

[54] **WHEELCHAIR WITH DETACHABLE DRIVE MEANS**

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180/16, DIG. 3; 280/242 WC, 36 R;
297/DIG. 4

[56] **References Cited**

UNITED STATES PATENTS

3,351,148 11/1967 Solomon 180/65 R X
3,381,973 5/1968 Carr 280/242 WC

3,387,681 6/1968 Rabjohn..... 180/13
3,688,857 9/1972 Miller 180/DIG. 3

FOREIGN PATENTS OR APPLICATIONS

1,540,324 9/1968 France 180/DIG. 3

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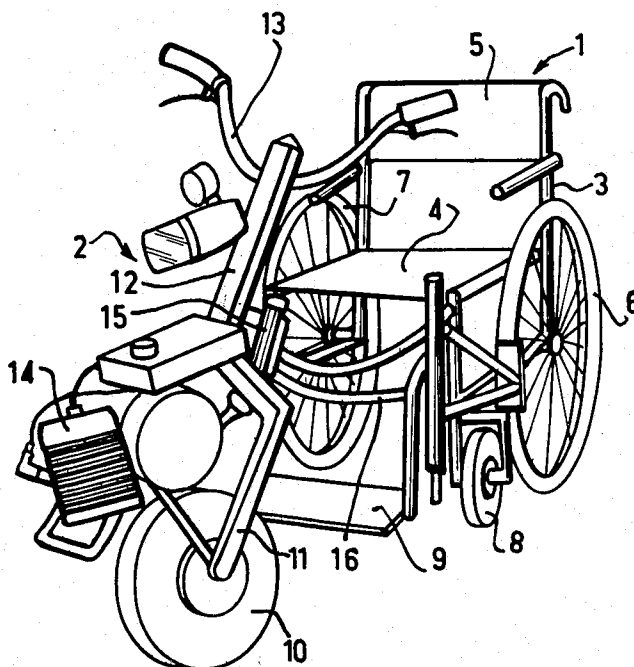
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[57]

ABSTRACT

A wheelchair has a detachable drive means so that it is useful both indoors under manual power and outdoors under motor power. The drive means is manipulable by the occupant himself, and to this end comprises a drive wheel and motor with steering handle bars, and means to detachably interconnect this assembly at each side of the wheelchair. The connecting means comprises ramps that guide laterally sliding pins toward their sockets, and rotatable cams received in vertical slots at the forward ends of the wheelchair armrests.

