

July 25, 1961

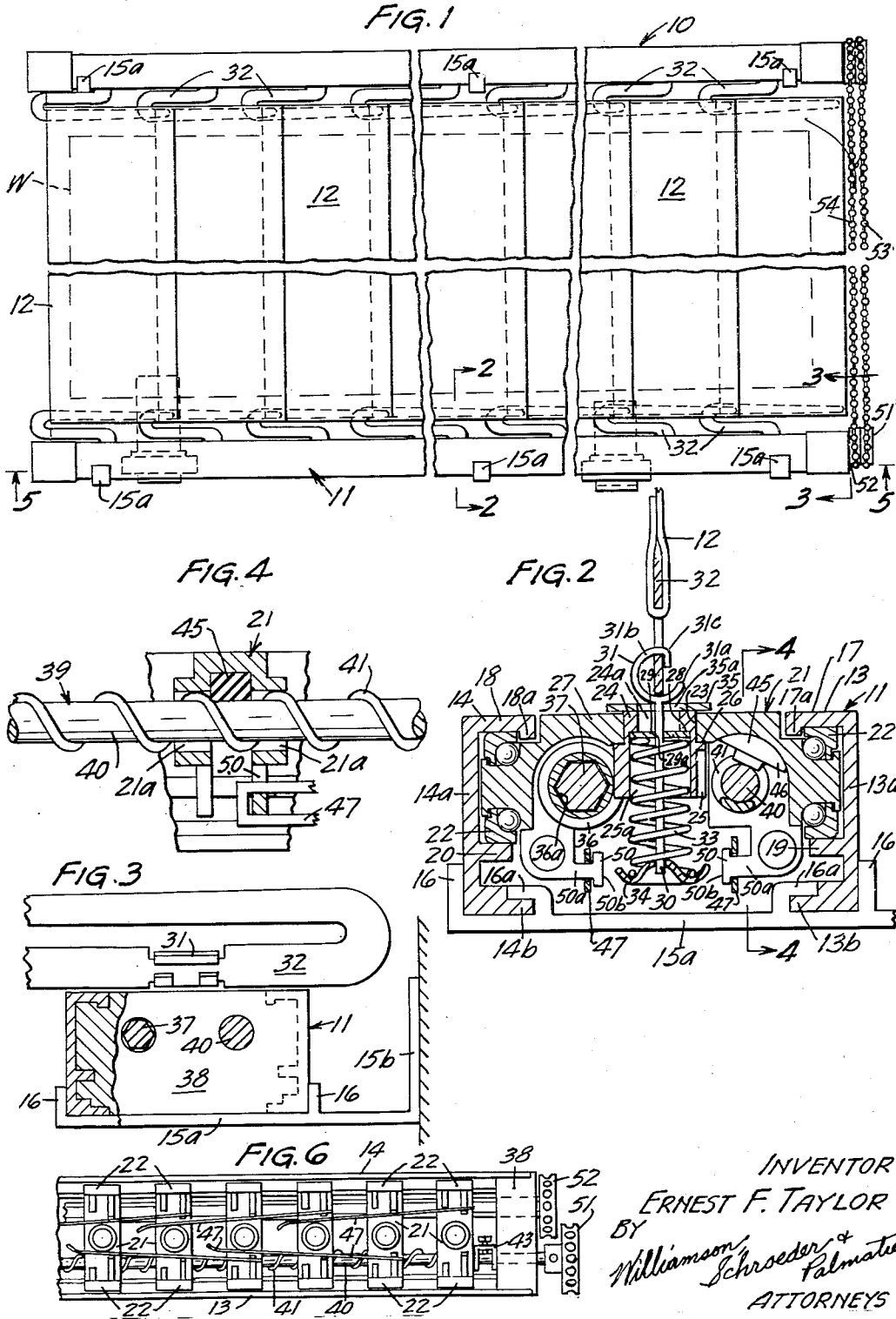
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WINDOW BLIND CONSTRUCTION

