

Feb. 20, 1934.

J. SCHMIDT

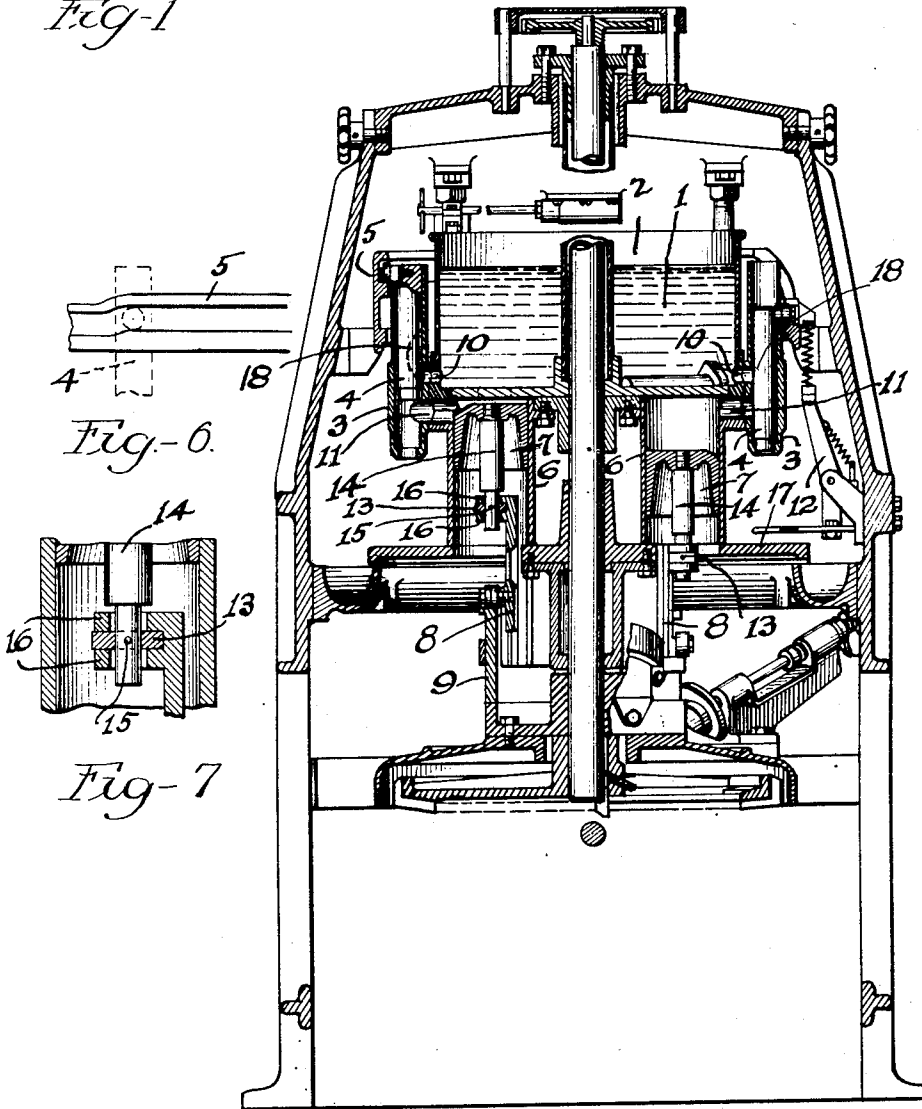
1,947,535

DRIPLESS NOZZLE FOR FILLING MACHINES

Filed Sept.- 30, 1932

2 Sheets-Sheet 1

Fig-1



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2 Sheets-Sheet 2

Fig-2

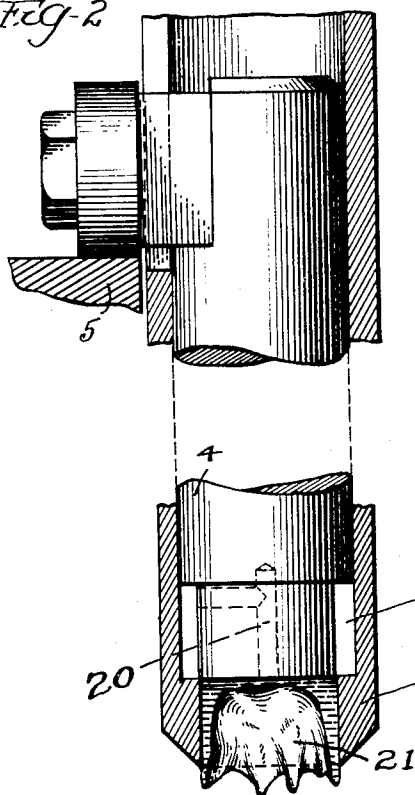


Fig-3

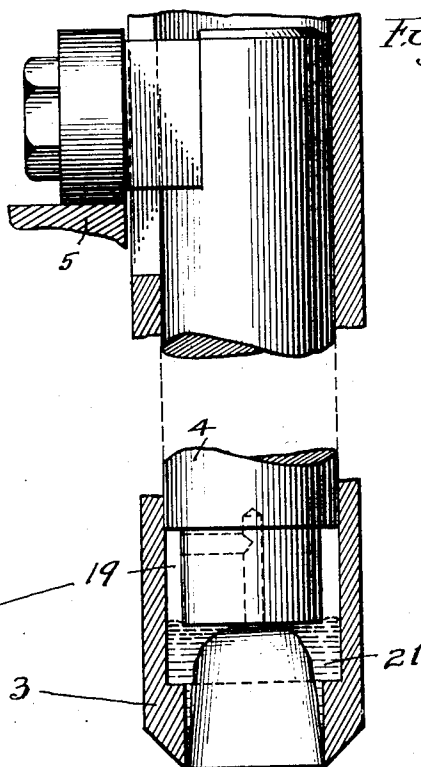


Fig-4

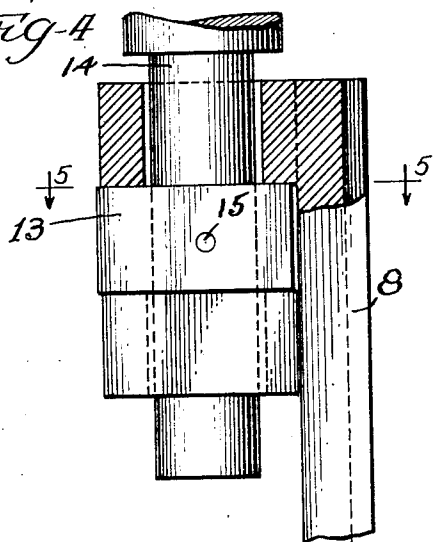
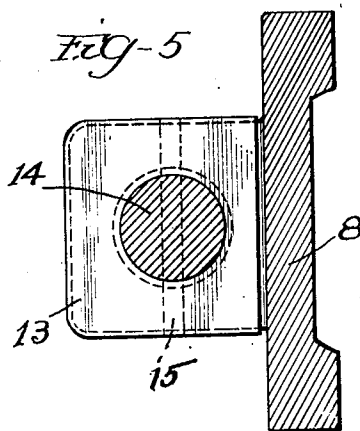


Fig-5



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UNITED STATES PATENT OFFICE

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DRIPLESS NOZZLE FOR FILLING MACHINES

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12 Claims. (Cl. 226—97)

This invention relates to a can filling machine and particularly to the filling nozzles used in connection with these machines.

Heretofore when filling plastic or semi-plastic substances with machines having filling nozzles there has been experienced considerable difficulty in cutting off the charge of material going into the cans so that there would be no drip to adhere to the filled can or that would contact with the unfilled can being placed after a filled can was removed from filling position.

Usually the material is measured by some suitable apparatus and discharged into the cans through channels leading to a filling nozzles that partially enters the filling hole in the top of the can or that enters the open end of the sanitary types of cans. Also usually the plastic material being filled into the cans has a more or less adhering nature and the last residue of the measured charge tends to adhere to the end of the plunger moving in the filling nozzle for ejecting the charge or stick to the rim of the nozzle, either in drops or rings, and being plastic it is sometimes also elastic so that this residue does not quickly and easily become detached from the charge that has been placed in the can, and as a consequence of this natural condition of the material some of this adhering material drop off of the nozzle and lands on the top of the can or catches on the flange edge of the sanitary cans and makes more or less of a messy condition to deal with, and these accumulations accruing during a day's run amount to considerable material that is usually a total loss aside from the annoyance occasioned by its presence on the tops of the cans during the subsequent operations of capping and sealing the cans.

