Oct. 25, 1955 R. K. FARRINGTON ET AL 2,721,982

MULTIPLE CONTACT LAMP HANGER

Filed Sept. 13, 1950 2 Sheets-Sheet 1

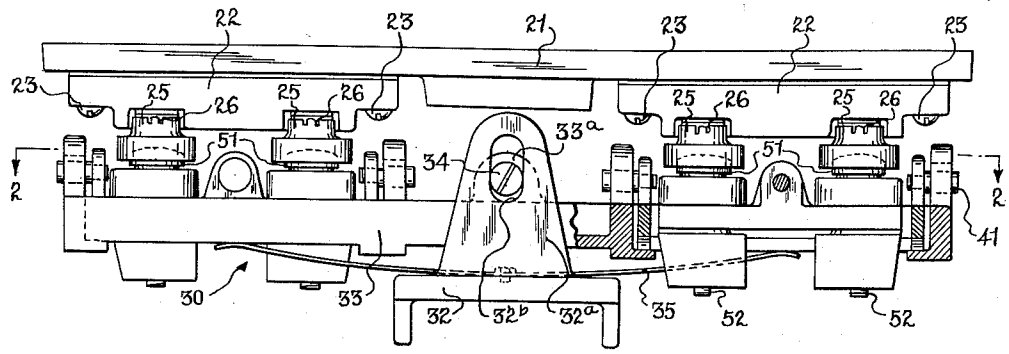


Fig. 1

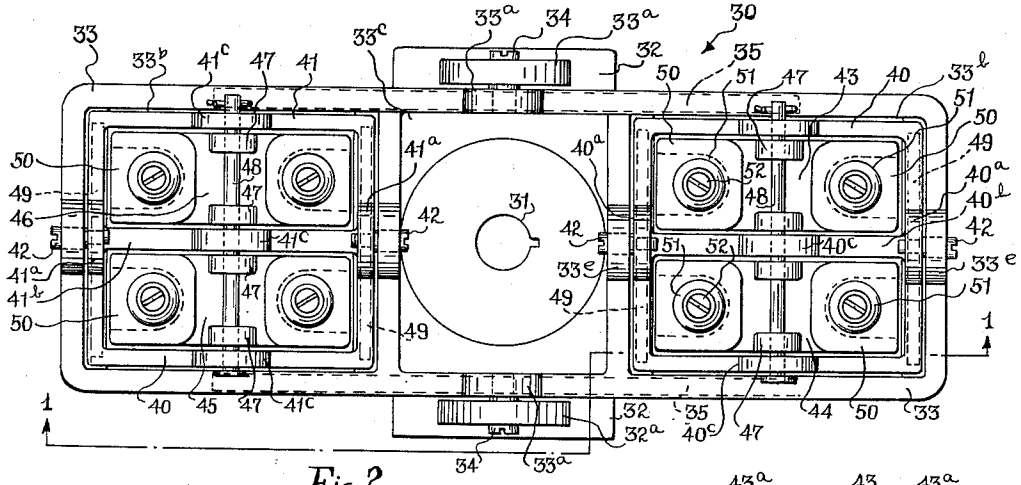


Fig. 2

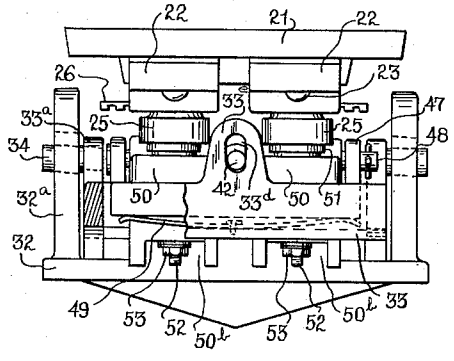


Fig. 3

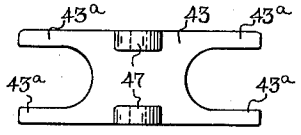


Fig. 4

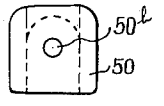


Fig. 5

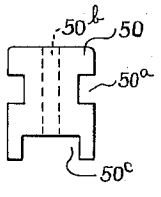


Fig. 6

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MULTIPLE CONTACT LAMP HANGER