9 Claims, 6 Drawing Figures



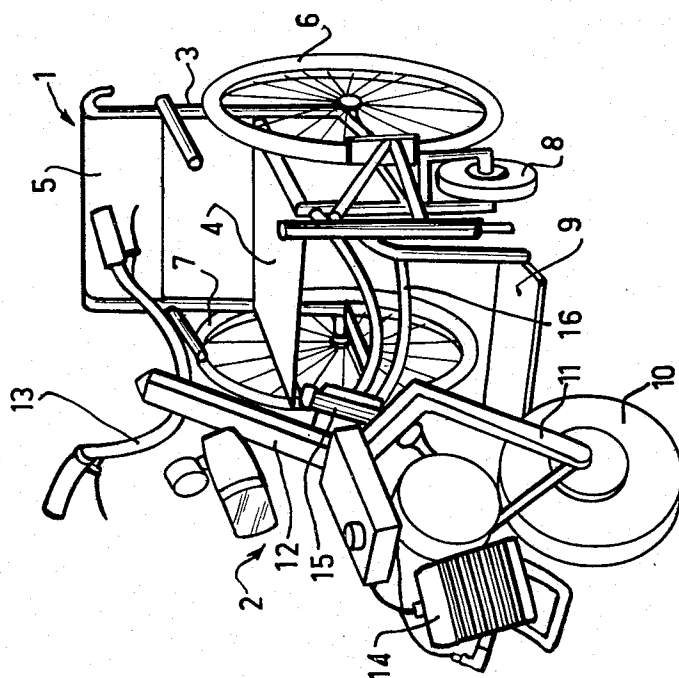
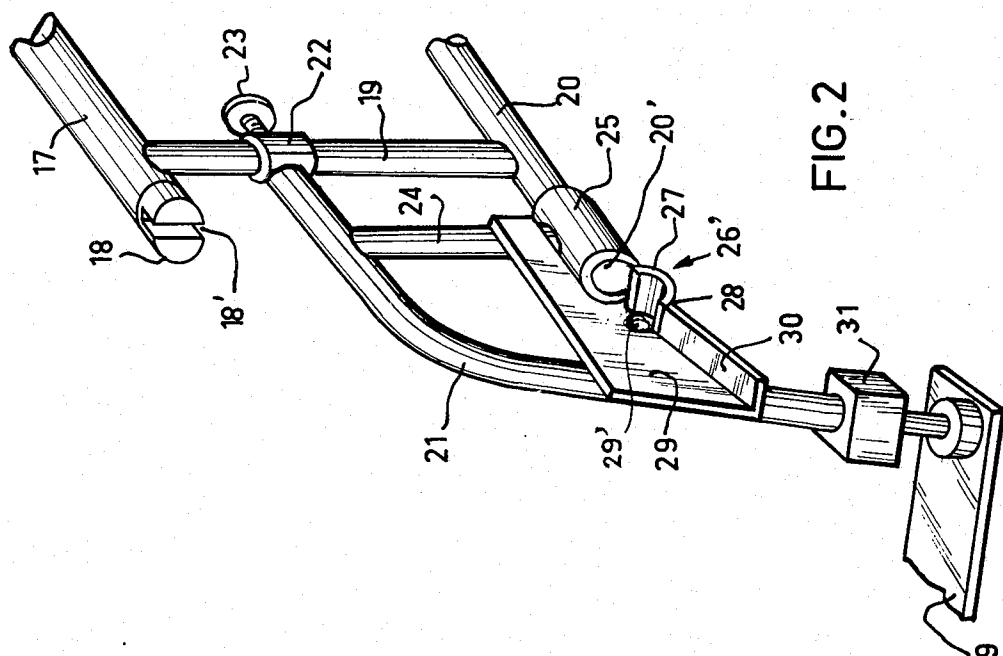


