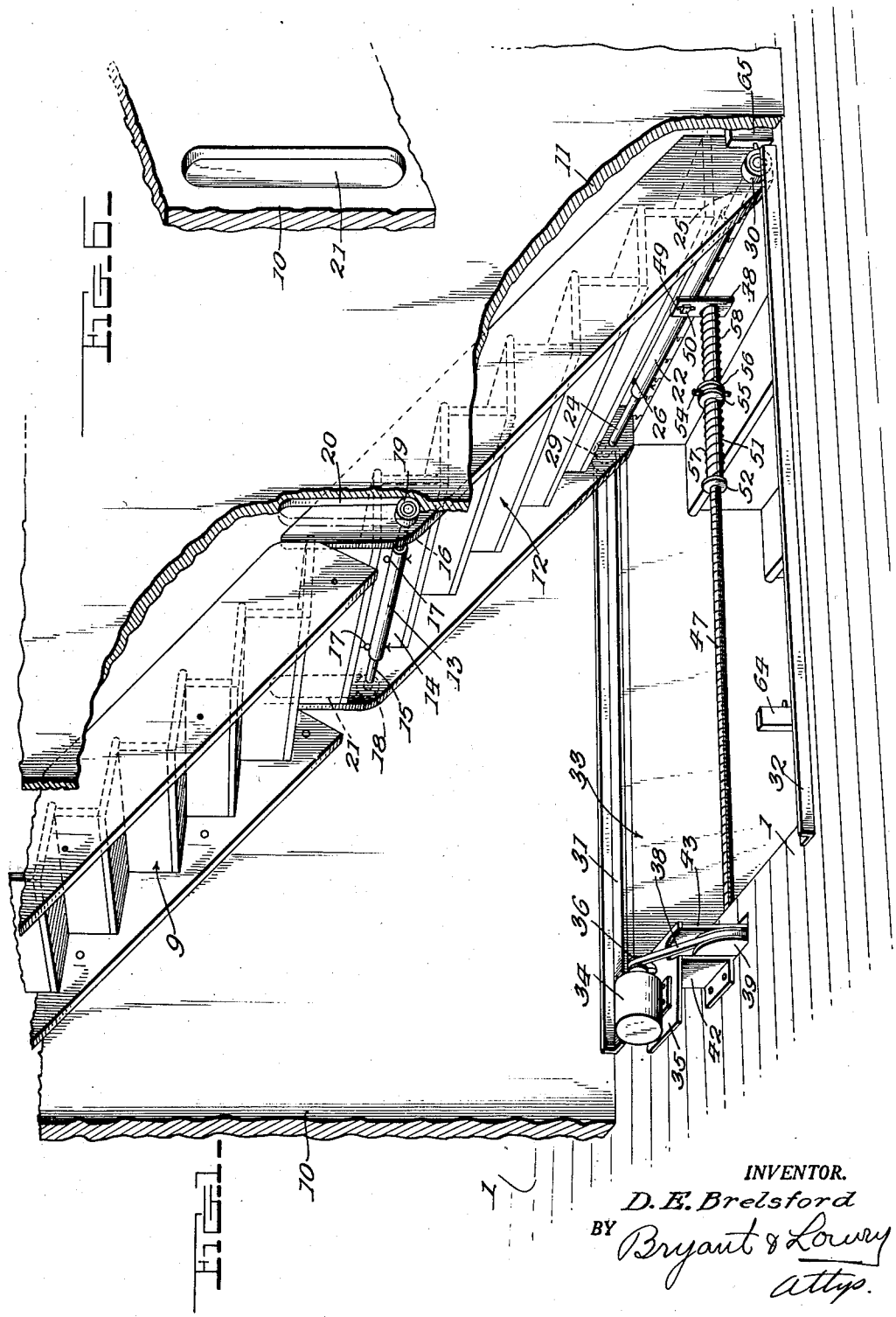
Aug. 21, 1951 D. E. BRELSFORD 2,564,954

RETRACTIBLE STAIRS

Filed April 26, 1948 3 Sheets-Sheet 1

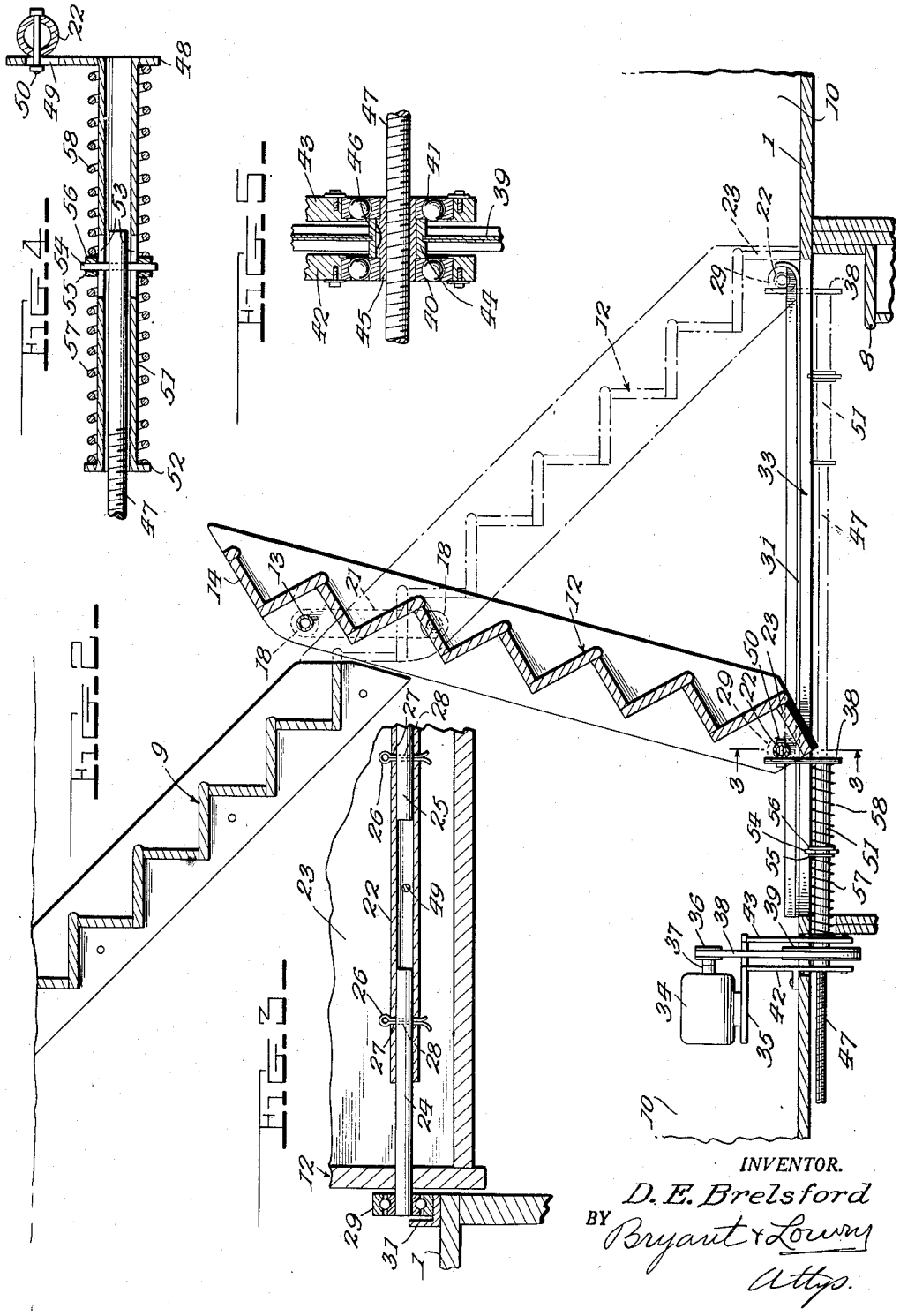


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RETRACTIBLE STAIRS

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RETRACTIBLE STAIRS

Filed April 26, 1948 3 Sheets-Sheet 3

FIG. 1

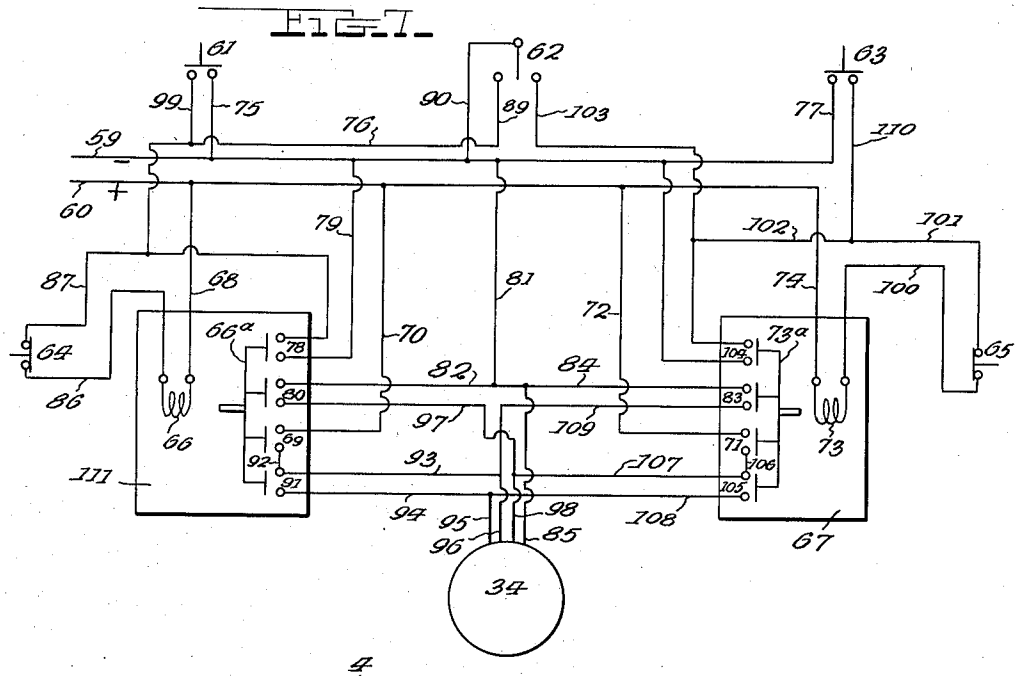
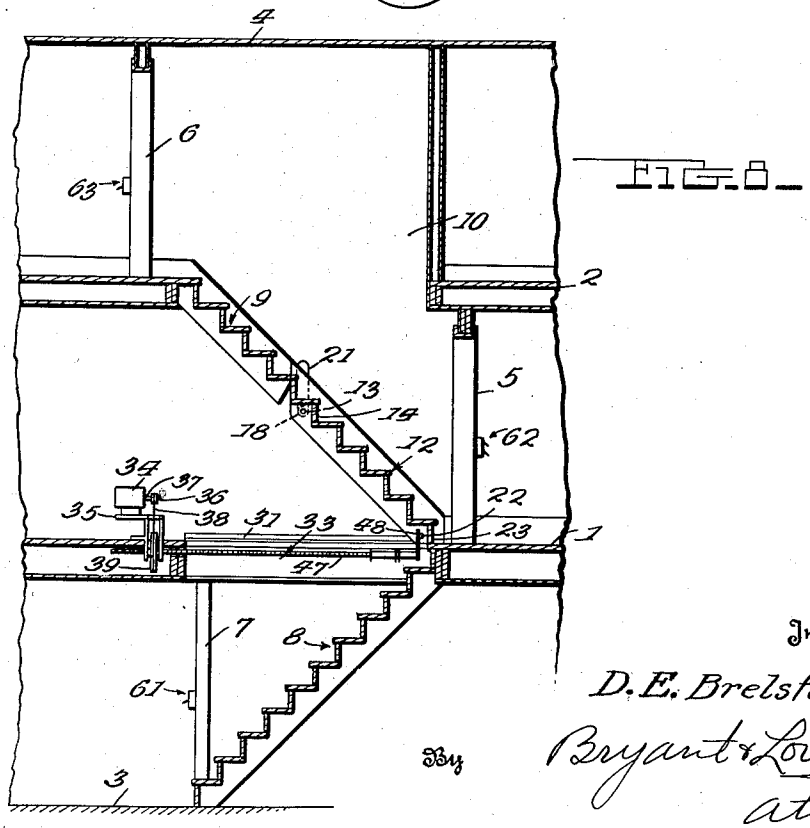


FIG. 2



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RETRACTABLE STAIRS

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Application April 26, 1948, Serial No. 23,274

1 Claim. (Cl. 20—10)

1

This invention relates to improvements in retractable stairs.

An object of the invention is to provide an improved construction of retractable stairs whereby one entrance serves both stairs leading down and up, thus conserving space and allowing the space under the stairs to be used as storage or closet space.

Another object of the invention is to provide an improved construction of retractable stairs having electric operating means for selectively moving the stairs into operative position or for retracting the same so that one entrance serves both stairs leading down and up from a floor to the floors below and above the same.

A further object of the invention is to provide an improved construction of reversably actuated retractable stairs whereby one entrance serves both stairs leading down and up, and said retractable stairs being highly efficient in operation and relatively inexpensive to manufacture and produce.

Other objects will appear as the description proceeds.

