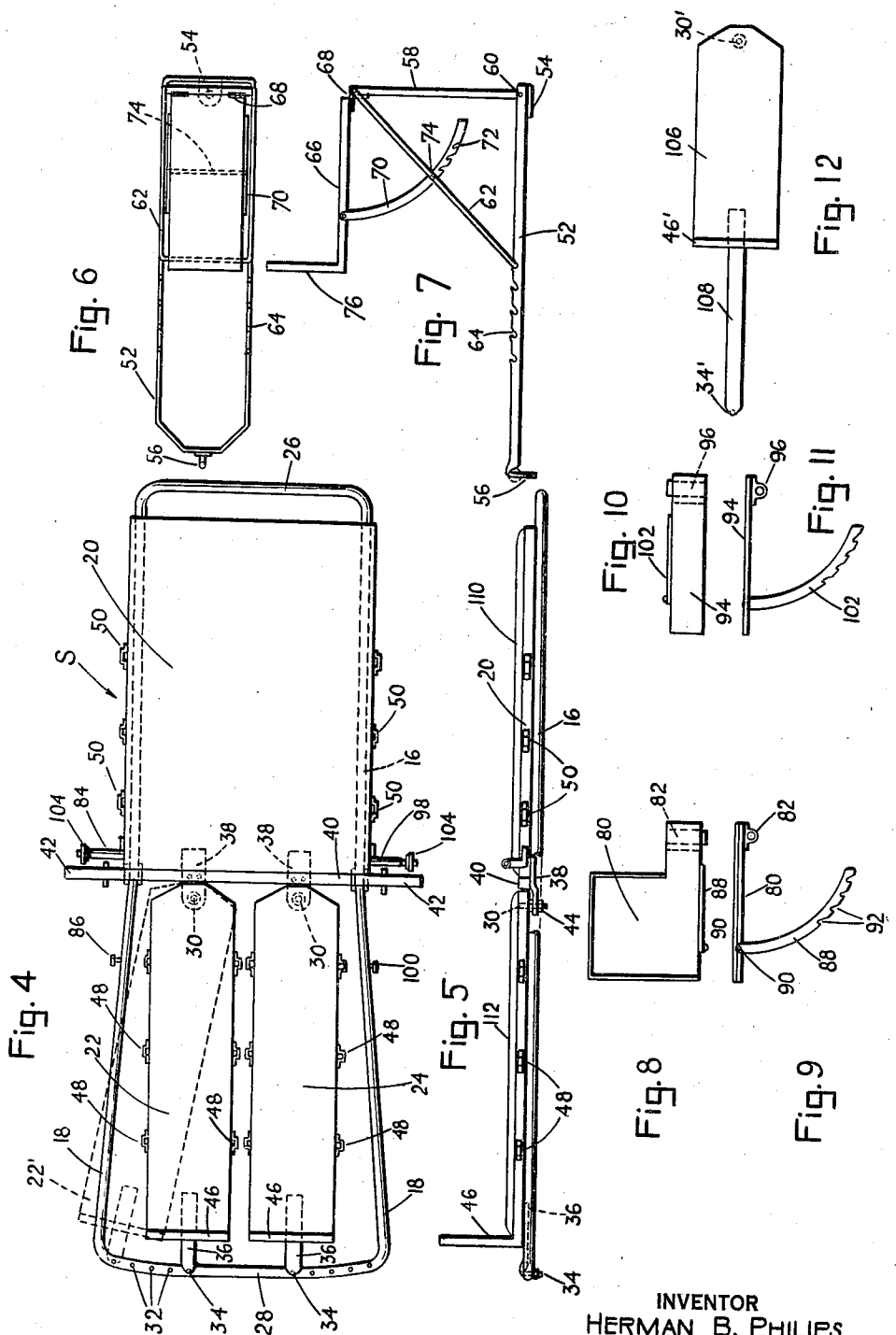

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

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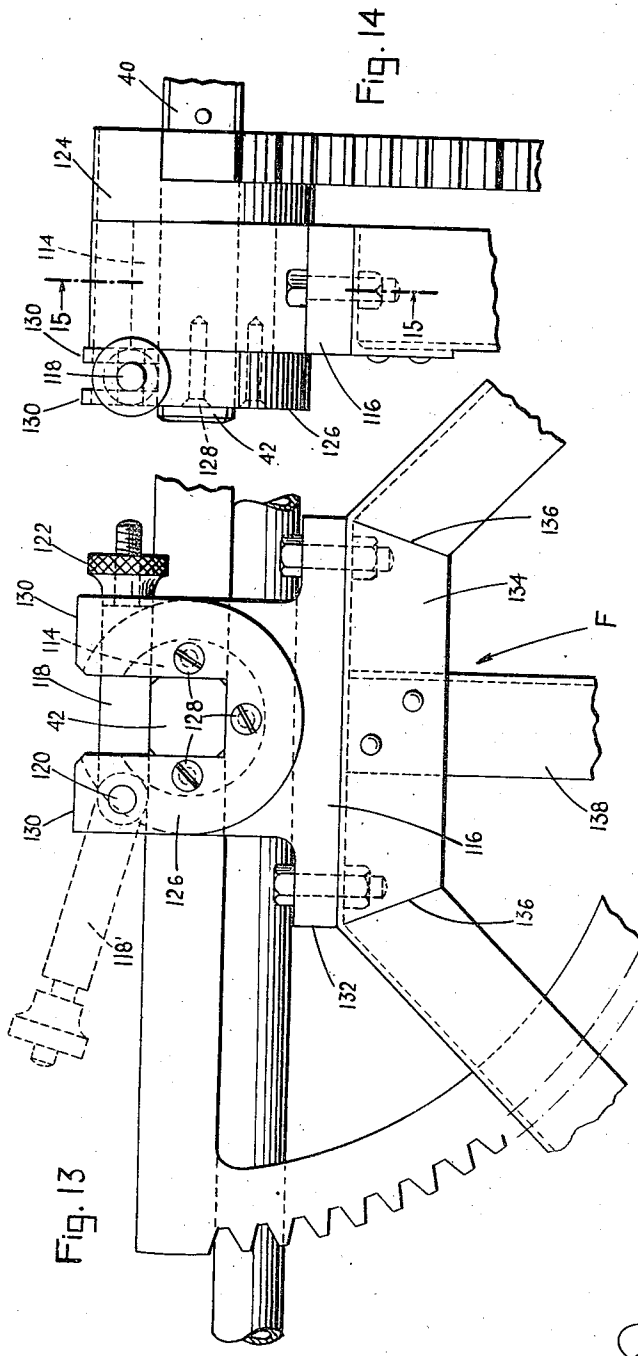