FIG. 4

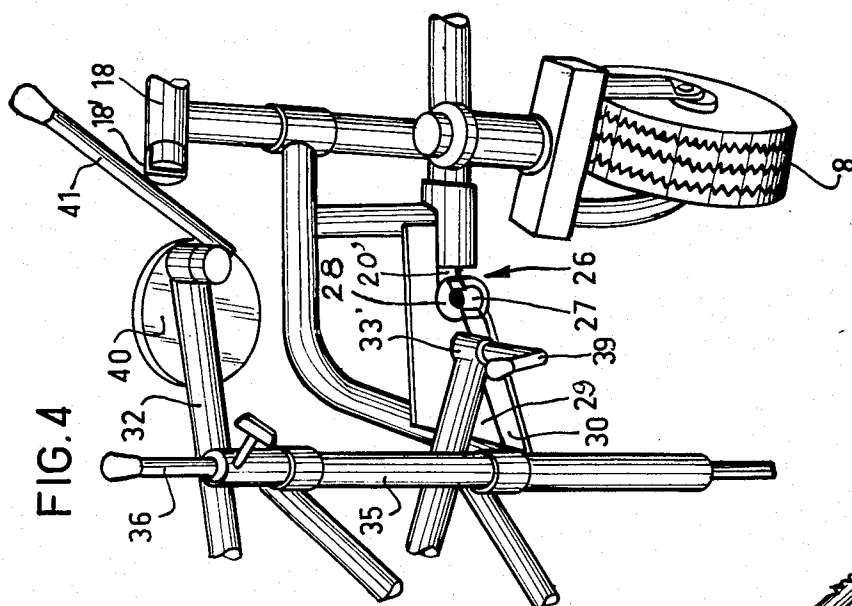
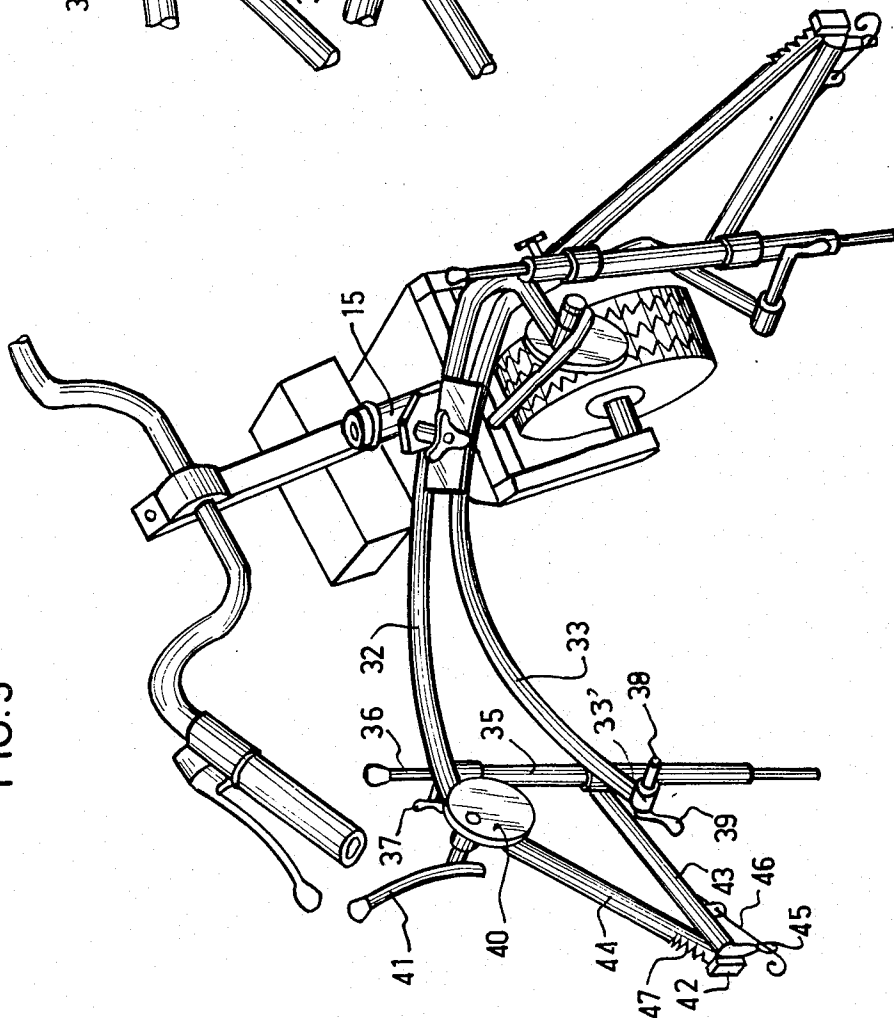
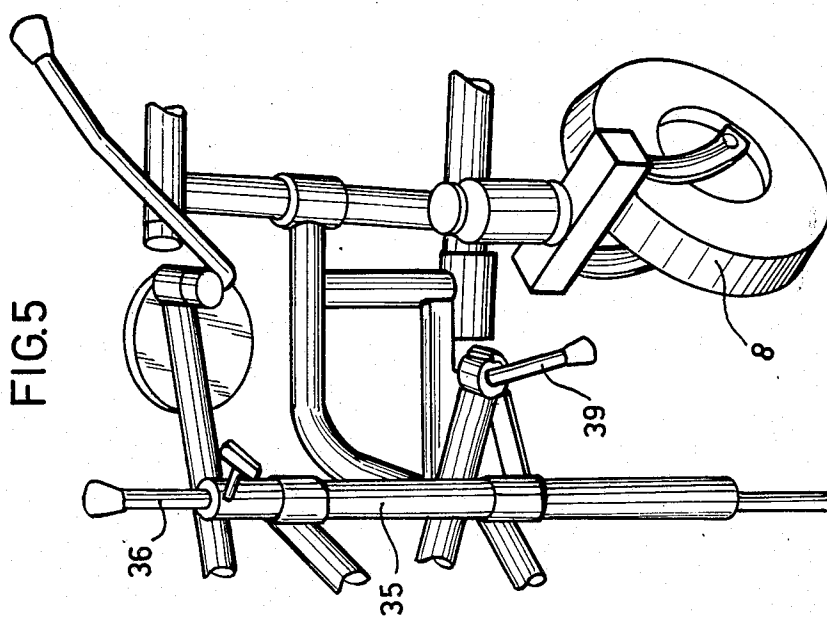
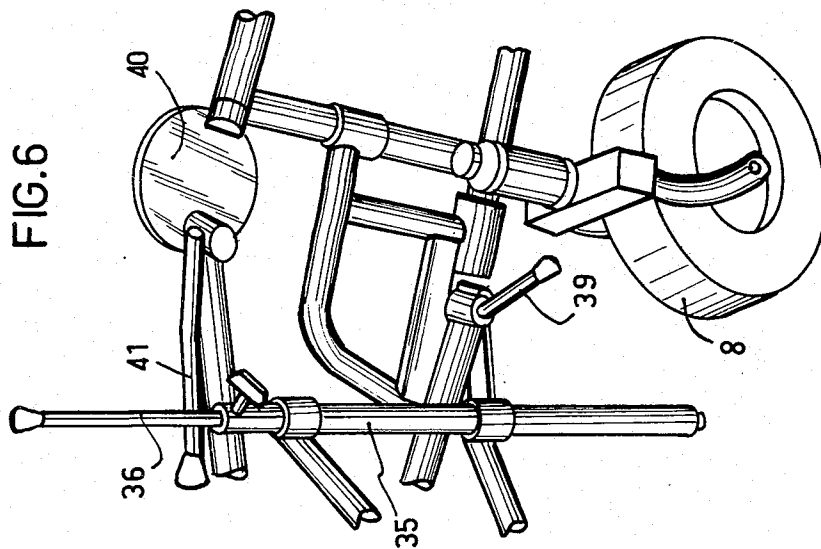