In the accompanying drawings which form a part of this application,

Figure 1 is a perspective view of the improved retractable stairs with parts of the enclosing walls being broken away and in section to better show the construction thereof;

Figure 2 is a longitudinal vertical sectional view of the improved retractable stairs showing the same in retracted position;

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 2;

Figure 4 is a longitudinal vertical sectional view through the cushioning means disposed between the retractable stairs and the actuating screw therefor;

Figure 5 is a vertical sectional view taken through the power driven nut supported upon the actuating screw for the retractable stairs;

Figure 6 is a perspective view of one of the track slots for one of the upper carrier rollers;

Figure 7 is a schematic wiring diagram of the power and control circuits for the retractable stairs; and

Figure 8 is a vertical sectional view of two flights of stairs and the location of the related equipment forming the subject matter of the invention.

Like characters of reference are used throughout the following specification and the accompanying drawings to designate corresponding parts.

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At present, stairs leading down and stairs leading up from the same floor are placed one above the other in order to save space, and require a separate entrance at the beginning of each run of stairs. The head room needed for the lower run of stairs also consumes the wasted space below the top run. The head room left above the top last stairs run is used thus only for that stairs as head room.

The improved retractable stairs are constructed similar to standard stairs, but in order to save space only one door or entrance to both stairs leading up and down need be provided. By utilizing part of the space for the stairs leading up as head room for the stairs leading down, the stair entrance for both upper and lower runs of stairs may be located in the same position.

By referring to Figure 8 of the drawings, it will be seen that there is provided a first floor 1, a second floor 2, a basement floor 3, and a roof 4, with doors 5, 6 and 7 disposed respectively at the stair entrances to said floors.

A stair run 8 of usual construction will be disposed between the first floor 1 and the basement floor 3, and the upper approximate half 9 of the stair run disposed between the first floor 1 and the second floor 2 will be of usual construction and supported in fixed permanent position directly below the door 6.

The stairs 9 will be disposed directly above the lower stairs 8 between the vertical walls or partitions 10 and 11.

The lower or retractable portion 12 of the stairs 9 leading from the first floor 1 to the second floor 2 will be provided with a transversely extending, centrally positioned supporting tube 13 disposed at the rear of the uppermost stair rises 14, and will support the rods 15 and 16 in its opposite ends, being secured by the cotter pins or keys 17 extendable through aligned openings (not shown) in said tube 13 and openings (not shown) through the rods 15 and 16.

Ball bearing rollers 18 and 19 will be mounted upon the outer ends of the rods 15 and 16 and will be received in the oppositely disposed vertical track slots 20 and 21 formed in the partitions 10 and 11 to extend flush with the surfaces thereof.

A similar transversely extending, centrally positioned supporting tube 22 is disposed to the rear of the lowermost stair riser 23 of the retractable stairs 12, and supports the rods 24 and 25 in its opposite ends, being secured by the cotter pins or keys 26 when placed through aligned openings 27 and 28 respectively formed through the tube 22 and the rods 24 and 25. Ball bearing

rollers 29 and 30 are mounted upon the ends of the rods 24 and 25, and roll upon the longitudinally extending angle iron tracks 31 and 32 fixed at the opposite sides of the opening 33 in the first floor 1 provided for the stairs.

An electric motor 34 is supported upon the bracket support 35 secured to the floor 1 adjacent the end of the opening 33 remote from the retractable stairs 12. A pulley 36 on the motor shaft 37 supports one end of a belt 38 whose opposite end extends about the pulley 39 which is mounted in the ball bearing races 40 and 41 between the depending arms 42 and 43 of the bracket support 35.

The hub 44 of the pulley 39 is secured about the axially disposed nut 45 by means of the key 46, and an elongated retractable stair actuating screw 47 is threaded through said nut 45 for reciprocable movement when said motor 34 is operated in clockwise and counter-clockwise direction.

A shock absorbing device for the retractable stair 12 is provided and includes a supporting plate 48 which is slotted at 49 to receive the securing bolt 50 extending through the tube 22. An elongated tube 51 secured to the depending plate 48 is disposed about the adjacent end of the retractable stair actuating screw 47 and is formed with an annular and peripheral flange 52 on its opposite end. The tube 51 is oppositely or diametrically slotted at 53 to receive the stop pin 54 extending through the end of the actuating screw 47. Washers 55 and 56 are disposed about the tube 51 at either side of the stop pin 54, and coil springs 57 and 58 are disposed about the tube 51 at the opposite sides of the washers 55 and 56 for automatically cushioning the action of the retractable stair actuating mechanism just described.