Fig. 13

Fig. 14

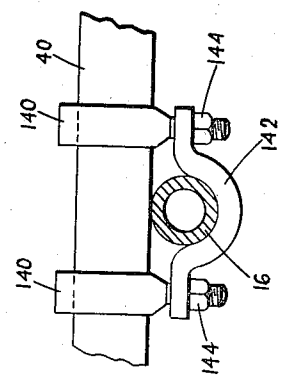

Fig. 18

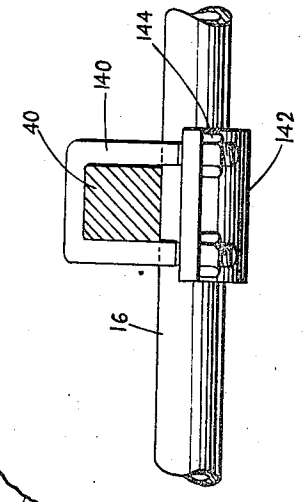

Fig. 17

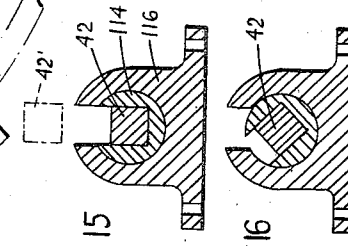

Fig. 15

Fig. 16

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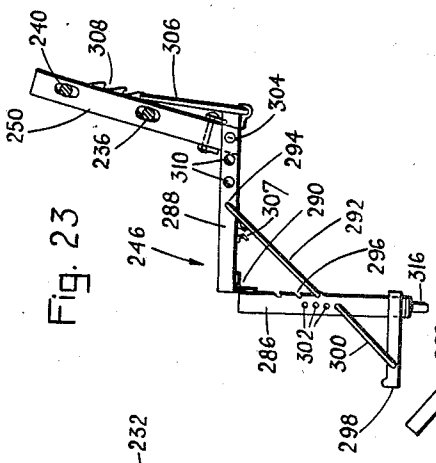