FIG. 3





WHEELCHAIR WITH DETACHABLE DRIVE MEANS

The present invention relates to wheelchairs for physically handicapped people, of the type that are provided with drive motors.

Conventional wheelchairs comprise a chassis mounted on four wheels of which the two rear wheels are quite large and the forward wheels quite small. In the past, when such wheelchairs have been motorized, the two small wheels have been replaced by a single forward wheel which both drives and steers the chair and is located forwardly of the footrest.

However, with such arrangements, the motorized wheelchair has been quite heavy and unsuitable for use indoors. It has thus been necessary for the invalid to have two wheelchairs: a relatively light one for use indoors, and a motordriven one for use outdoors for travelling greater distances. It is often difficult for the occupant to change from chair to chair, especially if he is heavy.

An attempt has been made to overcome these difficulties of the prior art, by placing the motor beneath the seat of a standard wheelchair, but this has rendered the wheelchair less mobile indoors, where it can hardly negotiate a stair step. Moreover, even outdoors, the driven speed is insufficient.

Accordingly, it is an object of the present invention to provide a wheelchair which will be sufficiently light and portable for convenient manually operated use indoors, but motor driven with sufficient power for use outdoors.

Another object of the present invention is the provision of such a wheelchair, which will be conveniently convertible from manual operation to motor drive, and vice versa, by the occupant himself.

Still another object of the present invention is the provision of a wheelchair with detachable drive means, the attachment and detachment of which is easily effected by the occupant of the chair.

Finally, it is an object of the present invention to provide such a wheelchair, which will be relatively simple and inexpensive to manufacture, easy to operate, maintain and repair, and rugged and durable in use.

Briefly, the objects of the present invention are achieved by providing a wheelchair which is generally of the indoor type, and which is provided on either side of its footrest with a guide ramp for detachable coupling to a drive motor-driven wheel-handle bar assembly which carries semicircular rearwardly extending shafts that on their rearward ends carry laterally displaceable pins or lugs whose mountings ride up the ramps and seat in upwardly open recesses, after which the pins may be laterally slid into sockets beneath the arms of the chair.

The forward ends of the armrests of the wheelchair are vertically slotted; and the rearwardly extending shafts of the detachable drive assembly carry at their upper rear ends cams rotatable about horizontal axes selectively to enter those vertical slots thereby to provide a further connection between the detachable assembly and the wheelchair.

Vertically adjustable feet carried by the rear ends of the shafts cooperate with the drive wheel to provide threepoint support for the drive assembly when detached from the wheelchair. The feet are elevated from the ground when the drive assembly is attached to the chair.

