April 7, 1953 D. E. DAVIS 2,634,124

AUTOMATIC DOOR OPENER

Filed April 28, 1948 2 SHEETS—SHEET 1

Fig 1

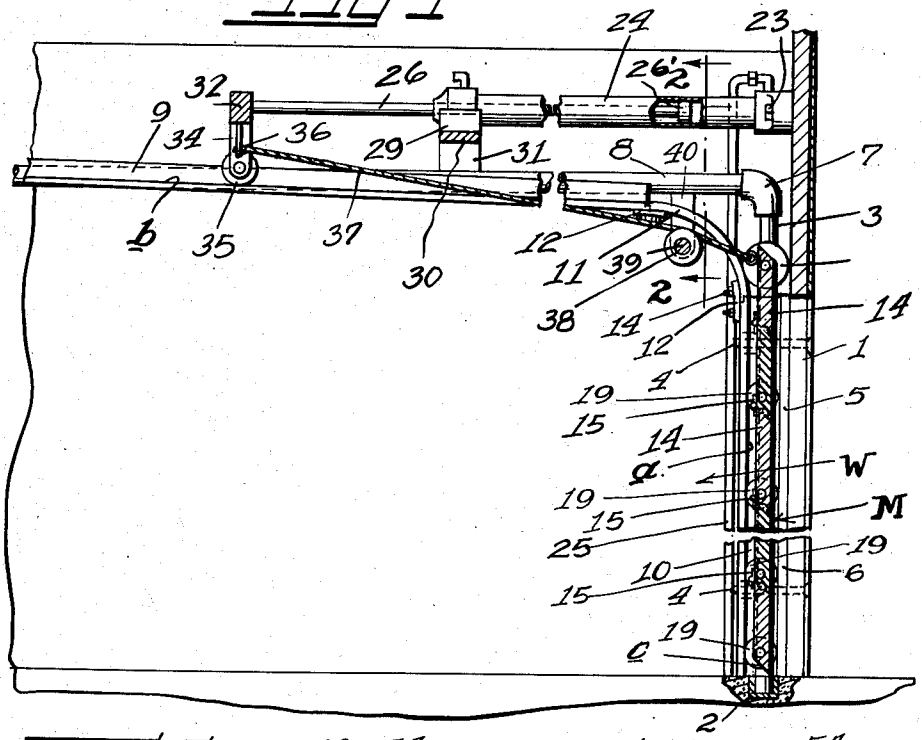


Fig 5

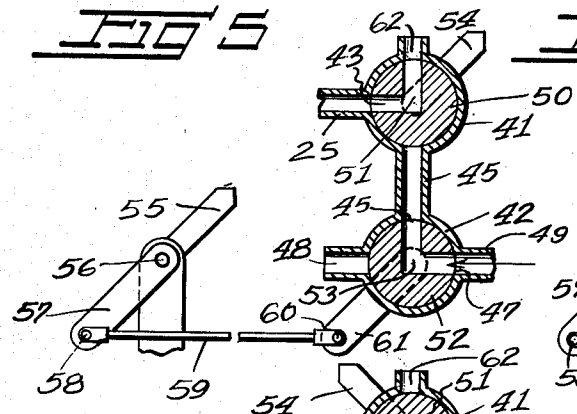


Fig 6

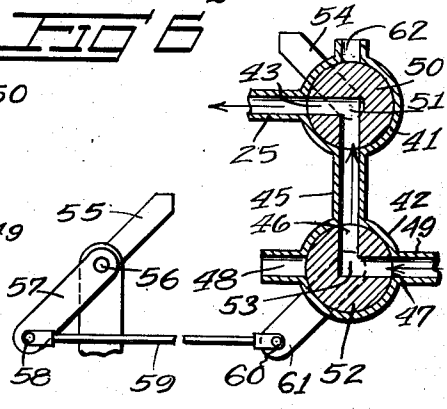
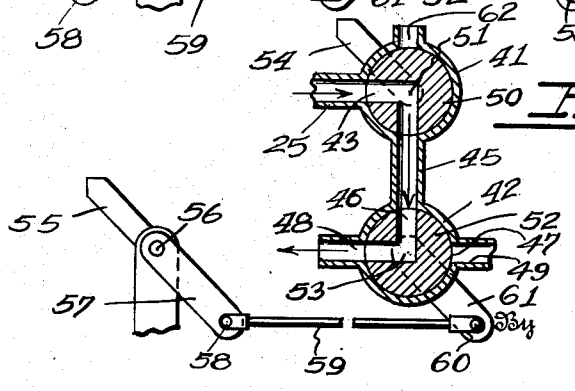