Fig. 23

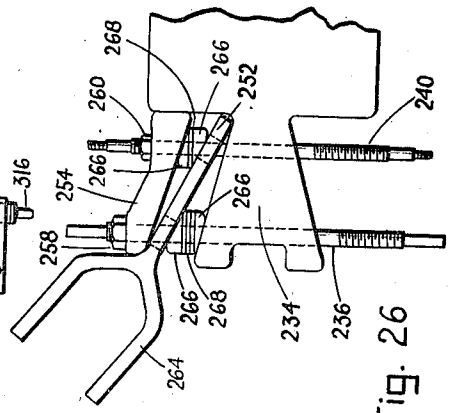

Fig. 26

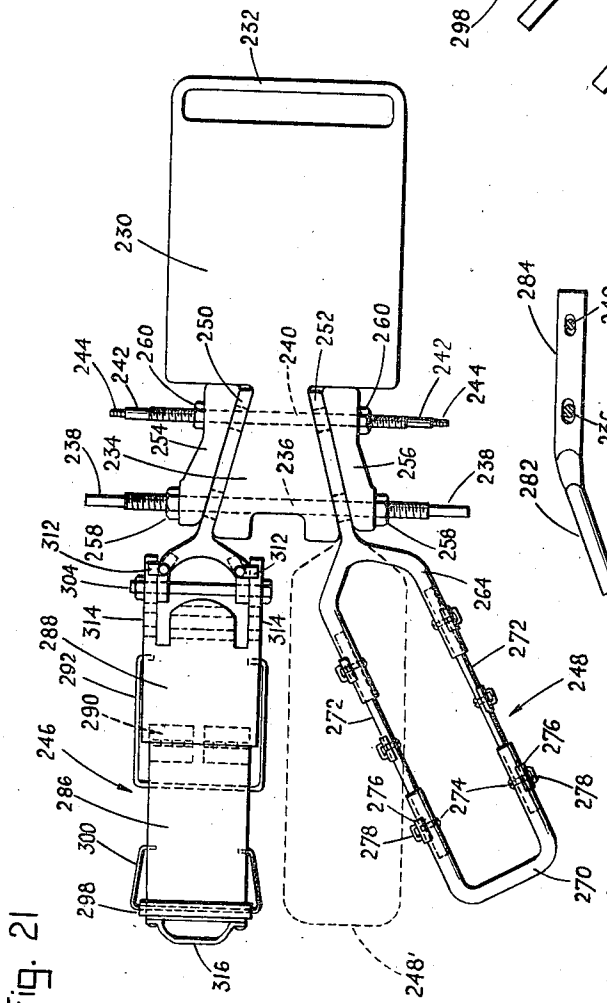

Fig. 21

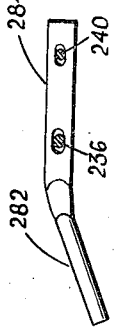

Fig. 24

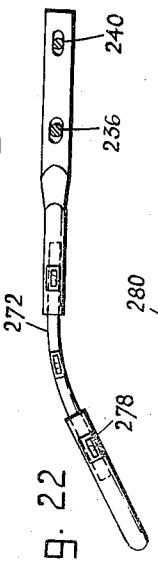

Fig. 22

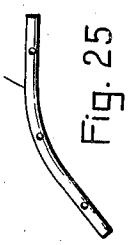

Fig. 25

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Patented Sept. 8, 1942 2,295,006

UNITED STATES PATENT OFFICE

2,295,006

INVALID SUPPORT

Herman B. Philips, New York, N. Y.

Application March 4, 1940, Serial No. 322,165

9 Claims. (Cl. 5—82)

This invention relates to apparatus for use by invalids, and more especially invalids unable to assume a sitting posture.

Persons suffering injury of the hip or spine are often placed in a plaster cast which immobilizes the body at the hip. Such persons are unable to assume a sitting posture, and heretofore have been left lying in bed in a horizontal position. They must remain so over a long period of time, ranging from a few months to a year, and usually about a half year. It is difficult for them to eat, to read or write, or even to look around.

This problem is a fairly common one, because even in the case of a fracture or disease of the thigh, as well as the hip or spine, it is customary to immobilize the patient at the hip. In some cases, the condition is permanent, as when due to paralysis in various forms. In some cases, the patient may be immobilized by reason of traction or/and splinting apparatus.

The primary object of my invention is to provide a rigid stretcher-like support for invalids of this character, which support will be adapted to be rested on the bed to facilitate sliding transfer of the patient from the bed to the stretcher. The stretcher is provided with appropriate straps or like contrivances by which the invalid may be securely fastened to hold him in the desired position. The stretcher is adapted to be carried to any desired place as, for example, a sun room, an open garden, or the like, where it may be supported in an angular position, or even a nearly upright position. Suitable foot support plates may be provided to help support the weight of the patient. Appropriate narrow or wide arm rests are detachably mounted on the stretcher and may be adjusted to any convenient angle. The patient is then in convenient position for reading, writing, eating, conversation, observation of his surroundings, and so on, with consequent improved outlook on life, and a better disposition for a cheerful convalescence. In some cases where conditions are favorable, the invalid may even be taken for an automobile ride, the stretcher being propped up at an angle in the car.

The stretcher preferably includes stiff leg supports which are detachably mounted in position, and either of which may be replaced by an articulated leg support, so that the good leg of the patient may be bent as though seated. Either leg support may be mounted in a position angularly displaced from the center line or axis of the stretcher, this being frequently necessary with hip injuries. The stretcher is preferably provided with suitable handles to facilitate carrying the same.

A further object of my invention is to provide a suitable frame for supporting the stretcher in any desired angular position. For this purpose, the stretcher is preferably provided with trunnions and the frame is provided with bearings adapted to readily detachably receive the trunnions of the stretcher. Adjustment means is preferably provided for changing the angle of the stretcher and for fixing the same in desired position.

In accordance with a further feature and object of the present invention, the frame is preferably provided with wheels, and then acts as a carriage to facilitate movement of the stretcher from place to place. I may include large wheels at each side of the frame, these being so dimensioned and positioned as to be operated by the invalid. The large wheels may, if desired, be provided with extra hand rings, such as are used with wheel chairs. In fact, from this viewpoint, it may be said that one object of the present invention is to provide an apparatus somewhat like a wheel chair, but adapted for use by invalids unable to assume a sitting position, and, therefore, unable to use a chair at all. The device might be termed a wheel stretcher, instead of a wheel chair.

The detachable relation between the stretcher and the support frame or carriage is important, because it makes it possible to rest the stretcher on the bed, as above described, in order to facilitate transfer of the patient to or from the stretcher. Once the patient has been securely strapped on the stretcher, he may be safely transported to the carriage. In a two-storied home, the carriage may be left downstairs and the stretcher carried with the patient from an upstairs bedroom down the stairway to the carriage, for daytime use by the patient.

To the accomplishment of the foregoing, and other more specific objects which will hereinafter appear, my invention consists in the invalid support elements and their relation one to the other, as hereinafter are more particularly described in the specification, and sought to be defined in the claims. The specification is accompanied by drawings, in which:

Fig. 1 shows the manner in which an invalid may be supported on my improved apparatus;

Fig. 2 is a side elevation of the same with the stretcher in horizontal position;

Fig. 3 is an end elevation of the same;

Fig. 4 is a plan view of a stretcher embodying features of my invention;

Fig. 5 is a side elevation of the same;

Fig. 6 is a plan view of an articulated leg support;

Fig. 7 is a side elevation of the same;

Fig. 8 is a plan view of a wide or table-like arm support;

Fig. 9 is a side elevation of the same;

Fig. 10 is a plan view of a narrow arm support;

Fig. 11 is a side elevation of the same;

Fig. 12 is a plan view of a modified leg support for a child;

Fig. 13 is a side elevation drawn to enlarged scale, and explanatory of the trunnion bearing support;

Fig. 14 is an end elevation of the same;

Fig. 15 is a section taken in the plane of the line 15—15 of Fig. 14;