The subject of this invention comprises an improvement in the operation of the feeding mechanism that discharges the plastic material into the cans through the nozzles and contemplates the provision of mechanism that will effectually stop the release and dripping of any material tending to hang on the end of the filling plunger or the nozzles.

Broadly this object is attained by providing an upward movement to the filling plunger just at the instant the can has been filled which will have the effect of pulling the drip and adhering material up into the mouth of the nozzle and hold it there by suction means during the removal of the filled can and the positioning of an empty can for filling.

Another feature of the invention resides in an

improved manner of mounting and centering the measuring chamber plunger and piston rod so that it is practically self centering at all times. This improvement greatly facilitates the assembling of the measuring chamber parts and removes the necessity of such close and accurate workmanship on these parts and also provides a self compensating means that will always realign itself during the life of the machine.

It is an object of the invention to provide improvements to filling machines wherein the drip of the filling nozzles will be controlled in a manner to prevent its escape from the mouth of the nozzles and soiling the cans.

It is also an object of the invention to provide an improvement to a filling machine wherein the adhering and drip residue remaining in the mouth of the filling nozzles will be drawn up into the body of the nozzle and be discharged therefrom with the next charge of material issuing from the nozzles.

It is a further object of the invention to provide an improvement in the operation of filling machine wherein a universal centering and aligning means will be provided for the connection between the measuring plunger and the operating slide connected thereto.

With such objects in view as well as other advantages inherent in the invention, consisting in the parts and combinations hereinafter set forth and claimed, it is to be understood that the several necessary elements, parts and combinations constituting the same may be varied in their proportions, placement and general arrangement without departing from the scope and nature of the invention, and in order to make the invention more clearly understood there are shown in the accompanying drawings, more or less diagrammatically, means and mechanism for placing the same in concrete form without limiting the improvements in their applications to the exact construction chosen to illustrate the invention.

In the drawings Figure 1 represents a vertical sectional elevation of a filling machine embodying the improvements forming the subject matter of this invention.

Figure 2 represents an enlarged detail of the filling nozzle on a filling machine with the filling plunger in a partially elevated position.

Figure 3 represents an enlarged detail of a filling nozzle showing the filling plunger in a more elevated position.

Figure 4 is an enlarged detail of the self-centering and aligning connection for the measur-

ing plunger which forces the measured charge of material into and through the filling nozzle.

Figure 5 is an enlarged detail of Figure 4 taken on substantially the line 5—5 of Figure 4 and clearly shows the loose connection employed to give a free self centering action to the piston rod of the measuring plunger.

Figure 6 indicates the raised portion of the actuating cam that controls the movement of the nozzle plunger and which lifts the plunger slightly just at the completion of the filling of the can to entrap the drip residue by suction.

Figure 7 is a further detail of the self centering arrangement for the measuring plunger.

The filling machine selected for demonstrating the application of the invention is of the continuous rotary type wherein the empty cans are standing in an upright position directly under the filling nozzles. Can centering devices are usually provided for accurately centering the cans to the nozzles, these have been omitted in this view to make the drawings less complicated. The machine shown is also of the nonadjustable type being adapted to only one height can, but it is understood that the improvements are fully applicable to any type of filling machine using filling means of this kind shown. Numerous other details of construction have been omitted from this drawing to simplify the showing all of which are well known in the art and do not seem necessary to a proper understanding of the invention.

The material being filled into the positioned cans is represented at 1, contained in the centrally disposed tank 2. Around the periphery of the tank 2 are arranged in spaced relation the filling nozzles 3, carrying the discharge plungers 4. The plungers 4 being reciprocated vertically in the nozzles 3 by means of the stationary cam track 5. Secured to the bottom of the tank 2 are measuring chambers 6 having therein reciprocating plungers 7, the plungers being operated by sliding connections 8 moved by the stationary cam 9. There are openings in the bottom of the tank 2 that register with the open ends of the measuring cylinders comprising ports 10, and 11. There is a no can no feed device controlling the feed of material which is always dependent on the presence of a can properly positioned under a nozzle shown generally at 12 which controls a section of the cam 5 in a manner to prevent the movement of the plunger 4 if no can has been positioned under a nozzle. This device is of a well known character on machines of this type and is clearly shown in other patents so has not been particularly detailed in this invention.