Filed Sept. 29, 1958

2 Sheets-Sheet 1



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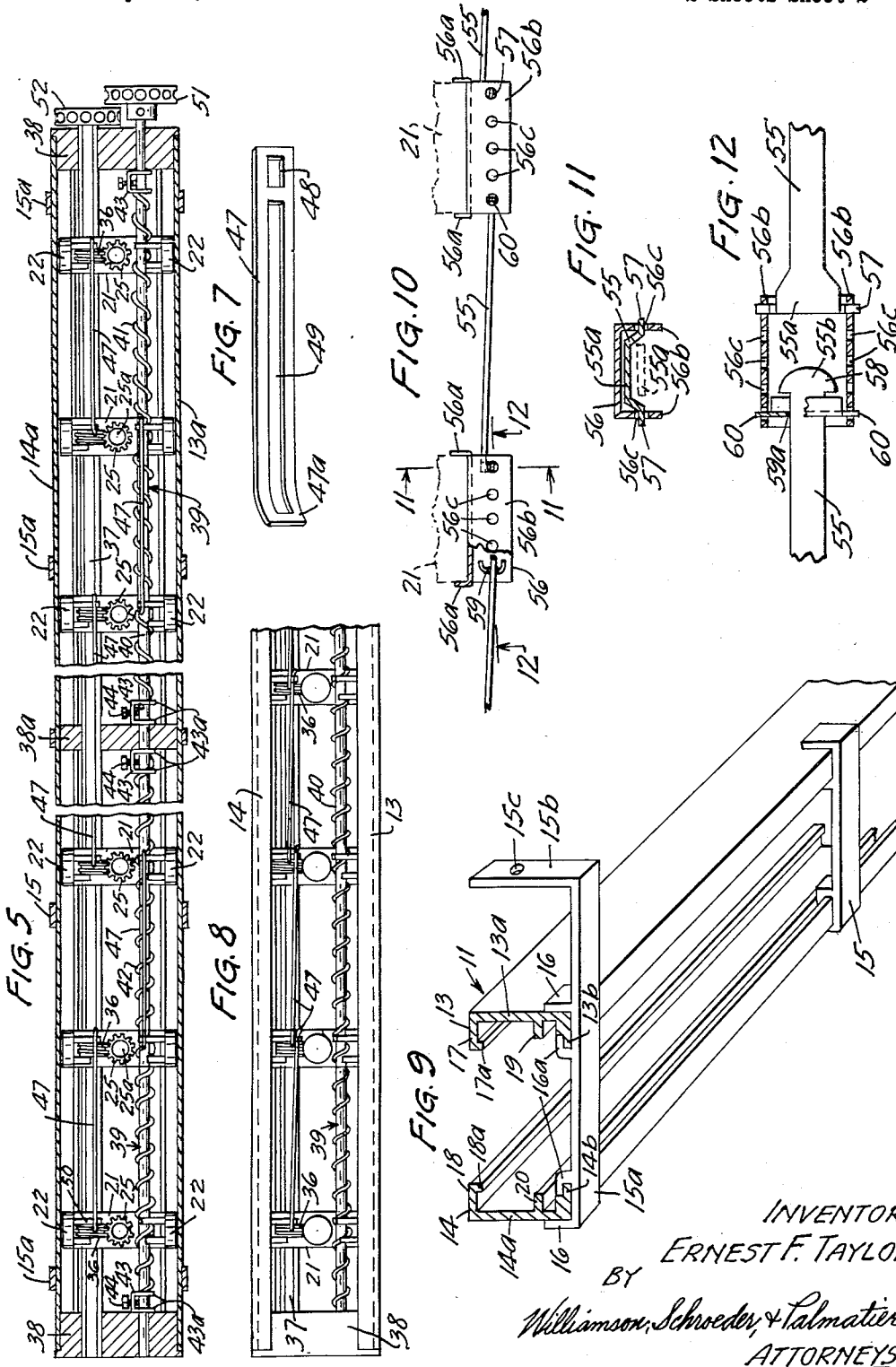
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WINDOW BLIND CONSTRUCTION

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1 Claim. (Cl. 160—173)

This invention relates to a window blind construction and more particularly relates to the apparatus of such a window blind construction for manipulating the louvers.

An object of the invention is the provision of new and improved window blind operating apparatus of simple and inexpensive construction and operation for moving the louvers of the window blind across the window opening and permitting the louvers to be turned on their individual axes.

Another object of the invention is to provide in a window blind construction, novel apparatus for operating the louvers to facilitate compact and readily accessible arrangement of the easily operating manual controls.

A further object of the invention is the provision in a window blind construction of improved apparatus which may be inexpensively manufactured and assembled for operation from either side of the window blind construction for positively and quickly moving the louvers across the window opening.