Fig. 16 is a similar section, showing the relation of the parts when the stretcher is tilted to angular position;

Fig. 17 is a section taken transversely of the stretcher trunnions and shows the method of attaching the same to the stretcher frame;

Fig. 18 is a transverse section through the stretcher frame at the trunnion;

Fig. 19 is explanatory of a modified wheel arrangement for the frame;

Fig. 20 shows a modified form of complete invalid support;

Fig. 21 is a plan view of a modified and more universally usable form of stretcher;

Fig. 22 is a side elevation of its stiff leg support arranged for extension;

Fig. 23 shows the articulated leg support in bent position;

Fig. 24 is a side elevation of a modified bifurcated end piece for the stiff leg support;

Fig. 25 is a side elevation of a modified pipe connection forming a part of the stiff leg support; and

Fig. 26 is a fragmentary plan view similar to Fig. 21, but showing the manner in which the angle of abduction may be changed.

Referring to the drawings, and more particularly to Figs. 1, 2 and 3, the complete invalid support comprises a stretcher S tiltably mounted on a suitable frame F, the latter preferably being wheeled for increased mobility. When the stretcher is in the horizontal position, as shown in Figs. 2 and 3, it is detachably related to the frame. The angular position may be adjusted by any suitable means, such as a crank or hand wheel 12, and appropriate means may be provided to lock the same in desired angular position. In the present case, the stretcher is locked by making the adjusting means a worm and gear sector which is inherently irreversible or self-locking. The frame F is preferably provided with wheels in order to act as a carriage for the stretcher. It may be provided with small wheels for movement by a nurse or attendant, but I prefer to include a pair of large side wheels 14 which are of such dimension and so located that they may be reached and moved by the patient himself. This permits the patient to turn the carriage to face in one direction or another, or to move the carriage about a room, or even from one room to another if the doorway therebetween is adequate in width. With the carriage shown, the use of the large wheels is optional, for the large wheels may be removed.

Considering the apparatus in greater detail, and referring now to Figs. 4 and 5, the stretcher S comprises a peripheral frame 16, preferably made of pipe or tubing. The frame is generally rectangular, but the sides may diverge toward one end, as is shown at 18, for a purpose later described. A back support 20 is mounted on the frame, and leg supports 22 and 24. The exposed parts of the frame, particularly the ends 26 and 28, act as convenient handles for carrying the stretcher.

The upper ends of the leg supports are pivotally mounted at 30, and the lower ends may be fixed in any of a number of positions so as to make possible abduction of the leg. Thus, in Fig. 4, the leg support 22 may be moved to the broken line position 22', or to any intermediate position, as by means of a number of holes 32. These are adapted to receive a bolt 34 (Fig. 5) formed at one end of a strap 36 secured beneath the leg support. The upper ends of the leg supports rest on straps 38 which are preferably secured to a stout cross bar 40 when, as is preferably the case, the stretcher is provided with outwardly projecting trunnions 42. In the particular construction here shown, the straps 38 also extend beneath and are secured to the back support 20. The mounting of the leg support on the stretcher may be released at pivot 30 by removing a nut 44.

The leg supports 22 and 24 are preferably provided with foot support plates 46 projecting upwardly therefrom. These help take the load or weight of the patient when the stretcher is supported in nearly upright position, so that all of the weight will not be applied to the straps. A large number of slots or other appropriate means, such as the cleats 48 and 50, are preferably provided on the leg supports and on the back support to receive straps which hold the invalid firmly in position. Ordinarily, only one leg will be in a plaster cast, and it is that leg which is strapped in position at the leg support. The torso is strapped in position above the hip so as to prevent any stress which might injure the plaster cast or cause movement at the immobilized joint.

Either of the leg supports may be removed and replaced by an articulated leg support, best shown in Figs. 6 and 7 of the drawings. Referring to those figures, the articulated leg support comprises a frame 52 adapted to be secured to pivot 30 at 54, and provided with a bolt 56 to be received in one of the holes 32 of the stretcher frame. The part 58 is pivoted to frame 52 at 60, and is held in position by a suitable U-shaped support 62, the lower end or cross-bar of which may be placed in any one of a series of notches 64. The part 66 is hinged at 68 on the part 58, and is adapted to be held in position by a support 70 notched at 72 to fit on a cross-bar 74 of the support 62. Part 66 may be provided with a foot plate 76. It will be evident that the articulated leg support may be adjusted in desired fashion, thus making it possible for one leg of the patient to be supported in angular or sitting position, as is shown in Fig. 1 of the drawings.

Referring now to Figs. 8 and 9, a wide or table-like arm support 80 may be detachably applied to the stretcher. The support 80 is provided with a fitting 82 adapted to be received on a suitable stud 84 (Fig. 4) projecting outwardly from the stretcher frame. The frame is also provided with a thumb screw 86 adapted to receive an adjusting arm 88 (Fig. 9) pivoted on the arm rest 80 at 90. The arm 88 may be notched, as indicated at

92, or may be slotted if an infinite range of adjustment is desired. The adjusting arm 88 is shown curved, but may be made straight, particularly if it is desired that the arm rest 80 be adapted for use on either the right-hand side or the left-hand side of the stretcher.