The universal centering and aligning connection forming a part of the measuring plunger assembly comprises a loosely mounted block 13 which is a close fit on the plunger rod 14 and is pinned thereto by the pin 15. The block 13 is slidably mounted between the flanges 16 on the top end of the slide 8, the holes in these flanges 16 for the passage of the plunger rod 14 are bored larger than the rod so that it may move laterally in any direction to self align itself with the plunger 7 and prevent any possibility of binding.

Having now given a brief detail description of the structure of this invention as applied to a commercial machine the operation will be described wherein further details will be referred to.

Operation

The invention will operate in the manner to be described when applied in substantially the way shown in the drawings but may operate somewhat differently if applied in a different manner.

Assuming that the tank has been filled with the material to be filled into the cans the machine may be started through suitable power means not shown. At the starting it is assumed that a supply of empty open end cans are available and will be successively fed to the machine by well known feeding mechanism not shown. As each can enters the machine, being placed upon the table 17, the mechanism 12 will be operated by the presence of a can to permit the elevation of the plunger 4 when it comes time for it to move under normal operation. When the can is first placed in position the plunger 4 may be in the position as at the right of Figure 1, or just about to raise under the action of the cam 5. The plunger 4 must be in the position as at the right of Figure 1 in order to permit the lowering movement of the plunger 7 in the measuring cylinder 6 to draw a charge of material from the tank 2 through the ports 10 and 11 and through the by pass in the plunger 4 indicated by the dotted lines 18 which represent a passage milled into the body of the plunger 4 and registering simultaneously with the ports 10 and 11 to make a complete passage from the tank 2 to the measuring cylinder 6.

As soon as the measuring plunger 7 has completed its downward movement and drawn a full charge of material from the tank 2 into the measuring cylinder 6 the plunger 4 will begin to rise and will rest at the position as of the left of the machine in Figure 1. As soon as the lower end of the plunger uncovers the port 11 the plunger 7 may begin to rise and force the charge of material out of the cylinder 6 through the port 11 into the positioned can through the nozzle 3, the material flowing under forced conditions until the plunger 7 has reached the top of its movement when there will be a residue of material remaining in the port 11 and the mouth of the nozzle 3 which might hang there if not affected by further forcing action. Just about this point of operation the plunger 4 begins to descend from its position as at the left of Figure 1 and forces the material out of the mouth of the nozzle 3 into the can which practically completes the filling operation.

As has been mentioned in the filling of plastic or sticky materials some material will adhere to the mouth of the filling nozzle 3 and to the end of the plunger 4 which material, depending on its nature, may continue to adhere to these parts or may drip therefrom and soil the top of the can or drop therefrom onto the bed plate 17 and smear up the machine and the oncoming cans.

One of the features of this invention now comes into play to prevent the dripping of any adhering residue of material in the mouth of the nozzle or on the end of the plunger. Just as soon as the plunger 4 has reached the end of its down stroke and has ejected all of the material from the mouth of the nozzle that will normally pass therefrom the plunger 4 is given a quick, short, upward movement by the cam 5 as is indicated by Figure 6 which has the effect of sucking the adhering material up into the mouth of the nozzle 3 and holding it there until

the filled can is removed and another can placed for filling.

The manner of producing a strong suction at this point of operation is accomplished by making the lower end of the plunger 4 of less diameter than the body of the plunger and making the mouth of the nozzle 3 of smaller diameter than the body of the nozzle so that when the small end of the plunger 4 enters the small end of the nozzle 3 there will be a chamber formed as at 19 Figure 2.

The small end of the plunger 4 is provided with a port 20 connecting with the chamber 19 so that as the plunger continues its downward movement the compression created in the chamber 19 will escape through the port 20 and assist in ejecting the material in the mouth of the nozzle.