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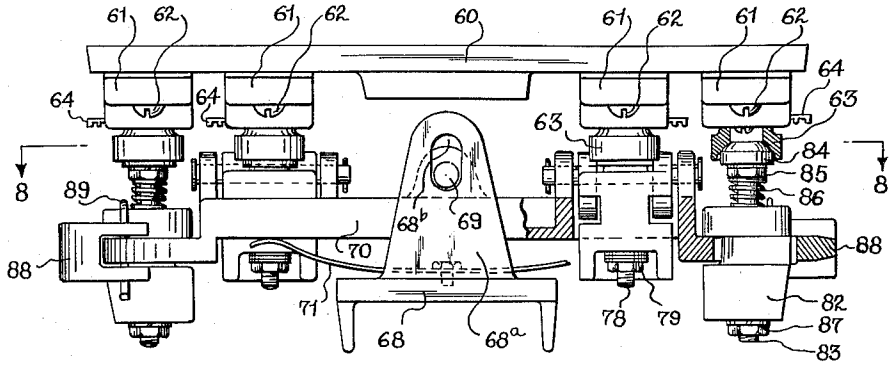


Fig. 7

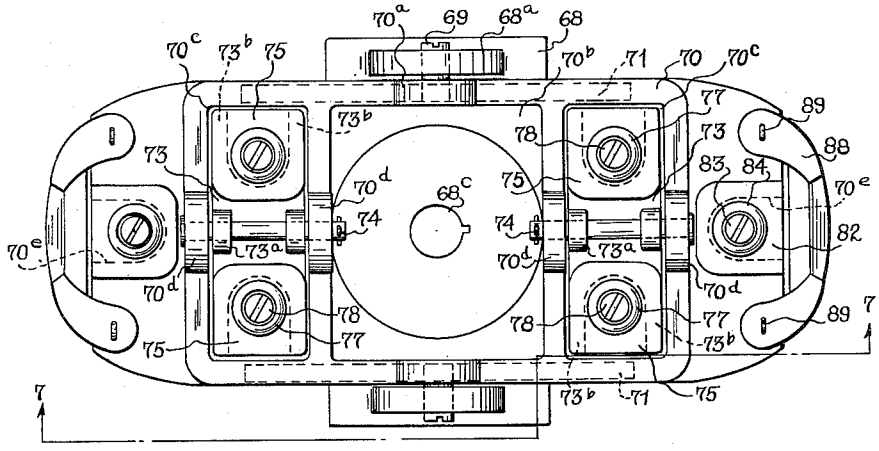


Fig. 8

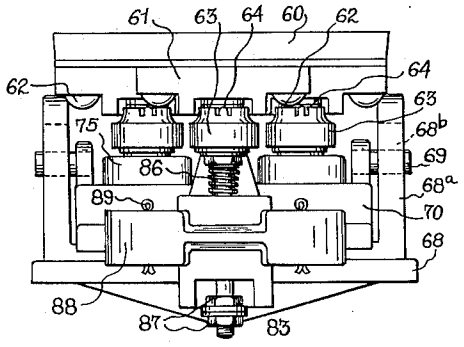


Fig. 9

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MULTIPLE CONTACT LAMP HANGER

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Application September 13, 1950, Serial No. 184,686

12 Claims. (Cl. 339—135)

This invention relates to lamp hangers having multiple contacts and in particular to such devices having means for equalizing the pressure between the contacts.

An object of the present invention is to provide means for supporting separable contacts in a simple but efficient manner providing for the necessary adjustment of the coacting pairs of contacts when making and breaking the circuit.

In the drawings,

Fig. 1 is a side elevation partly in section showing an embodiment having eight pairs of contacts;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is an end elevation of the embodiment of Fig. 1;

Fig. 4 is a plan view of a contact support lever used in the various embodiments;

Fig. 5 is a top view of an insulator block used with the invention;

Fig. 6 is a side view of the block shown in Fig. 5;

Fig. 7 is a side elevation partly in section of a modification having six pairs of contacts;

Fig. 8 is a sectional view on the line 8—8 of Fig. 7; and

Fig. 9 is an end view of the embodiment shown in Fig. 7.