Narrow arm rests may also be provided, one of these being shown in Figs. 10 and 11 of the drawings. The construction is similar to that already described, the arm rest 94 being provided with a fitting 96 adapted to be received on a stud 98 (Fig. 4) projecting outwardly from the stretcher frame. A thumb screw 100 is also provided on the stretcher frame to receive adjusting arm or quadrant 102 (Fig. 11). In the present case, it is contemplated that the wide arm support be used on the right-hand and the narrow one at the left, but additional arm supports may be provided, particularly another narrow one, the wide or table-like support being used only for eating or for games, or the like. The arm supports are readily attachable to or removable from the stretcher, as by removing the thumb nuts 104 at the ends of the studs 84 and 98, and loosening the thumb screws 86 and 100. The arm rests are preferably removed when the patient is being transferred from bed to the wheeled frame, or back again. If desired, the support studs 84 and 98 may be upwardly displaced or elevated somewhat, so that the arm supports may be turned to horizontal position when the stretcher is turned to the horizontal position shown in Figs. 2 and 3. This is not essential, but makes it possible for articles to be left on the arm supports within reach of the patient, even when the stretcher has been turned to horizontal position to rest the patient or to encourage a nap.

To accommodate children, the only important change needed is to shift the position of the foot support plates 46 on the leg supports in order that the child may be centrally disposed on the stretcher. Referring to Fig. 12, I show a modified leg support 106 which is like those shown in Fig. 4, but considerably shorter in respect to the distance between the pivot 30' and the foot plate 46'. This difference is made up by prolonging the support strap 108, the distance between the pivot 30' and the bolt 34' being the same as that shown in Fig. 4. An articulated leg support of reduced dimension may also be provided; that is, the leg support of Figs. 6 and 7 may be provided in a child's size, as well as an adult size. Minor differences in dimension may be compensated by liberal use of gum rubber pads or folded blankets or other pads inserted at appropriate points.

It may be mentioned that a thin layer of padding with suitable leather or other washable upholstery covering may be provided, as is indicated at 110 and 112 in Fig. 5, but this is not essential, and if used must be kept comparatively thin in order not to defeat the primary object of rigid and immovable support of the body.

Referring now to Figs. 13 and 14, the trunnions 42 are received in a slotted rotatable bearing 114 which is itself rotatably mounted in a slotted stationary bearing 116. The principle underlying this construction will be clear from inspection of Figs. 15 and 16. The trunnion 42 is readily dropped into or out of the rotatable bearing 114 which is itself rotatable in stationary bearing 116. Both the rotatable and stationary bearings are slotted or open at the top to receive the trunnion 42, this being moved vertically between the solid and broken line positions shown in Fig. 15. The slots are open at the top when the stretcher is in horizontal position. It is only in this position that it is contemplated to add the stretcher to the frame or to remove it from the frame. The stretcher may then be turned, as is indicated in Fig. 16. This is alone sufficient to anchor the stud 42 against escape from the bearing. However, if it is desired to additionally lock the trunnions in position, a further lock means may be provided such as the bolt 118, best shown in Figs. 13 and 14. This bolt is pivoted at 120 and may be swung to the open or broken line position 118', after loosening the thumb nut 122. When the bolt is swung to the solid line position, it bears against the trunnion 42 and may be locked in position by tightening nut 122, the inner end of the nut being received in a mating recess.

To assemble the parts of the trunnion bearing, the rotatable bearing 114 is slid from the inside toward the outside of the stationary bearing 116, and is provided with an enlarged inner flange 124 to limit the outward movement. The outer flange 126 is added subsequently, as by means of the screws 128. If a precautionary lock, such as the bolt 118, is employed, it is convenient to mount the same in upward projections 130 formed integrally with the outside flange 126.

The stationary bearing 116 is provided with an appropriate base or flange 132 which is bolted to the upper part 134 of the frame F. The sides of the frame are made of angle bar material which is slit or notched at 136 to permit the same to be bent in the manner shown. An upright 138 may also consist of angle bar material, and its primary purpose is to carry the axle for the large wheels.

The manner in which the trunnion bar 40 is secured to the pipe frame 16 is clearly shown in Figs. 17 and 18 of the drawings. It will be understood that the pipe frame may be mounted on top of the trunnion bar, thereby simplifying their connection, but there is a slight advantage in mounting the trunnion bar above the pipe frame; first, so that the latter will rest level if placed temporarily on a horizontal surface, such as the floor; second, that it will rest more nearly flush with the surface of a bed when rested on the bed to transfer a patient from the bed to the stretcher, or vice versa; and third, in minimizing the displacement of the center of mass of the patient when changing the stretcher from horizontal to angular position. In Fig. 5, it will be seen that the trunnion bar 40 does not project above the surface of the stretcher, it being either flush or lower than the stretcher surface, because the back support 20 is itself mounted on top of the pipe frame 16.

Reverting now to Figs. 17 and 18, U-shaped clamps 140 are fitted around bar 40 and their lower ends pass through a strap 142 and are clamped in position by nuts 144.

Referring now to Figs. 2 and 3 of the drawings, the side members 146 of the frame are secured at their lower ends to a rectangular bottom frame 148. The upright members 138 also extend to the bottom frame 148. Crossed supports 150 (Fig. 3) may be provided between the upright members 138 in order to properly space the sides of the frame. Bearings 152 are provided on uprights 138 to receive axle 154. The main wheels 14 are preferably removably attached to axle 154, and the latter is removably slidable through the bearings 152. This is of advantage in making the frame considerably narrower for move-

ment through a door which is unable to receive the frame with the wheels 14.

As illustrated in Figs. 2 and 3, the frame is provided with four wheels, two large wheels 14, and two small wheels 156. These are carried on bent supports 158 rotatably mounted in appropriate vertical bearings or holes in the ends of the frame. They are removable by releasing the nuts 160. Additional bearing holes are provided near the sides of the frame at 162 (see Fig. 3), thus making it possible to use four small wheels, instead of two large wheels and two small wheels. This is shown in Fig. 19 which is like Fig. 3, but shows the use of two small wheels 156 at each end of the frame, the large wheels and axle being removed altogether. With this construction the patient must be moved by an attendant or nurse. The large wheels have the advantage of permitting some movement by the patient himself. For this purpose, the large wheels may, if desired, be provided with extra hand rings 164, such as are used on ordinary wheel chairs.