Fig 7



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April 7, 1953 D. E. DAVIS 2,634,124

AUTOMATIC DOOR OPENER

Filed April 28, 1948 2 SHEETS—SHEET 2

Fig 2

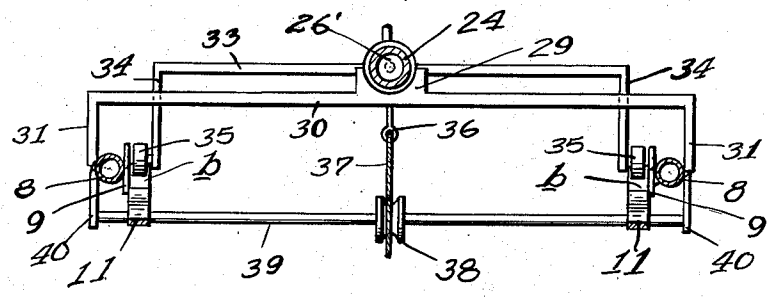


Fig 3

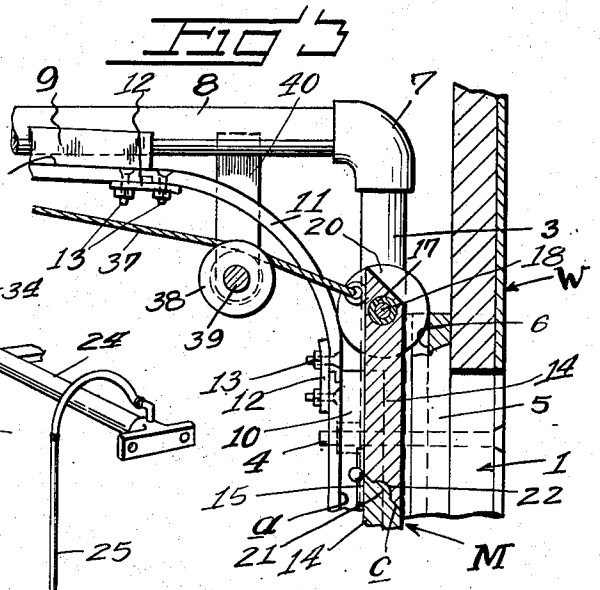
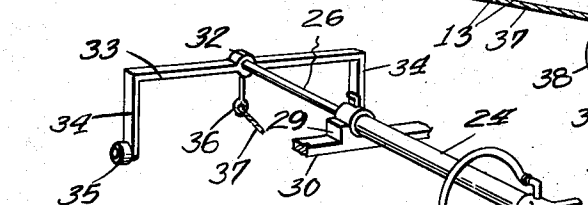