It is to be understood that although certain preferred embodiments of the invention are hereinafter described in detail, the invention is not limited to such embodiments unless so defined by the appended claims. In addition, the terms and phrases used herein are merely descriptive and illustrative and are not to be construed as in any way limiting the invention.

In the illumination field, the definite present trend is toward the provision of multiple lamp installations in an effort to improve uniformity of illumination as well as its directional qualities. There has also been increasing use of multiple lamp fixtures, and this is particularly noticeable in connection with fluorescent lamp installations. Most fluorescent lamps of well-known types are adapted to be operated on alternating current, and, having arc discharge characteristics, lend themselves readily to production of a stroboscopic effect. Therefore, it has become desirable to maintain adjacent lamps in different phase relationships with each other to obviate this unpleasant effect, and this has necessitated the provision of several circuits for each fixture. Multiple contacts and circuits are also necessary when operating lamps on the well-known step or progressive starting type circuit, as well as when a fixture contains lamps having various voltage or current characteristics.

In many applications, it is necessary or desirable to mount the fixtures on the ceiling, and, when the ceiling is high, maintenance difficulties are encountered unless the fixture can be lowered to a convenient level. The present invention is adapted for use with any one of a number of lowering devices, one of which, for example, is that described in the copending application of Thayer B. Farrington et al., Serial No. 184,954, filed September 15, 1950, now Patent No. 2,666,909.

Speaking first generally, there is shown in Figs. 1, 2 and 3 an embodiment of the invention having eight pairs of coacting contacts. The device comprises a fixed member, normally attached to a ceiling fixture, which has eight fixed contacts mounted in two groups of four respectively on each side of the center. A separable element also bears eight contacts which coact with those above mentioned and are adjustably mounted with respect to each other by means of pivots. That is, the groups of four are mounted one on each end of a lever pivoted at a point intermediate its ends. Within each group of four, one pair is similarly mounted with respect to the other pair and pivoted about an axis at right angles to the groups-of-four axis previously mentioned, and then each contact of a given pair is pivoted with respect to the other about an axis parallel to the first mentioned axis. Platform springs tend to keep all the elements substantially level in the absence of external pressure and also provide shock mounting. As is obvious, because of the novel method of mounting the contacts on the separable element, a decided advantage is obtained when drawing the fixed and separable elements together. If the separable element is tilted, the pressure between all pairs of coacting contacts is nevertheless equalized and no damage results. Also, any irregularities in the mountings of the fixed contacts will be compensated for, and firm engagement between all pairs of contacts obtained.

Referring now to Figs. 1, 2 and 3, the member which is fixed to the ceiling fixture or other support comprises a plate **21** to which insulator blocks **22** are attached by the bolts **23**. Four cup-shape downwardly opening contacts **25** are secured to each insulator block **22**, in this embodiment, and are spaced at the four corners of a rectangle. Electrical connections may be made to the ears **26**, one being attached to each of the contacts **25**.

As previously mentioned, the present invention may be adapted for use in a number of lowering type fixtures, and, therefore, no particular holding device or lowering elements are shown. It is to be understood, however, that the separable element, shown generally by the numeral **30**, is to be attached to the lowering part of whatever fixture incorporates the present invention. To this end, fittings **31** are provided in the central portion of a bracket **32** which serves as the base member for the separable element **30**. The fittings associated with **31** serve to removably latch the upper and lower sets of contacts in mating engagement (as shown in Figs. 1, 2 and 3) as taught in my copending application mentioned above. The vertical play of screws **34** in slots **32*b*** permits the unlatching of the separable member from the fixed member in the co-pending application mentioned. On each side of the bracket **32** are upstanding lugs **32*a*** between which a supporting member **33** is pivotally mounted by means of the bolts or screws **34** which extend through the slots **32*b*** and are threaded into the lugs **33*a*** located centrally on the member **33**. Platform springs **35**, adjacent the lugs **32*a*** and at right angles to the pivotal axis, are concave upwardly and support the member **33** on the base **32** as shown in Fig. 1.