The stretcher may be tilted on the frame and locked in position by any suitable means, such as a quadrant and lock screw, but in the present case this is accomplished by means of a gear sector and worm. Referring to Fig. 3, it will be seen that one of the two rotatable bearings 124 of the frame is fitted with a gear sector 166. In the present case, this is cast integrally with the rotatable bearing, but if it is desired to avoid the necessity for different castings at each side of the frame, the bearings may be made alike and may be adapted to receive a separately cast gear sector. Referring now to Fig. 2, the gear sector is engaged by a worm 168 carried on a shaft 170 passing through suitable bearing plates 172 secured to the frame. Axial movement of shaft 170 is prevented by suitable collars or thrust bearings. The shaft 170 may be provided with a suitable crank or, if desired, with a small hand wheel 12, rotation of which tilts the stretcher. Because of the self-locking characteristic of the worm, it is not essential to provide additional locking means, and the gearing may itself be considered a means to lock the stretcher in desired angular position. The gear sector 166 may, if desired, be limited to a 90° arc. However, I prefer to use 180° arc, not only for symmetry and strength, but for two additional advantages. One is that in many cases the extremities may be tilted up and down for a few minutes at a time for therapeutic use, particularly in circulatory diseases. Another, is that the frame or carriage is made nearly symmetrical, and the stretcher may, therefore, be placed on the carriage pointing in either direction.

In the drawings, I show the large wheels 14 and the small wheels 156 as being located on a common floor level. This has the advantage of avoiding unexpected and perhaps uncomfortable tilting of the frame, such as might result if one small wheel is raised relative to the other wheels. On the other hand, when only three wheels rest on the floor at a time, it is somewhat easier to manipulate and to turn the frame when moving it. There is some advantage and some disadvantage with either construction. To change from the present construction to the other type, it is merely necessary to slightly lower the bearings 152 of the axle 154, thus making the small wheels 156 slightly higher that the large wheels.

The height of the carriage or stretcher bearing is selected to permit adequate tilting of the stretcher. The carriage may be high enough to permit a true vertical position, although it is enough if it permits a nearly vertical position, such as that shown in Fig. 1.

Where the matter of width for passage through doorways is of considerable importance, the frame may be re-arranged so as to be no wider than or even of less width than the stretcher. Such an arrangement is illustrated in Fig. 20, in which it will be seen that the stretcher 200 is pivoted on top of bearings 202, instead of between the bearings. The forward sloping parts of the frame are omitted, for when they are included, as in Fig. 1, they must be spaced apart far enough for the stretcher to move therebetween. In Fig. 20, the bearings are carried on side members 204 and 206 which are spaced apart an amount which may be less than the width of the stretcher 200. The freely pivoted wheels 208 are mounted, as before, on the horizontal portion 210 of the carriage.

Fig. 20 also shows a modified method of adjusting the angular position of the stretcher. In this case, no gearing is provided, but a sector 212 is slidably mounted on carriage member 204 in a guide shoe 214. The forward end of sector 212 is pivotally and preferably detachably connected to the stretcher 200 at the point 216. The sector may be locked to hold the stretcher in any desired angular position by means of a pressure screw 218, or other suitable lock mechanism.

As before, the stretcher is detachable from the carriage to facilitate transfer of the invalid from bed to stretcher or back again. For this purpose the frame of stretcher 200 may be detachably received in brackets 220, which brackets remain a part of the carriage, or as an alternative, the brackets 220 with a cross-shaft extending therebetween, may be made a part of the stretcher, in which case the bearings 202 may be left open at the top as previously described.

As before, large wheels may be added if desired, and inasmuch as their use is optional, they are indicated in broken lines at 222, the axle being passed through bearings 224. In this figure of the drawings the bearings have been lowered slightly so that either the front wheels and the large wheels, or the rear wheels and the large wheels, will be resting on the floor at any one time, instead of all the wheels.

The stretcher of Figs. 4 and 5 is satisfactory when the condition of the invalid permits the hurt leg or plaster cast to remain in the plane of the stretcher, that is, when there is no "extension" or "flexion," and when even the "abduction" is comparatively small in amount. In Figs. 21 through 26, I show a modified form of stretcher which is more universally adaptable to the various situations which arise in practice, for in very many cases the prescribed position of the immobilized leg is a combination of either "extension" or "flexion" with either "abduction" or "adduction."

Referring now to Fig. 21, the stretcher comprises a main back support 230 having a handle 232 and a keystone-shaped extension 234. This part of the stretcher may, if desired, be formed of a single aluminum casting, and in such case the casting is, of course, provided with appropriate webs or stiffening ribs to make the same adequate in strength yet light in weight. A sturdy rod or shaft 236 passes through and is preferably fixed in keystone member 234. The extreme ends of rod 236 are squared at 238 and act as trunnions which are adapted to be re-

properly assembled and adjusted for the patient, it may be left alone until the convalescence of the patient is completed, or until the shape of the plaster cast is changed.

For spinal and other cases, the patient, or braces on the patient, may be fastened to a simple form of stretcher, and extra supports perpendicular to the stretcher may be used.

It is believed that the construction, operation, and method of use of my improved invalid support, as well as the many advantages thereof, will be apparent from the foregoing detailed description thereof. It will also be apparent that while I have shown and described my invention in several preferred forms, many changes and modifications may be made in the structures disclosed without departing from the spirit of the invention as sought to be defined in the following claims.