Fig 4



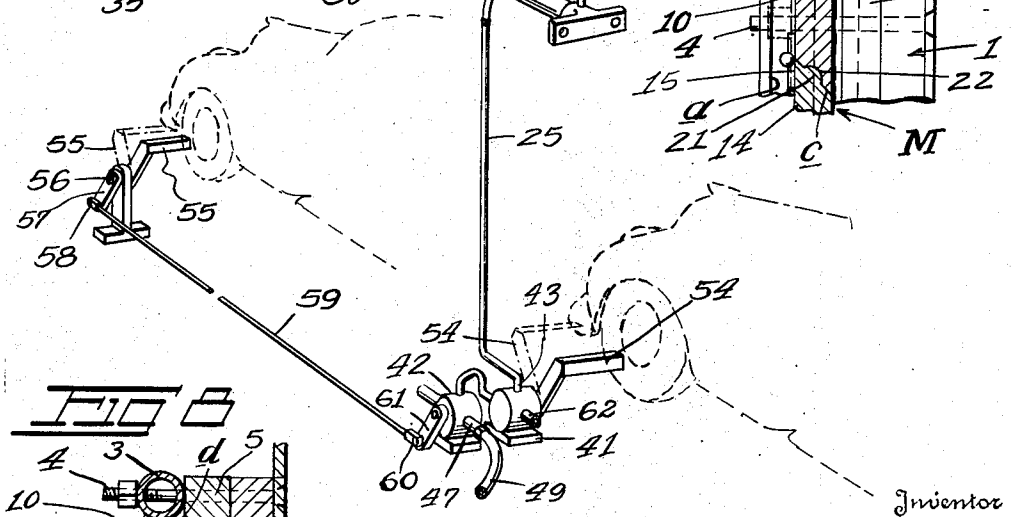
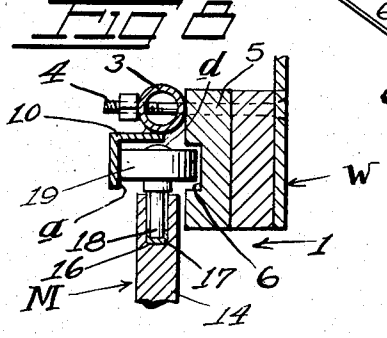


Fig 8



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Patented Apr. 7, 1953 2,634,124

UNITED STATES PATENT OFFICE

2,634,124

AUTOMATIC DOOR OPENER

Daniel E. Davis, Dallas, Tex., assignor of fifty-eight per cent to Mary Davis Miller

Application April 28, 1948, Serial No. 23,760

1 Claim. (Cl. 268—42)

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This invention relates to a closure apparatus and it is primarily an object of the invention to provide an apparatus of the kind including a closure member together with substantially automatic means for controlling the opening and closing movements of the closure members.

It is also an object of the invention to provide an apparatus of this kind including a closure member and pneumatic means associated therewith for moving the closure member into open position.

Another object of the invention is to provide a closure apparatus including a closure member supported for movement into open or closed position together with means operable at points remote from the door closure and fore and aft thereof for effecting opening movement of the door.

A still further object of the invention is to provide an apparatus of this kind including a shiftable closure member together with pneumatic means for moving the closure member into open position said means including a valve mechanism interposed in a supply line leading from a source of air under pressure wherein operating means for the closure member fore and aft thereof for opening the flow of the air to effect opening movement of the closure member.

The invention consists in the details of construction and in the combination of the several parts of my improved door closure apparatus whereby certain advantages are attained, as will be hereinafter more fully set forth.

In order that my invention may be better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a view partly in section and partly in elevation illustrating a closure apparatus constructed in accordance with an embodiment of the invention;

Figure 2 is a fragmentary sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary view partly in section and partly in elevation of an upper front corner portion of the apparatus as herein embodied;

Figure 4 is a diagrammatic view in perspective of the pneumatic means herein embodied for controlling the movements of the closure member;

Figure 5 is a diagrammatic view partly in section and partly in elevation, illustrating the valve mechanism of the door closure and in closed adjustment and in adjustment for operation from a point in front of the closure member;

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Figure 6 is a view similar to Figure 5, but showing the valve mechanism in open position;

Figure 7 is also a view similar to Figure 5, but showing the valve mechanism in exhaust adjustment; and

Figure 8 is an enlarged detail sectional view taken substantially on line 8—8 of Figure 3.

The invention as illustrated in the accompanying drawings of a type particularly designed for use in connection with a garage, although it is believed obvious that use of the apparatus is not to be limited in this respect.

As illustrated, at each side of the car entrance 1, and to one side thereof, the floor of the building is provided with an upwardly facing socket 2, to receive the lower end portion of an elongated post or standard 3, preferably pipe, or the like. The socket 2 is also positioned closely adjacent to the inner face of the walls of the structure provided with the entrance opening 1.

The post or standard 3 is of a length to extend above the top of the entrance opening 1 and when in position is substantially vertically defined. The post or standard 3 is held in position by the bolts 4 positioned as desired and herein shown as disposed through the post 3 and the wall W. The bolts 4 are also directed through the back strip 5 to tightly and snugly hold the strip between the post 3 and the wall W as particularly illustrated in Figure 8. The strip 5 is of a length to extend along the post 3 from a point closely adjacent to the floor line of the building structure to a point closely adjacent to the top of the door opening 1.