Brakes for the wheelchair are also carried by the rear ends of the shafts of the drive assembly and comprise brake pads selectively applicable against the large rear wheels of the chair.

Other objects, features and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a wheelchair according to the present invention, with the drive assembly attached;

FIG. 2 is an enlarged fragmentary perspective view of the structure interconnecting the forward end of one armrest and the adjacent end of the footrest of the chair itself, with the drive assembly removed, showing the means that provide the connections to the drive assembly;

FIG. 3 is a perspective view from the rear, showing the drive assembly as seen by the occupant of the wheelchair;

FIG. 4 is a fragmentary perspective view, looking toward one outer side of the wheelchair, showing the drive assembly at the left almost completely engaged with the wheelchair to the right of FIG. 4;

FIG. 5 is a view similar to FIG. 4 but showing the parts more fully engaged; and

FIG. 6 is a view similar to FIGS. 4 and 5 but showing the parts fully engaged and ready for power drive of the wheelchair.

Referring now to the drawings in greater detail, and first to FIG. 1, there is shown a wheelchair 1 provided with a drive and steering assembly 2. For sake of clarity, much of the detail has been omitted from FIG. 1 and is shown in the subsequent figures. Wheelchair 1 comprises a chassis 3 of hollow tubular construction, a seat 4, a back 5, large rear wheels 6 and 7 and small forward wheels 8 of which only one is visible in FIG. 1, and a footrest 9. Drive assembly 2 comprises a drive and steering wheel 10 mounted at the lower end of a fork 11 which is surmounted by a column 12 carrying the handle bars 13 and the conventional steering, braking, and motor control members. Fork 11 also carries a column 15 that carries rearwardly extending semicircular shafts 16.

FIG. 2 shows in greater detail the structure of the wheelchair, at one side thereof, for detachably receiving the drive assembly. The armrest 17 of the wheelchair terminates forwardly in a plug 18 having a vertical slot 18' therein. An intermediate vertical tube 19 depends from armrest 17 and slides in a lower tube 20 of chassis 3, which terminates forwardly in a forward end 20'. An elbowed tube 21 at its rear end carries a sleeve 22 vertically adjustable on tube 19 by means of set screw 23 thereby to regulate the height of armrest 17. An intermediate tube 24 interconnects tube 21 and sleeve 25 that surrounds forward end 20' of tube 20. A socket 26 (FIG. 4) or 26' (FIG. 2) comprises a semicylindrical upwardly opening seat 27, which in the FIG. 4 construction is formed by removing a portion from a cylindrical tube 28 forms the rest of the socket. A vertical plate 29 is secured to tubes 21 and 24 and sleeve 25 and has a hole 29' therethrough in the FIG. 2 embodiment, or mounts the tube 28 in the FIG. 4 embodiment, for the reception of coupling means on the drive assembly, to be described hereinafter. Plate 29 terminates at its lower end in an outwardly extending inclined ramp

30 to guide the coupling means to be described toward the seat 27.

At its lower end, tube 21 carries a connector 31 for telescopically fixing the height of footrest 9.

Turning now to FIG. 3, the drive assembly is seen as viewed by the occupant of the wheelchair prior to assembly to the chair. It will be seen that the semi-circular shafts 16 are comprised in fact by vertically-spaced tubes 32 and 33 to the rear ends of which are secured a vertical tube 35 in which a rod 36 is vertically slidable. The vertically slid position of rod 36 is selectively fixed by a set screw 37, so that the lower ends of rods 36 provide, with drive wheel 10, three-point support for the drive assembly when detached and not in use.

Each rear end of tube 33 carries a horizontal sleeve 33' in which is disposed a pin or lug 38 manipulable by handle 39. Pins 38 are coaxial on a horizontal axis, as are the sockets 26 or 26' that selectively receive them.

Each rear end of tube 32 carries a cam 40 eccentrically mounted for rotation about a horizontal axis under the control of a handle 41.