I claim:

1. A stretcher-like support for invalids unable to assume a sitting posture, said support comprising a stiff back support having a keystone-shaped member projecting therefrom, spaced rods extending transversely through said keystone member, the projecting portions of said rods being threaded, leg supports having angularly disposed arms apertured to receive the aforesaid rods, and clamping members and nuts to lock the leg supports to the back support.

2. A stretcher-like support for invalids unable to assume a sitting posture, said support comprising a stiff back support having a keystone-shaped member projecting therefrom, spaced rods extending transversely through said keystone member, the projecting portions of said rods being threaded, the ends of one of said rods being arranged to act as trunnions to be received by a suitable frame or carriage, the ends of the other support being arranged to receive suitable arm rests, leg supports having angularly disposed arms apertured to receive the aforesaid rods, and clamping members and nuts to lock the leg supports to the back support.

3. A stretcher-like support for invalids unable to assume a sitting posture, said support comprising a stiff back support having a keystone-shaped member projecting therefrom, spaced rods extending transversely through said keystone member, the projecting portions of said rods being threaded, leg supports having angularly disposed arms apertured to receive the aforesaid rods, clamping members and nuts to lock the leg supports to the back support, biasing washers for changing the angle of the leg support relative to the axis of the stretcher, one of said leg supports being assembled out of tubular members inserted one in the other and locked together by appropriate screws, at least some of said members being suitably dimensioned and bent to dispose the leg support at a desired angle relative to the plane of the stretcher.

4. A stretcher-like support for invalids unable to assume a sitting posture, said support comprising a stiff back support, spaced rods extending transversely through said support, the projecting portions of said rods being threaded, the ends of one of said rods being arranged to act as trunnions to be received by a suitable frame or carriage, the ends of the other rod being arranged to receive suitable arm rests, leg supports apertured to receive the aforesaid rods, clamping members and nuts to lock the leg supports to the back support, one of said leg supports being assembled out of tubular members inserted one in the other and locked together by appropriate screws, at least some of said members being suitably dimensioned and bent to dispose the leg support at a desired angle relative to the plane of the stretcher.

5. A stretcher for an invalid unable to assume a sitting posture, as for example because of a spinal or hip injury, said stretcher comprising a stiff non-articulated back support extending as a rigid member from the head end of the stretcher to a point below the hips of the patient, leg supports at least one of which constitutes a stiff rigid non-articulated member, said member being assembled out of two side tubes, an end U-shaped member receiving the outer ends of said side tubes, and a Y-shaped member the branches of which receive the inner ends of said side tubes and the stem of which is secured to the back support, said side tubes being replaceable and being appropriately bent to fit the needs of the particular patient, and means whereby the stem of said non-articulated leg support may be relatively permanently and immovably fixed to the back support with the leg support at a desired angle to the axis of the stretcher, the back support and said non-articulated leg support being provided with means for fastening an invalid securely thereon.

6. A stretcher-like support for invalids unable to assume a sitting posture, said support comprising a stiff back support having a keystone-shaped member projecting therefrom, spaced rods extending transversely through said keystone member, the projecting portions of said rods being threaded, and leg supports, one of said leg supports being assembled out of two side tubes, an end U-shaped member receiving the outer ends of said side tubes, and a Y-shaped member the branches of which receive the inner ends of said side tubes and the stem of which is apertured to receive the aforesaid rods, and nuts to lock said leg support to the back support, the side tubes of said leg support being replaceable and being appropriately bent to fit the needs of the particular patient.

7. A support for an invalid unable to assume a sitting posture, said support comprising a stretcher-like member, and a frame for supporting the same in any desired angular position, said stretcher-like member comprising a stiff back support having a keystone shaped member projecting therefrom, spaced threaded rods and trunnions extending transversely through said keystone member, leg supports having angularly disposed arms apertured to receive the aforesaid threaded rods, and clamping members and nuts to lock the leg supports rigidly on the back support, said frame having bearings adapted to receive the trunnions of the stretcher member, and adjustment means for changing the angle of the stretcher member in the frame.

8. A support for an invalid unable to assume a sitting posture, said support comprising a stretcher-like member, and a wheeled frame for supporting the same in any desired angular position, said stretcher-like member comprising a stiff back support having a keystone shaped member projecting therefrom, spaced threaded rods and trunnions extending transversely through said keystone member, leg supports having angularly disposed arms apertured to receive the aforesaid threaded rods, and clamping members and nuts to lock the leg supports rigidly on the back support, said frame having bearings adapted to detachably receive the trunnions of

ceived in the bearings of a wheeled carriage as previously described. Another rod **240** passes through and is preferably anchored in the keystone member **234**. Its ends **242** act as studs which receive arm rests as previously described, these being held on the studs by nuts screwed on threaded ends **244**.

The rods **236** and **240** are used to assemble the leg supports generally designated **246** and **248** with the back support **230**. Various forms of leg supports may be used, but in each case the leg support terminates in an arm, such as **250** or **252**. The arms are provided with holes, so that they can be slipped over the rods **236** and **240**. Clamping plates **254** and **256** are then added, followed by clamping nuts **258** and **260**. The outwardly projecting ends of the rods **236** and **240** are, of course, appropriately threaded to receive the nuts **258** and **260**.