A still further object of the invention is the provision in a window blind construction of improved apparatus for spacing the louvers from each other when the louvers are drawn across the window opening so as to be equally spaced thereacross and for permitting convergent movement of the louvers with respect to each other when they are drawn across the window opening toward the edges thereof.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIG. 1 is a front elevation view partly broken away and showing the general arrangement of the window blind construction as applied adjacent a window opening;

FIG. 2 is a detail transverse section view taken on a vertical plane substantially at 2—2 in FIG. 1;

FIG. 3 is a detail section view, partly broken away, and taken on a substantially vertical plane as indicated at 3—3 in FIG. 1;

FIG. 4 is a detail section view taken on a substantially vertical plane as indicated at 4—4 in FIG. 2;

FIG. 5 is a detail section view taken on a substantially horizontal plane and looking upwardly, as indicated substantially at 5—5 in FIG. 1;

FIG. 6 is a detail section view similar to FIG. 5 and showing the carriages in a closely spaced relation with each other as contrasted to the widely spaced relation in FIG. 5;

FIG. 7 is a perspective view of one of the links utilized in this invention;

FIG. 8 is a section view, somewhat similar to FIG. 5, but showing a slightly modified form of the invention; and

FIG. 9 is a detail perspective showing frame structure with the carriages and other control apparatus removed for clarity of detail.

FIG. 10 is a detail side elevation view of another modification adapted for use with the present invention;

FIG. 11 is a detail section view taken approximately at 11—11 in FIG. 10; and

FIG. 12 is a detail section view taken approximately at 12—12 in FIG. 10.

In the form of the invention shown in FIGS. 1—7 in-

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cludes a pair of elongate frame structures, indicated in general by numerals 10 and 11, which are adapted for mounting along opposite sides of a window opening W for mounting and moving the opposite ends of the plurality of louvers 12. The frame structures 10 and 11 are substantially identical with each other and likewise the operating apparatus contained therewithin for controlling movement of the louvers 12 are substantially identical and a description of the lower frame structure 11 and the apparatus therein will suffice for an understanding of the entire construction. In the form shown, the frame structures 10 and 11 extend along the top and bottom sides of the window opening.

The frame structure 11 includes a pair of elongate and juxtaposed channel or frame members 13 and 14 which are secured in spaced and opposed relation with each other by a plurality of brackets 15 and 15a. The brackets 15a are provided with outwardly projecting wall-engaging flanges 15b which are apertured as at 15c to permit attachment of the bracket to the wall adjacent the window W as by screws. The frame members 13 and 14 have upright walls 13a and 14a and bottom flanges 13b and 14b which lie on the brackets 15 and 15a and are retained in position thereon as by upstanding flanges 16 and intumed lips 16a. The frame members or channels 13 and 14 also have upper flanges 17 and 18 respectively which cooperate with the intermediate, inwardly projecting flanges 19 and 20 respectively for defining wheel-confining tracks for supporting the carriages 21. The upper channel flanges 17 and 18 also have downturned lips 17a and 18a respectively for retaining the rotary bearing or carriage mounting wheels 22 in the tracks.

It should be particularly noted that the transverse spacing of the channels 13 and 14 will permit any debris or other material to fall completely between the channels and there will be substantially no accumulation of dust or other debris to interfere with the operation of the carriages 21 or other louver operating mechanisms hereinafter specifically described.

A plurality of carriages 21, each have the rotary bearings 22, are carried by the track-defining flanges of channels 13 and 14, and as best seen in FIG. 5, the carriages may be equally spaced along the side of the window opening, or may be closely spaced together as seen in FIG. 6 when the louvers are drawn across the window opening. Each of the carriages 21 is provided with means for mounting and revolving the end of a respective louver 12, and as best seen in FIG. 2, the carriage 21 is provided with a circular bearing aperture 23 in the top thereof into which extends the cylindrical barrel 24 of a worm gear 25, the teeth of which bear upwardly against an annular bearing surface 26 on the inner side of the upper carriage wall 27. The integrally formed worm gear 25 and cylindrical barrel 24 are bored as at 25a and 24a to define a shoulder surface 28 against which bears a friction washer 29. The washer 29 has a rectangular aperture 29a therein through which extends a rigid shank 30 having a corresponding configuration and having an attachment clip 31 formed on the upper end thereof for securing the louver in mounting hook 32 to the shank 30. The clip 31 has a forwardly projecting lower lip 31a and an arcuate upper portion 31b and an intumed upper lip 31c for retaining the hook 32.

A compression spring 33 bears upwardly against the friction washer 29 and bears downwardly against a wire retaining element 34 which projects through an aperture in the shank 30. A washer 35 having a circular aperture 35a therein is disposed between the end of barrel 24 and the clip 31 lays upon the upper surface of the carriage 21. Worm 36 is meshed with the worm gear 25 and has a hexagonal opening 36a therethrough.