When the plunger 4 has reached the lower end of its stroke and is given the quick up movement described the material adhering in the mouth of the nozzle 3 and on the end of the plunger 4 will have closed the outer opening of the port 20 so that the first upward movement imparted to the plunger 4 will immediately create a suction in the chamber 19 tending to suck the material on the end of the plunger up into the port 20 and also pulling it with the plunger movement up into the mouth of the nozzle 3 which quite effectually prevents and stops any tendency of the residue of material to drip or fall from either the nozzle or plunger.

Inasmuch as the plunger 4 must remain in a down position for a time while the measuring plunger 7 is again filling the chamber 6 the cam 5 holds the plunger 4 in the slightly raised suction position while this filling is going on and as soon as the chamber 6 has received a new charge of material the plunger 4 is moved upward by the cam 5 until in the position as at the left of the view in Figure 1 when the cycle of operations described will be repeated.

The material sucked up into the nozzle 3 by the short movement of the plunger 4 as described will gather in the nozzle somewhat as shown in Figure 3 when the plunger 4 reaches its highest position, and since its plastic condition tends to hold it together in a body the suction created in the enlarged chamber 19 due to the full upward stroke of the plunger 4 will hold this body of material 21 in the nozzle until the next charge is being ejected from the chamber 6 when it will be mixed with the new charge and passed into the next can. This residue of material does not materially affect the volume of the measured charge going into each can because the residue remaining in the nozzle after each charge is substantially uniform.

The self centering device for the plunger rod 14 seems to have been sufficiently described in the detailed part of the specification so that little more may or need be said about it. The reason for a self adjustment at this point is due to the difficulty in ordinary commercial manufacture to machine the slides and position the cylinders always in exact alignment so that when the rods which are screwed tightly into the plungers 7 engage with the slides 8 they will not cause a binding of the plungers 7 in the cylinders 6. By means of the construction shown slight variations in the machining of the parts is permissible and yet when the parts are assembled they will align themselves so there will be no binding of the associated parts.

Referring further to the action of the mate-

rial dripping from the nozzles it should be mentioned that where a material is being handled that is not of a particularly sticky or adhering nature the most of it will drop from the nozzle into the filled can before removal of the can and the slight amount remaining on the nozzle and plunger may not be sufficient to close the port 20 to create a suction in the chamber 19. In such a case the slight upward movement of the plunger will naturally carry the particles adhering around the edge of the nozzle up into the nozzle which brings the material into contact with a larger surface and it will adhere thereto without the suction desirable for larger quantities.

It might also be mentioned that the action of the plungers 4 are discontinued automatically when a can fails to appear at a filling station under one of the nozzles. If the mechanism 12 is not actuated by the presence of an empty can the plunger 4 at the right of Figure 1 will remain in the position shown. This is necessary because the measuring plungers 7 will act to draw a charge of material into the chamber 6 at each cycle of the machine, and to discharge this material before the cycle is completed, so by holding the plunger 4 in the position at the right of Figure 1 the measured charge will simply be projected back into the tank through the ports 10, 11, and 18 and no material will be lost or spilled onto the machine due to the absence of a can at this station.

What I claim as new and desire to secure by Letters Patent is:

1. A filling machine having a series of filling nozzles and movable plungers therein, a source of material supply, means for drawing a charge of material from said supply, a measuring chamber for receiving said charge, said means moving said charge from said chamber into a positioned can through said nozzles, a suction chamber formed adjacent the mouth of said nozzles and said plungers whereby material adhering to the said nozzles and the ends of said plungers will be prevented from dripping therefrom by suction created in said suction chamber.

2. A filling machine having a filling nozzle and a plunger movable therein, a source of material supply, means for separating a charge of material from said supply and discharging it into a positioned can through said nozzle, the plunger in said nozzle being moved to eject the final portion of said charge from said nozzle, a suction chamber adjacent the discharge end of said nozzle and said plunger in which a suction is created when said plunger is elevated to cause material adhering to the said nozzle and plunger to remain in contact therewith.

3. A filling machine having a filling nozzle and a plunger movable therein, a source of material supply, means for separating a charge of material from said supply and passing it into a positioned can through said nozzle, means for imparting a reciprocating movement to the plunger in said nozzle to eject material from the end of said nozzle, a suction chamber adjacent said nozzle in which a suction is created by the movement of said plunger and the presence of material on the end of said plunger.