The electrical system and diagram shown in Figure 7 will now be described. Power or energy enters through the conductors 59 and 60 and is distributed and controlled by several conductors, switches and relays in which 61 is a spring loaded normally open control station which is located in the basement 3. Switch 62 is a double throw spring loaded, normally open switch located on the first floor 1. Switch 63 is similar to switch 61 and is located at the head of the stair run to the second floor 2. Switch 64 is a limit switch, normally closed and spring loaded. Switch 65 is also a limit switch, normally closed and spring loaded.

A controlled relay 66 is normally open and controls the rotation of the motor 34 for opening the stairs. A controlled relay 73 is normally open and controls the rotation of the motor 34 for closing the stairs. The motor 34 is a single phase, induction type standard speed, 1750 R. P. M., and of sufficient horsepower to operate the stairs.

Positive energy entering conductor 60 is fed to coil 66 by conductor 68 and contact 69 by 70 and contact 71 by 72, and finally by coil 73 by 74.

Negative energy entering conductor 59 is fed to one side of switch 61 by wire 75 and to the center top of switch 62 by wire 76 and to one side of switch 63 by wire 77. On the lower side contact points 78 by wire 79, and contact points 80 by wires 81 and 82, contact points 83 by wires 81 and 84, also one motor lead 85 to connect 71 by wire 72 and coil 73 by wire 74.

The flow of current, for opening the stairs when switch 62 contacts are closed, enters conductor 60 along wire 68, energizing coil 66, thence through wire 86 and switch 64 and through conductors 87, 88 and 89, through switch 62, thence through conductor 90 and back to 59. When coil 66 was energized, relay switch bar 66a was closed, closing contacts 78, 80, 69 and 91, sending current to motor 34 by circuits from wires 60 to 70, contacts 69 across wire 92, contact 91 energizing circuits 93 and 94 completing motor circuit 95 and 96. Contact 78 is a holding circuit supplanting the contacts made by switch 62. Contact 80 closes circuits 59, 81, 82 to 97 and motor circuit 98. Motor circuit 85 is fed through 60, 81, 84 and 85. The motor 34 continues to run until limit switch 64 is opened, releasing coil 66, opening contacts 78, 80, 69 and 91, stopping the motor 34. Switch 61 has the same control as stated above, connected in the circuit by wires 75 and 99.

The flow of current when the switch contacts 62 are closed, thereby closing the stairs 12, enters conductor 60 along wire 74 energizing coil 73, thence wire 100 through limit switch 65, then to wires 101, 102, 103, through switch 62, then through wire 90 and back to 59. When coil 73 was energized, relay switch bar 73a was closed, closing contacts 104, 83, 71 and 105, sending current to motor 34 by circuits 60 to 72, contacts 71 across 106 energizing circuits 107 and 108, completing motor circuits 95 and 98. Contact 104 is a holding circuit supplanting the contacts made by switch 62.

Contact 83 closes circuit including wires 59, 81, 84 to 109 and motor circuit 96. Motor circuit 85 is fed through wires 60, 81, 84 and 85. The motor continues to run until limit switch 65 is opened, releasing coil 73, opening contacts 104, 83, 71 and 105, stopping the motor 34. Switch 63 has the same control as stated above connected in the circuit by 77 and 110.

During the travel of the stairs 12, either opening or closing, or whenever both limit switches are closed and the current ceases, the relays 111 and 67 being energized will immediately open. This returns circuits back to normal so that when current is continued, service will be the same as previously explained.

Motor circuits 95, 96, 98 and 85 are internally connected, thus wires 95 and 85 are field leads, wires 96 and 98 being the starter leads. To reverse motor, the wires 95 and 96 must be connected together and wires 98 and 85 connected, or for opposite direction of rotation, wire 95 is connected to wire 98 and wire 96 is connected to wire 85.

While the preferred embodiment of the instant invention has been illustrated and described, it will be understood that it is not intended to limit the scope of the invention thereto, as many minor changes in detail of construction may be resorted to without departure from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

In a device of the kind described, a floor, an inclined stair leading up therefrom and having a fixed upper section and a retractable lower section, means to guide the upper end of said lower section along a vertical path, said vertical guide means including a pair of guide members between which said lower section fits and having confronting vertical slots, said vertical guide means further including rollers carried by the upper end of said lower section and engaging said slots, means to guide the lower end of the lower section along a horizontal path extending

in opposite directions from the line of movement of the upper end of said lower section, said horizontal guide means including a spaced pair of confronting guide bars and further including rollers carried by the lower end of said lower member and engaging said guide bars, and means to effect movement of the lower end of the lower section along said horizontal path.

DAVID E. BRELSFORD.

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