The strip 5 is of a width to extend outward beyond the post 3 and said extending portion has extending lengthwise thereof a track groove 6 for the purpose to be hereinafter referred to.

The top extremity of each of the posts or standards 3 has detachably secured thereto by the coupling joint 7, an end portion of an elongated tubular member or pipe 8 of required dimensions. This pipe 8, when in working position, is substantially at right angles to the post or standard 3, and is disposed inwardly of the building, or in a direction away from the entrance opening 1.

As is clearly illustrated in Figure 2, of the drawings, the members or pipes 8 are to be mounted at substantially the same height and substantially in parallelism. The opposed faces of the members or pipes 8 have welded or otherwise rigidly secured thereto the angle members or irons 9 which extend from substantially one

end of the members or pipes 3, to a desired distance beyond the opposite or free ends of the members or pipes 8. Each of the members or irons 9 at its end position remote from the port or standard 3 may be supported in any manner desired, it only being necessary that the member or iron 9 is properly held in desired position. The angle members or irons 9 are disposed forwardly and downwardly on a predetermined incline so that the closure member M may return by gravity from open position to closed position as will later be more particularly referred to.

The inner side of each of the posts or standards 3 have welded or otherwise rigidly held thereto an angle member or iron 10 which is disposed from the lower extremity of said post or standard 3, to a point spaced inwardly of the upper extremity thereof. The angle member or iron 10 has a flange *a* extending outwardly from the inner face of the post or standard 3, and spaced therefrom, said flange *a* being opposed to the groove 6 in the track strip 5.

The angle member or iron 9 has a bottom flange *b* which extends inwardly from the associated member or pipe 8 and the forward or front end of the flange *b* and the upper end of the flange *a* of the adjacent post or standard 3 has interposed therebetween an arcuate track member 11 detachably held in place by the splice plate 12, held in position by the conventional bolts 13. The track member 11 is on a radius and of a length determined by the distance between the opposed ends of the flanges *a* and *b*.

By having the track members 11 readily removable, the collapsing of the apparatus may be easily accomplished as the members or pipes 8 are also easily separated from the posts or standards 3.

The closure member M is of a width in excess of the width of the entrance opening 1 in the wall W but of a width slightly less than the distance between the opposed flanges *a* when the apparatus is in assembled or working position. The closure member M comprises a plurality of flat panels 14 of desired dimensions and said panels 14 are in duplicate. The longitudinal marginal edges of the panels are beveled, as at *c*, on an angle of 45°. When the member M is in its lowermost or closed position, the bevel edges *c* of adjacent panels 14 overlap and are in close contact. The longitudinal marginal portions of the panels 14 at the inner sides thereof, are hingedly connected, as at 15, so that the closure member constitutes an articulated unit that can readily move from a vertical position, as when closed, to a horizontal position, as when opened, and vice versa.

Each of the panels 14, is provided in its opposite end edges and closely adjacent to its lower longitudinal margin with sockets 16 in each of which is fitted an expansible bearing sleeve or thimble 17.

Tightly engaging within the bearing sleeve or thimble 17 is an end portion of a stub shaft 18 which is of a length to extend a distance outwardly from the adjacent end of the panel 14. Freely rotating on the extended portion of the shaft 18 is a wheel 19. This wheel is preferably of a diameter slightly less than the distance between a flange 8 and the bottom of the opposed groove 6 in a track strip 6. The wheel 19 is held in position by the head *d* on the outer end of the shaft 19 and as this shaft 18 can be readily applied or removed, the wheel 19 may easily be mounted.

As the closure member M moves upwardly from closed to open position, the wheel 19 of the panels 14 will ride over the track members 11 and the flanges *b* and vice versa. The incline of the flanges *b* will allow the closure member M to move by gravity from the open position to closed position. When the panels 14 are in vertical position, the wheels 19 will be closely accommodated between the flanges *a* and the bottoms of the grooves 6 to permit vertical movement of the closure member M with a minimum of frictional resistance and also holding against flexing the portions of the gate in vertical position.