Brakeshoes 42, selectively applicable against large rear wheels 6, are carried at the rear ends of tubes 43 and 44 which at their forward ends are mounted for pivotal movement about a vertical axis on sleeve 35. A plate 45 mounts shoes 42 for pivotal movement into and out of engagement with wheels 6 under the command of a cable 46 manipulated in a conventional manner from the handle bars 13, a spring 47 tending to draw shoes 42 out of engagement with wheels 6. Latch means (not shown) are provided for releasably maintaining the brake means in inwardly swung operative position adjacent wheels 6.

To assemble the drive means to the wheelchair, the occupant of the chair rolls his chair manually toward the drive means which are resting in the position shown in FIG. 3. He aims the ramps 30 for the sleeves 33', until these sleeves slide up the ramps 30 in the FIG. 4 relationship. Further drawing the parts together, the occupant causes the sleeves 33' to seat in the sockets 26. He then pushes inwardly on each handle 39 to move the pins 38 into the tube 28 or hole 29', depending on the manner of formation of the receptacle for the pin.

The handle 41 can then be swung forwardly, from the FIG. 5 position to FIG. 6 position, so that the cams 40 enter the vertical slots 18'. The members 40 are called "cams", because they bear against the bottoms of the slots 18' with sufficient force, and with sufficient leverage under the action of handle 41, to tilt the wheelchair slightly rearwardly so that the small forward wheels 8 are elevated from the ground and the wheelchair now has three-point support on the large wheels 6 and the drive wheel 10.

The lower ends of the rods 36 are now elevated from the ground and to give still more clearance, the set screws 37 can be released and the rods 36 raised from the FIG. 5 to the FIG. 6 position, after which the set screws 37 are again tightened to maintain rods 36 in this elevated position.

Finally, the occupant swings the tubes 43, 44 inwardly and latches them so that the brake pads 42 are closely adjacent the rear wheels 6.

The occupant can then start the motor, which can be electric or gasoline powered, and operate the motor

from the controls provided in a conventional manner on the handle bars 13.

To separate the drive assembly from the wheelchair, the foregoing steps can be performed in the reverse order.

From a consideration of the foregoing disclosure, therefore, it will be evident that all of the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand. For example, the wheelchair itself may be of the foldable type, as also may be the drive assembly, for easy carrying in a vehicle such as an automobile, or for storage. These and other modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

Having described our invention, we claim:

1. In combination, a wheelchair and a drive assembly for said wheelchair, said drive assembly comprising a motor and a wheel driven by said motor disposed forwardly of said wheelchair, and means carried by said drive assembly and extending rearwardly of said motor and driven wheel to both sides of said wheelchair for detachably connecting said drive assembly to said wheelchair, said means including means disposed on opposite sides of said wheelchair when said drive assembly is connected to said wheelchair and within reach of and manipulable by the hands of the occupant of the wheelchair to effect the connection and disconnection of said drive assembly to and from said wheelchair.

2. Apparatus as claimed in claim 1, said connecting means comprising ramps on each side of said wheelchair guiding rearwardly extending portions of said drive assembly toward seats on said wheelchair for the interconnection of said drive assembly with said wheelchair.

3. Apparatus as claimed in claim 2, and pins carried by the portions of said drive assembly that are received in said seats for sliding movement into and out of interconnecting relationship with said wheelchair.

4. Apparatus as claimed in claim 3, said seats comprising upwardly open recesses carried by said wheelchair at the summit of said ramps.

5. Apparatus as claimed in claim 1, said connecting means comprising means on said wheelchair defining vertical slots at each side of the wheelchair, and vertically swinging means on said drive assembly selectively engageable in said slots.

6. Apparatus as claimed in claim 5, said vertically swinging means comprising cam means actuated by levers for engaging in said slots and for pressing rearwardly against said wheelchair at the base of said slots to tilt the wheelchair rearwardly.

7. Apparatus as claimed in claim 6, said slots being disposed at the forward ends of armrests of the wheelchair.

8. Apparatus as claimed in claim 1, and vertically adjustable legs that cooperate with said wheel to support said drive assembly when the drive assembly is detached from the wheelchair.

9. Apparatus as claimed in claim 1, the wheelchair having large rear wheels, and brake means carried by the drive assembly and positionable adjacent said large rear wheels when the drive assembly is connected to the wheelchair.

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