Arm **252** is preferably disposed at an angle relative to the axis of the stiff leg support **248**. This angle is preferably made half of the angle of the side of keystone member **234** relative to the axis of the stretcher. Thus, the stiff leg support **248** may be inserted with either side uppermost, so that it will occupy either the solid line position **248**, or the dotted line position **248'**, the latter position bringing the leg support parallel to the axis of the stretcher. This establishes two main positions for the stiff leg support, but various other angles are obtainable by the insertion of suitable washers or spacers on the rods **236** and **240** when clamping the leg support in position.

Referring to Fig. 26, it will be noted that in this case the arm **252** of the bifurcated part **264** of the stiff leg support is disposed on the opposite side of keystone member **234**. In other words, in this case it is assumed that it is the right leg of the patient that is in a plaster cast. The angle of abduction has been increased by inserting washers inside arm **252** on rod **236**, and outside of arm **252** on rod **240**. The available washers preferably include angularly-shaped washers **266**, as well as straight washers **268**, the latter being disposed between the angular washers. The clamping member **254** is added, followed by the nuts **258** and **260**, as was previously described. It will be noted that by adding or subtracting washers, any desired angle of abduction, and even adduction, may be obtained.

The stiff leg support **248** is preferably made up of a bifurcated member **264**, a U-shaped tubular member **270**, and two intermediate tubular or pipe members **272**. Members **272** are received at one end in member **270**, and are locked in position by appropriate screws **274**. These preferably pass into special fittings **276** which are threaded to act as nuts, and which are formed with loops **278** for the reception of appropriate straps for securing the cast on the support. The opposite ends of members **272** are received in appropriate tubular passages in the arms of bifurcated member **264**, and are locked in position by screws and cleats, as previously described. Additional cleats may be added at the center of members **272**, as shown in the drawings, so that an adequate number of straps may be used.

For extension" or "flexion," the intermediate members **272** are appropriately bent. In Fig. 22, it will be seen that members **272** are bent to provide a moderate amount of extension. Different members may be bent different amounts. If a change in the length of the leg support is needed, this may also be obtained by appropriate change in the length of the intermediate members **272**. Thus, referring to Fig. 25, I show a different intermediate member **280** in side elevation, this member being bent at a sharper angle than the member **272**, and also being somewhat longer. In other cases the intermediate members may be straight, or shorter, etc.

In some cases it may be desired that the bend begin at or near the hip. In such case the bifurcated member is suitably modified, as in Fig. 24, in which I show a bifurcated member **282** in side elevation, the arm **284** of this member being disposed at an angle relative to the forked tubular arms. The intermediate members may be straight, in which case the leg support will be straight yet disposed at an angle to the plane of the stretcher. The intermediate members may also be curved, in which case the desired "extension" of the leg will be a more continuous curvature distributed over several points.

Referring now to Figs. 21 and 23, the articulated leg support **246** is made up of two main members **286** and **288** hinged at **290**. The angle therebetween is adjustable by means of a bent rod or yoke **292**, the ends **294** of which are sprung into holes in member **288**, and the cross bend of which may be received in any one of a number of notches **296** on member **286**. A foot support **298** is slidable on member **286**, and its position may be adjusted by means of links **300**, preferably formed of a single bent rod and having ends which may be sprung apart and received in any of a number of holes **302** in the side edges of member **286**. The member **288** is pivotally related to arm **250** by means of a suitable bolt **304**. The angular relation may be determined by tightening the bolt **304** and, if desired, by means of a U-shaped strut **306** the cross bar of which cooperates with notches **308** on the bottom of arm **250**. When not in use this is swung downwardly and forwardly into spring clip **307**. Bolt **304** may be received in any of a number of holes **310** in order to properly adjust the effective length of member **288**. Arm **250** is, of course, secured to the stretcher by means of the rods **236** and **240**, as was previously described. The holes through arm **250** (as well as arms **252** and **284**) are preferably elongated to accommodate the angularity which results, when using biasing washers as was explained in connection with Fig. 26.

The articulated leg support **246** may be readily shifted to straight position. The upward movement of member **286** is limited by the nature of the hinge construction at **290**. When member **288** and arm **250** are brought into the same plane they may be locked in that position by turning anchoring lugs **312** from the dotted line position shown in Fig. 21 to the solid line position, so that the lugs are disposed on opposite sides of the rearwardly extending arms **314** of member **288**. A suitable handle **316** is provided at the end of member **286** to facilitate carrying the stretcher. The cross bar of the U-shaped member **270** of the stiff leg support acts as another carrying handle for the foot end of the stretcher.

It will be understood that two stiff leg supports may be provided, instead of one stiff support and one articulated support. It may be emphasized that inasmuch as the patient may be immobilized for a period of, say, six months, it is comparatively small trouble to order and assemble the necessary parts to make up a stiff leg support which will exactly conform to the needs of any particular patient. Once the stretcher has been

the stretcher member, adjustment means for changing the angle of the stretcher member in the frame, and wheels mounted on said frame for facilitating movement from place to place.

9. A support for an invalid unable to assume a sitting posture, said support comprising a stretcher-like member, and a wheeled frame for supporting the same in any desired angular position, said stretcher-like member comprising a stiff back support having a keystone shaped member projecting therefrom, spaced threaded rods and trunnions extending transversely through said keystone member, leg supports having angularly disposed arms apertured to receive the aforesaid threaded rods, and clamping members and nuts to lock the leg supports rigidly on the back support, said frame having bearings adapted to detachably receive the trunnions of the stretcher member, adjustment means for changing the angle of the stretcher member in the frame, and wheels mounted on said frame for facilitating movement from place to place, said wheels including one or more small freely pivoted self-steering wheels and large wheels at each side of the frame, said large wheels being dimensioned and positioned and, if desired, provided with extra hand-rings, to be operated by the invalid.

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