As most clearly shown in Fig. 2, the member **33** has two large generally rectangular openings **33*b*** therethrough, spaced on each side of a central aperture **33*c***, and positioned generally to register with the insulator blocks **22** on the fixed plate **21** of the upper portion. The central opening **33*c*** provides access means to the fittings **31**, of course. Two contact supporting frames **40** and **41** are pivotally mounted, one within each opening **33*b***, by means of axially alined screws **42**, which are retained within slots **33*d*** through upstanding lugs **33*e*** integral with support member **33** adjacent each end of each opening **33*b***. The screws **42** are threaded into the lugs **40*a*** and **41*a*** on their respective supporting frames. The supporting frames **40** and **41** are generally rectangular in shape

(to fit within the openings 33) and each has a cross bar, 40*b* and 41*b* respectively, which creates two rectangular openings within each frame. Pivotally mounted within these openings are contact support levers, designated as 43, 44, 45 and 46. For the purpose of mounting, upstanding lugs 47 on each lever are provided with openings which register with similar openings in lugs 40*c* and 41*c* which extend upwardly from the frames 40 and 41 respectively adjacent the openings. Pins 48 pass through these registered openings and provide pivotal mountings for the support levers intermediate their ends. Platform springs 49, mounted one on each side of each frame 40 and 41, and at right angles to the pivotal axis 42—42, support the frames resiliently in a balanced position.

As seen in Fig. 4, which shows one of the four identical contact support levers, the lever 43 is bifurcated on opposite sides of its pivotal axis thereby providing parallel arms 43*a* at right angles to the pivotal axis and so spaced as to receive between them an insulator block 50. The insulator blocks 50, shown in Figs. 5 and 6, are all alike. Each has a horizontally extending U-shape groove 50*a* cut into the sides thereof, which allows the block to be slid into position between the arms of a contact support lever. They are prevented from sliding out by contact with the edges of the frames surrounding the levers. A contact 51, of proper convex-top configuration to fit the cup-shape fixed contact 25, is held in place on each insulator block 50 by a bolt 52 which extends through a central aperture 50*b*. The lower portion of each block 50 is grooved as at 50*c* to provide electrical protection for the nut 53 to which an electrical lead may be attached.

As will be apparent from the above description, pressure equalizing action is obtained by simple but very efficient means. Each of the contacts 51 of the pair mounted on each of the support levers 43, 44, 45 and 46, equalizes with the other contact mounted on the same lever by pivoting on the pins 48; each of the pairs equalizes with another pair (in a set of four) about the axis defined by the screws 42; each group of four equalizes with the other group of four by pivoting about the axis of screws 34. For example, assuming that the right hand side (Fig. 1) of the separable element 30 is tilted upward in the raising operation, then each of the contacts 51 mounted on the right end of each of the support levers 43 and 44 will equalize with the contact mounted on the left end of the lever. The two contacts mounted on lever 43 will then equalize with those on the lever 44 if necessary, and, as the fixed and separable elements are pulled together, a similar equalizing procedure will take place within the left-hand group of four. Finally, the two groups of four will be equalized with each other. Therefore, it is seen that tilting and moderate misalignment does not damage the units and firm engagement between all of the mating coacting contacts is obtained.

In Figs. 7, 8 and 9, there is shown a modification of the invention providing for pressure equalization between six pairs of contacts instead of eight pairs as in the first described embodiment. This embodiment comprises generally a member, normally fixed to a ceiling fixture, which bears six fixed contacts disposed in two groups of three each. These contacts coact with six adjustable contacts carried by a separable member in correspondingly arranged groups of three.

Referring to the drawings, the member which is normally fixed to the ceiling fixture comprises a plate 60 to which insulator blocks 61 are attached by the bolts 62. The insulator blocks 61 are arranged in two groups of three respectively on each side of the center and each has fixed to it a cup-shape downwardly opening contact 63 which bears an ear 64 to which an electrical lead may be attached.