A hexagonal shaft 37 extends longitudinally through

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the frame structure 11 and is journaled in bearings 38 which are mounted on the ends of the channels 13 and 14, and is also supported by a bearing 38a disposed medially between the ends of the channels 13 and 14 and is mounted thereon.

The present invention is also provided with means for moving the carriages 21 longitudinally of the frame structure 11, and in the form shown, such means include a rotary drive member, indicated in general by numeral 39. The rotary drive member 39 includes an elongated shaft 40 which is oriented parallel to the hexagonal shaft 37 and is also mounted in the end and center bearings 38 and 38a. The shaft 40 extends through apertures 21a in the carriages 21 and is rotatable therein. The drive member 39 is provided with a pair of spiralling carriage driving helices 41 and 42 which are disposed respectively on the opposite end portions of the shaft 40 and which are formed of spirally wound stiff wires which peripherally engage the shaft 40 in each spiralling convolution. The inner ends of the helical wires 41 and 42 are disposed adjacent each other at a position medially between the ends of the shaft 40 and are secured to the shaft 40 adjacent the bearing 38 by means of wire clamping brackets or clips 43, each of which is substantially U-shaped and has a pair of apertured ears 43a through which the shaft 40 extends, and a set screw 44 for clamping the wire against the shaft. The outer ends of the helical wires 41 and 42 are similarly clamped to the shaft 40 by clips 43. It will be noted that by loosening of the set screw 44, the clip 43 may be longitudinally adjusted relative to shaft 40 whereby to adjust the pitch of the helical wire.

A pair of carriages 21 which are next adjacent the center bearing 38a and are disposed substantially medially between the ends of the frame structure 11 are provided with non-rotatable followers 45 projecting inwardly and engaging the corresponding helical wire on the shaft 40. A pair of stationary lugs or nibs 46 are provided on the interior of the carriage housing for engaging the follower 45 and retaining the same in non-rotatable condition therein.

Means are provided for interconnecting the adjacent carriages so as to permit convergent movement of the carriages from the position shown in FIG. 5 into the position shown in FIG. 6 but to permit only limited divergent movement of the carriages so that when the carriages reach the spacing shown in FIG. 5 they will be restrained in that position. In the form shown, such means comprise a plurality of elongate and substantially rigid interconnecting links 47 each of which has an elongate longitudinally oriented aperture 48 therein and an elongate slot 49 extending into proximity with the aperture 48 and substantially through the entire length of the link to the opposite end 47a which is curved for purposes hereinafter more fully described. The links 47 are attached to the carriages 21 by tabs or lugs 50 which are formed integrally of the carriages and which have diminished neck portions 50a and elongate head portions 50b which are oriented transversely of the direction of movement of carriages 21 along the frame structure 11 and more specifically in the form shown, are oriented in a vertical position. The head portions 50b are of such size as to be received through the apertures 48 in the links 47, when oriented in alignment therewith and when the links 47 are swung to their normal horizontal positions, the links will be retained on their tabs 50 by their head portions 50b.

As best seen in FIG. 5, the links 47 extend between adjacent carriages and the tab 50 of one carriage projects through the aperture 48 and the tab 50 of the adjacent carriage projects through the slot 49.

It will be noted that each of the carriages has a pair of tabs 50 respectively disposed adjacent opposite ends of the carriage and respectively positioned below the shafts 40 and 37. In the form shown in FIG.

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5, adjacent links are alternately disposed adjacent alternate sides of the frame structure 11 and are attached to the opposite tabs 50 of a particular carriage for connecting that carriage with adjacent carriages.

Means are provided for operating the shafts 37 and 40 for controlling the louvers. In the form shown, such means include a pair of ball chain pulleys 51 and 52 respectively secured on the ends of shafts 40 and 37, and a pair of continuous ball-type chains 53 and 54 are trained over the pulleys 51 and 52 respectively and are also trained around the corresponding pulleys at the upper frame structure 10. It will be seen that the manually controllable chains 53 and 54 are arranged in compact relation with each other at one end of the window blind construction. It will be readily understandable that by slightly changing the lengths of the shafts 37 and 40, the pulleys could be placed at the other end of the window blind construction, and if desired, one chain could be placed at one end and the other chain could be placed at the other end.