4. A filling machine having a filling nozzle, a plunger movable in said nozzle, a source of material supply, means for separating a charge of material from said supply and passing it into a positioned can, means for imparting an intermittent reciprocating movement to said plunger

to eject material from said nozzle, a chamber formed in said nozzle body by the presence of said plunger, the presence of material adhering to the end of said plunger causing a suction to be formed in said chamber when said plunger is reciprocated.

5. A filling machine having a filling nozzle, a plunger movable in said nozzle, a source of material supply, means for separating a charge of material from said supply, means for directing said charge into a positioned can, means for imparting intermittent movement to said plunger, a chamber formed in said nozzle body by the presence of said plunger when in its down position, the presence of material in the end of said nozzle and on the end of said plunger causing the creation of a suction in said chamber when said plunger is given an upward movement.

6. A filling machine having a filling nozzle, a plunger movable in intermittent stages in said nozzle body, a source of material supply, means for separating a charge of material from said supply, means for directing said charge into a positioned can, means for imparting intermittent movement to said plunger, said plunger having a portion of lesser diameter and said nozzle having a portion of lesser diameter, the coaction of said portions forming a suction chamber adjacent the mouth of said nozzle, the presence of material in the mouth of said nozzle and on the end of said plunger acting to create a suction in said chamber when said plunger is moved.

7. A filling machine comprising a tank carrying a supply of filling material, a chamber adjacent said tank and connected thereto, means in said chamber for drawing a charge of material therein from said supply, said means comprising a reciprocating plunger, a slide member for reciprocating said plunger, a means for moving said slide member, a connecting rod between said plunger and said slide member, a slidable means connecting said rod to said slide member to permit of proper alignment between said parts.

8. A filling machine comprising a tank carrying a supply of filling material, a chamber adjacent said tank, a plunger for drawing a charge of material therein from said supply, a connecting rod fixedly attached to said plunger, a slide member for actuating said plunger, a loose connection between said slide member and said connecting rod to permit said rod to align itself with said plunger.

9. A filling machine having a filling nozzle and a plunger movable therein, a source of material supply, means for separating a charge of material from said supply and discharging it into a positioned can through said nozzle, the plunger in said nozzle being moved to eject the final portion of said charge from said nozzle, a suction

chamber formed in the nozzle body adjacent the discharge end of said nozzle and said plunger and by the presence of said plunger and in which a suction is created when said plunger is elevated, said suction chamber communicating with the outer end of the plunger whereby the resulting suction upon withdrawal of the plunger causes material adhering to said nozzle and plunger to remain in contact therewith.

10. A filling machine having a filling nozzle and a plunger movable therein, a source of material supply, means for separating a charge of material from said supply and discharging it into a positioned can through said nozzle, the plunger in said nozzle being moved to eject the final portion of said charge from said nozzle, a suction chamber formed in the nozzle body adjacent the discharge end of said nozzle and said plunger, a passageway leading from the end of said plunger to said chamber so that when material in the end of the nozzle closes the passageway and the plunger is elevated a suction is created in the said chamber to hold the adhering material against the end of the plunger and in the nozzle opening.

11. A filling nozzle for can filling machines comprising a nozzle body having an interior bore terminating in an open discharge port of reduced diameter and having an inlet port communicating with said bore, a plunger reciprocable in the bore of said nozzle body and having a reduced portion projectible into said discharge port and cooperable with the nozzle bore to form a suction chamber interiorly of the nozzle when the reduced portion of the plunger projects into the discharge port, said suction chamber communicating with the outer end of the plunger whereby the resulting suction upon withdrawal of the plunger minimizes dripping of material adhering to the nozzle and the end of the plunger.

12. A filling nozzle for can filling machines comprising a nozzle body having an interior bore terminating in an open discharge port of reduced diameter and having an inlet port communicating with said bore, a plunger reciprocable in the bore of said nozzle body and having a reduced portion projectible into said discharge port and cooperable with the nozzle bore to form a suction chamber interiorly of the nozzle when the reduced portion of the plunger projects into the discharge port, said plunger being provided with a passage extending from its outer end face to the surface of its reduced portion whereby to form a communication between said suction chamber and the outer end of the plunger to minimize dripping of material adhering to the nozzle and the end of the plunger when the latter is withdrawn into the nozzle.

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