The separable element comprises the bracket 68 having upstanding lugs 68*a* with slots 68*b* cut therethrough. Pivoted between the lugs 68*a*, on screws or bolts 69 which are threaded into lugs 70*a* and ride in the slot 68*b*,

is a supporting member 70 which has a central aperture 70*b* through which access may be had to the fittings 68*c* which are latching fittings as described at 31. Platform springs 71 mounted on the bracket 68 maintain the member 70 resiliently on an even keel. The member 70 also has two rectangular openings 70*c* spaced one on each side of the central opening, and pivotally mounted within each of the openings 70*c* is a contact support lever 73. For the purpose of mounting, upstanding lugs 73*a* on the levers 73 are provided with openings which register with similar openings in lugs 70*d* which extend upwardly from the member 70 adjacent the openings 70*c*. The pins 74 pass through these registered lug openings and provide pivotal mountings for the support levers intermediate their ends.

The contact support levers are in all respects like that described in connection with Fig. 4 and therefore no detailed description of them will be made. Each lever 73 is provided with parallel arms 73*b* between which is received an insulator block 75 which is identical to that previously described with reference to Figs. 5 and 6. After assembly, the insulator blocks 75 are prevented from sliding out of the levers 73 by contact with the surrounding sides of the member 70. A contact 77, of proper size and shape to fit the cup-shape fixed contact 61 is held on each insulator block 75 by a bolt 78 and nut 79 to which an electrical lead may be attached.

Mounted on each end portion of the member 70 and laterally outside of contacts 77 is a spring supported contact 84. A slot 70*e* opening outwardly at each end of member 70 is of proper shape to embrace the grooved portion 82*a* of an insulator block 82, in all respects like the blocks 50 or 75. However, rather than being securely bolted to the insulator block, the contact is spring mounted thereon. A long bolt 83 extends through the block and the contact 84 is retained at the top of the bolt by a nut 85. A coil spring 86, surrounding the bolt 83 and interposed between the contact 84 and the insulator block 82 urges the contact upwardly. Two nuts 87 threaded on the lower end of the bolt 83 limit its upward movement and also serve as retaining means for an electrical lead. The insulator blocks 82 are retained within the slots 70*d* by keeper bars 88, each of which is bifurcated at its tips and retained in position on the end edges of the member 70 by the pins 89.

Assuming that the separable element is tipped somewhat in the raising operation and its right-hand end (Fig. 7) is higher, the contact 84 on the exereme right will strike its mating fixed contact 63 first. It, being spring mounted, will adjust itself downwardly against the pressure of the spring 86, and allow the contacts 77 mounted on the right-hand lever 73 to meet their respective coacting fixed contacts. If the element 68—70 is tilted about its longer center line as seen in Fig. 8, the two contacts mounted on the right-hand lever 73 will equalize pressure between themselves by causing the lever to pivot about the pin 74. As the fixed and separable elements are drawn together, the same equalizing procedure takes place within the left-hand group, and finally pressure is equalized between the two groups by the pivoting action of the member 70 about the pins 69.

It is seen that the embodiments of the invention described provide simple but efficient means for the necessary adjustment of coacting pairs of contacts in a separable lamp hanger. Various changes may, of course, be made in detail and arrangement of parts without departing from the invention as defined by the appended claims. What we claim is:

1. Lamp hanger electrical contact supporting means comprising bracket means, a member having a pivotal mounting on said bracket means, a plurality of platform springs engaged between said bracket means and said member on opposite sides of said pivotal mounting, a plurality of more than two contacts carried by said member on each side of said pivotal mounting, and adjust-

ment means whereby to equalize pressure between contacts of said plurality of more than two contacts.

2. Lamp hanger electrical contact supporting means comprising bracket means, a member pivotally mounted on said bracket means in a transverse axis intermediate its ends, a group of contacts carried by said member on each side of said pivotal mounting, each said group comprising two pairs of contacts, said pairs being pivotally mounted with respect to each other, and each group of two pairs being pivotally mounted with respect to said member.

3. Lamp hanger electrical contact supporting means comprising bracket means, a member pivotally mounted on said bracket means in a transverse axis intermediate its ends, a group of contacts carried by said member on each side of said pivotal mounting, each said group comprising a plurality of pairs of contacts, and equalizing means whereby to equalize pressure between said pairs of contacts and between contacts of each said pair.