In the operation of the present invention, the chain 53 may be manually moved to rotate the shaft 40 for turning the helix and causing the carriages which contain the followers 45 to move along the frame structures. As the carriages are moved outwardly toward the ends of the frame structures, the tabs 50 of the carriages will slide in the slots 49 of the links 47, and the curving ends 47a of the links will guide the links inwardly and around the tabs of the next adjacent carriages, substantially in the manner shown in FIG. 6. It will be noted that it is important for the helicoidal wires 41 to have the same pitch so as to move the carriages at each side of the window blind construction at the same rate of speed. If necessary to adjust the pitch, the wire clamping brackets or clips 43 may be longitudinally adjusted so as to be properly adjacent the pitch of the wire.

When the chain 53 is manipulated so as to draw the carriages inwardly toward the center of the window opening, the driven carriages will be moved by the gears and follower and subsequently the link 47 will draw the next adjacent carriage toward the center etc., until all of the carriages have been moved slightly toward the center at the proper spacings.

It is believed well to note that the links and the carriages are readily and easily assembled before the carriages are moved into the frame structure 11. The carriages 21 will be oriented with respect to the links so that the carriages and links may be attached, one by one, together and then the carriages will be moved inwardly through the end of the frame structure and onto the shafts and into the tracks.

The louvers 12 will be rotated by operating the chain 54 which causes shaft 37 to revolve for driving the several worms 36 in each of the carriages. The worm gears 25 are then driven, and the frictional relation between the surfaces 35a and the friction washers 29 will cause the washers 29 to revolve with the worm gears 25 and will thereafter cause the shaft 30 and louver 12 to revolve.

If it is desired to revolve only one of the louvers, the hook 32 may be manually revolved to turn the shaft 30 and friction washer 29 with respect to the worm gear 25. The manually rotated louver will be oriented properly with respect to the other louvers when the chain 54 is subsequently operated to rotate all of the louvers into closed condition, whereupon the single louver which had been previously manually turned will engage the adjacent louvers and hooks 32 and be restrained thereby until all of the louvers are again in parallel relation with each other.

The modification shown in FIG. 10 will replace the links 47 and tabs 50 which interconnect the carriages and prevent the carriages from being spaced from each other more than a certain predetermined distance. A plurality of links 55 are provided for interconnecting the carriages,

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and one end of each of the links 55 is secured to a respective carriage and the other end of the link 55 is slidable with respect to the next adjacent carriage. An inverted, channel-shaped attachment member 56 is provided for attachment to each of the carriages 21 as by tabs 56a. The depending, opposed sidewalls 56b are provided with a plurality of apertures 56c. One end 55a of each of the links 55 has a pair of pins 57 formed integrally thereof and adapted to project through a pair of the apertures 56b for securing the link 55 to the carriage 21. The other end portion 55b of each of the links 55 has an enlarged head or abutment portion 58 formed therein, and the end portion 55a is slidably carried in a guide 59 which is slotted at 59a to receive the link 55 therein, and the guide 59 is also provided with a pair of pins 60 projecting into a pair of the apertures in the member 56. When the carriages 21 are moved toward each other the end portion 55b will slide beneath the next adjacent link 55, substantially in the manner shown in dotted lines in FIG. 11. When the carriages 21 are drawn apart from each other, the abutment portions 58 of the links 55 will engage the guide 59 and will limit the sliding movement between the links 55 and the carriage so as to limit the next spacing between adjacent carriages.

It will be seen that I have provided a novel window blind construction wherein helixes are employed for positively controlling and easily driving the carriages along the side of the window opening. The present invention facilitates compact arrangement of the manually controllable chains at one end of the window blind construction or at the other end. Furthermore, it will be seen that I have provided a new and novel apparatus for interconnecting the carriages and permitting convergent movement of the

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carriages with respect to each other and permitting only limited divergent movement of the carriages so as to space the carriages along the side of the window opening.

It will, of course, be understood that various changes may be made in the form, detail, arrangement and proportion of the parts without departing from the scope of my invention which consists of the matter described herein and set forth in the appended claim.

I claim:

- Apparatus for attaching the end of a louver to the carriages of a window blind construction, comprising an elongate upright shank for attachment in the carriage and having on the end thereof a generally sleeve-shaped clip oriented transversely of the shank, said clip being longitudinally split at one side and having an inturned and substantially radially extending lip, and an attachment element adapted to be secured to the louver and having a bar with a diminished neck portion received through the split side of the clip and rotated against the inturned lip, whereby the attachment element and louver may be readily detached from the clip and shank.

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