Associated with the top panel are the wheels 20 positioned adjacent to the upper longitudinal margin of said top panel. Each of these wheels is operatively engaged with its panel in the same manner as each of the wheels 19 hereinbefore referred to and it is therefore not believed necessary that such mounting be described and illustrated in detail.

These wheels 20 are each of a diameter greater than a wheel 19. The wheels 20 are of substantially the same diameter as are also the wheels 19. The wheels 20 are also of a size to have close contact, when the member M is in fully closed position, with the bottom of the groove 6 and the lower portion of the adjacent track member 11. This is of advantage due to the fact that when the member M is fully closed the wheels 20 of the top panel 14 are in position to immediately ride over the track members 11 upon initial opening movement of the member M. The rollers 20 also provide means to facilitate the maintaining of the closure member M in an effective closed position.

The opposed beveled edges *c* of adjacent panels 14 are provided therealong from end to end with the mortices 21 and grooves 22 which snugly interfit when the panels are in closed position, and thereby prevent the passage, between adjacent panels 14, when in closed adjustment, of the elements, dust, and the like. The mortices 21 are preferably on the upper longitudinal faces of the panels 14 and, of course, the grooves on the lower edges.

Anchored, as at 23, to the wall W at the required distance above the entrance opening 1, is the inner or base portion of an elongated cylinder 24 which extends substantially horizontal inwardly from the wall W. In communication with the inner or base portion of the cylinder 24, is a pipe line 25 through which air under pressure is delivered within the cylinder 24, to move or force outwardly the plunger 26 which has sliding movement through the outer head 27 of the cylinder 24. The extremity of the plunger 26 within the cylinder 24 carries a piston 26 of desired type against which presses, in a well known manner, the air under pressure delivered into the cylinder 24, through the line 25 to move outwardly the plunger 26 when it is desired to shift the closure member M to open position.

The cylinder 24 is above the members 8 and substantially midway therebetween and the outer end portion of the cylinder rests from above upon the saddle 29 carried by the central portion of a cross member 30 having at its ends the depending arm 31 welded or otherwise rigidly secured to the members and preferably to the outer sides thereof.

The arms 31 are of length depending upon the distance desired to support the outer end portion of the cylinder 24 above the arms 8 to maintain the cylinder substantially horizontal.

The outer extremity of the plunger rod 26 is secured, as at 32, to the central portion of a cross member 33 provided at its end portions with the depending arms 34. The lower extremities of these arms 34 carry the outboard rollers 35 which engage from above the flanges *b* and ride therealong upon endwise movement of the rod 26 in either direction to provide at all times desired support for the outer portion of the rod 26 without interfering with the desired movement thereof.

The central portion of the member 33 has operatively connected therewith, as at 36, a flexible member 37, such as a wire cable of requisite gauge. The cable 37 extends from the member 36 to the top panel 14 of the closure. At a point closely adjacent to the track section 11, the cable 37, when the closure member is fully closed, passes over and engages a guide and supporting pulley 38. This pulley 38 is freely and rotatably mounted upon a cross rod 39 interposed between and held by the arms 40, rigid with and depending from the members 8 outwardly of the track sections 11. The arms 40 are of such length to place the roller 38 in a position below and substantially central of the track members 11 although such position may be varied dependent upon the requirements of practice.

The roller 38 assures desired initial pull on the closure member M to shift the same into open position. When the initial lifting of the closure member M has raised the member M to bring the top panel 14 about central of the track members 11, the cable 37 will be free of the roller 38 but the continued outward movement of the plunger 26 will assure the closure member to be drawn to the desired position on the flanges *b*.

The valve mechanism for controlling the flow of compressed air through the line 25 into the cylinder 24, as herein disclosed, comprises two valve casings 41 and 42. The casing 41 in its peripheral wall has a discharge port 43 from which leads the pipe line 25 and in ninety degrees (90°) relation thereto is an inlet point 44 which is in communication through the line 45 with the outlet part 46 in the peripheral wall or the second valve casing 42. Quarter spaced at opposite sides of the port 46 are the inlet port 47 and the opposed exhaust port 48. The port 47 has in communication therewith a pipe line 49 leading from a source of air under pressure and which source may be as preferred and positioned as desired.