4. Lamp hanger electrical contact supporting means comprising bracket means, a member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, a group of contacts carried by said member on each side of said pivotal mounting, each said group comprising a plurality more than two contacts, at least two contacts of each said group being pivotally mounted with respect to each other.

5. Lamp hanger electrical contact supporting means comprising bracket means, a member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, two groups of contacts carried by said member respectively on opposite sides of said pivotal mounting, each said group comprising at least three contacts, two contacts of each said group being pivotally mounted with respect to each other and a third contact of each said group being separately adjustably mounted with respect to said member.

6. Lamp hanger electrical contact supporting means comprising bracket means, a member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, a plurality of platform springs engaged between said bracket means and said member on opposite sides of said pivotal mounting, a group of contacts carried by said member on each side of said pivotal mounting, each said group comprising at least three contacts, two contacts of each said group being pivotally mounted with respect to each other and a third contact of each said group being separately adjustably mounted with respect to said member.

7. Lamp hanger electrical contact supporting means comprising bracket means, a member pivotally mounted on said bracket means on a transverse axis intermediate its ends, said member mounted intermediate the ends of said brackets, a plurality of platform springs engaged between said bracket means and said member on opposite sides of said pivotal mounting, two contact support frames pivotally mounted on said member one on each side of said pivot and maintained in equilibrium by a plurality of platform springs, and two contact support levers pivotally mounted within each said support frame, each end of each said contact support lever bearing a contact.

8. Lamp hanger eletcrical contact supporting means comprising bracket means, a rectangular member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, a plurality of platform springs engaged between said bracket means and said member on opposite sides of said pivotal mounting, two rectangular contact support frames carried by said rectangular member one on each side of said transverse axis, each said contact support frame having a pivotal axis at right angles to said transverse axis, and two contact support levers carried by each said contact support frame one on each side of said contact support frame pivotal axis, each said lever having a pivotal axis parallel to said transverse axis, each said lever having a contact mounted on each end thereof.

9. Lamp hanger electrical contact supporting means comprising bracket means, a rectangular member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, said member having two rectangular openings therein one on each side of said pivotal mounting, a rectangular frame having clearance in each said opening and having a pivotal mounting on said member at right angles to said first-mentioned pivotal mounting, each said frame having two rectangular apertures therethrough one on each side of said second-mentioned pivotal mounting, and a lever in each said aperture and having a pivotal mounting on said frame parallel to said first-mentioned pivotal mounting, and an insulator block carried on each end of each said lever.

10. Lamp hanger electrical contact supporting means comprising bracket means, a rectangular member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends and having a slot at each end thereof, each said slot opening toward its associated end, said member having two rectangular openings therethrough independent of said slots and one on each side of said pivotal mounting, a lever mounted in each said opening and having a pivotal mounting on said member at right angles to said transverse axis, each said lever having its opposite ends bifurcated, an insulator block in each of said bifurcated lever ends and in each of said slots, said ends and the walls of said slots respectively supporting said blocks for sliding movement only in a direction along said lever and slot respectively, a keeper closing the end of each said slot, and a side wall of each said rectangular opening lying opposite each bifurcated lever end to hold the insulator block therein.

11. Lamp hanger electrical contact supporting means comprising bracket means, a member having a pivotal mounting on said bracket means on a transverse axis intermediate its ends, said member carried intermediate the ends of said bracket means, a plurality of more than two contacts carried by said member on each side of said pivotal mounting, and adjustment means whereby to equalize pressure between contacts of said plurality of more than two contacts, said adjustment means including in each of said plurality of contacts a resilient mounting between at least one of said contacts and said bracket means.

12. Lamp hanger electrical contact supporting means comprising bracket means, a rectangular member pivotally mounted on said bracket means on a transverse axis intermediate its ends, a plurality of platform springs engaged between said bracket means and said member on opposite sides of said pivotal mounting, two contact support frames carried by said member one on each side of said transverse axis, each said frame being pivotally mounted intermediate its ends about an axis at right angles to said transverse axis, the respective distal ends of each platform spring bearing against said member substantially in alignment with the mid-point of said last-mentioned pivotal mounting of each contact support frame, each said frame having contacts mounted one on each side of its pivotal axis.

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