Working in the valve casing 41 is a rotary valve member 50 having therethrough a port 51, the ends of which being so spaced as to open the flow from the line 45 through the port 51, and through the line 25.

Working in the valve casing 42 is a rotary valve member 52, having therethrough a port 53, the ends of which being also spaced ninety degrees (90°) so that when the valve member 52 is in one position, as shown in Figures 5 and 6, the port 53 will open flow through the lines 45 and 49 and when in a second position, as shown in Figure 7, the port 52 will open flow through the line 45 and the exhaust port 48.

The valve casings 41 and 42, in practice, are positioned at desired distance in advance of the entrance opening 1 and disposed in the path of travel of a vehicle is a laterally directed arm X, carried by an upwardly disposed rock arm 54 movable with the valve member 50. When the closure member M is in closed position, the valve

members 50 and 52 are in the positions shown in Figure 5 and at which time the arm 54 is on an upward incline in a direction away from the entrance opening 1. As a vehicle approaches the entrance opening 1, a part of such vehicle, such as a wheel, will strike the arm 54 and throw the same over to the position as shown in Figure 6, with the resulting flow of air under pressure from the source of supply through the valve members 52 and 50, and through the line 25 into the cylinder 24. This results in the rod 25 being forced outwardly to pull the closure member M from its closed position to an open position upon the flanges *b*. The pressure within the cylinder 24 will maintain the closure member M in open position until a part of the vehicle such as a wheel strikes the upwardly disposed rock arm 55 inclined toward the entrance opening 1.

This arm 55 is herein disclosed as carried by a suitably mounted stub shaft 56 which is also provided with a second rock arm 57 depending therefrom in a direction opposed to the arm 55. Operatively connected as at 58, with the rock arm 57, is an end portion of an elongated rod 59 of a required length to operatively connect as at 60, with downwardly and rearwardly inclined rock arm 61, movable with the valve members 52.

As the car strikes the rock arm 55 as shown in Figure 5, the same will be thrown into the position shown in Figure 7, whereby the port 53 will register with the exhaust port 48 and the line 45 allowing the desired release of air pressure in the cylinder 24 to permit the door closure to return by gravity to closed position.

When the vehicle is to pass out through the opening 1, upon the initial travel of the vehicle, a part thereof will strike the lever 55 or more particularly the laterally directed arm 61 thereof, to throw the valve member 52 in the adjustment shown in Figure 6, whereby air under pressure may again flow into the cylinder 24 to force the rod 26 outwardly to the left of the closure member M into open position and to maintain such open position until the vehicle passes out through the opening 1. After the vehicle has passed out through the opening 1 it again will strike the arm 54 and return the valve member 50 to the position shown in Figure 5 when the port 51 will return to register with the port 43 and in the exhaust port 62 of the casing 41. This will release the pressure within the cylinder 24 and again allow the closure member M to return by gravity to closed position.

It is believed obvious that the rock arms 54 and 55 may be selectively operated manually to effect the desired opening of the closure member M.

From the foregoing description it is thought to be obvious that a closure apparatus constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated.

I claim:

An automatic door opener, including a vertically movable door formed of horizontally hinged sections, rollers mounted on the opposite ends of said sections, and spaced parallel inverted L-shaped trackways engaged by said rollers, the upper legs of said trackways sloping upwardly and rearwardly from the upper ends of the vertical legs thereof, said opener comprising a single acting fluid pressure cylinder-piston unit mounted above the inside of the door opening and

centered between the upper sloping legs of said trackways, a piston rod extending rearwardly from said cylinder, an inverted U-shaped frame, rollers carried at the lower ends of the side portions of said frame and engaged in the said horizontal legs, means for securing the rearwardly directed end of said piston rod centrally of the horizontal portion of said frame, a cable, means depending centrally of the horizontal portion of said frame for the attachment of an end of said cable thereto, other means for the attachment of the opposite end of said cable to the center of the uppermost section of said door, and means for controlling the admittance of exhaust of the fluid pressure to and from the outer end of said cylinder, said door gravitating to closed position upon the exhaust of the fluid pressure from the cylinder.

DANIEL E. DAVIS.

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