Sept. 28, 1937. E. J. BUCZKOWSKI 2,094,059

SHINGLE

Original Filed Dec. 23, 1930 2 Sheets-Sheet 1

Fig. 1.

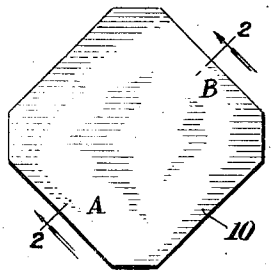


Fig. 2.

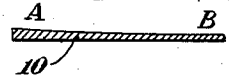


Fig. 4.

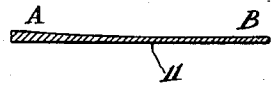


Fig. 3.

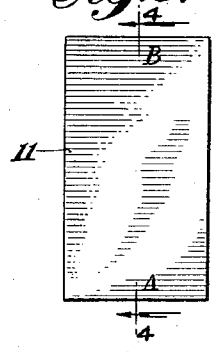


Fig. 10a.

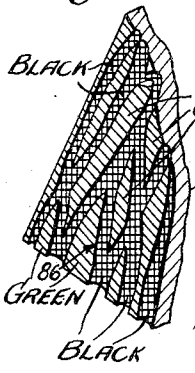


Fig. 7.

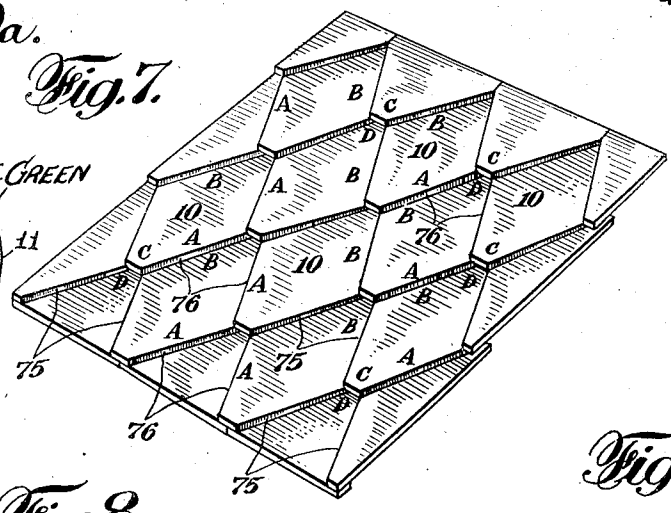


Fig. 8.

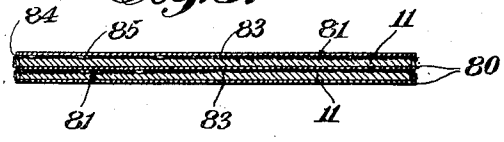


Fig. 10.

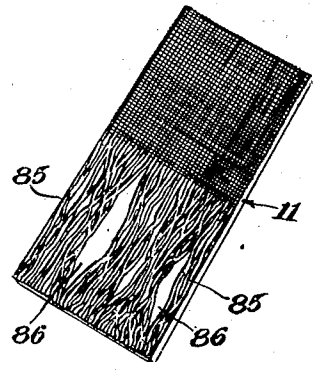
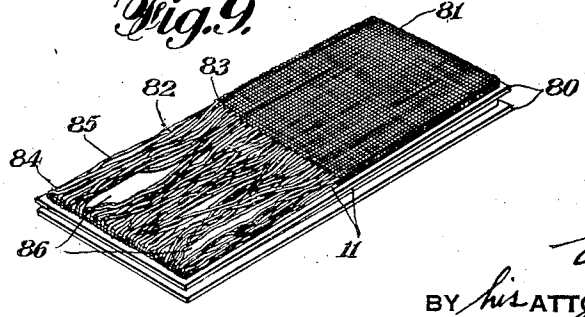


Fig. 9.



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Sept. 28, 1937. E. J. BUCZKOWSKI 2,094,059

SHINGLE

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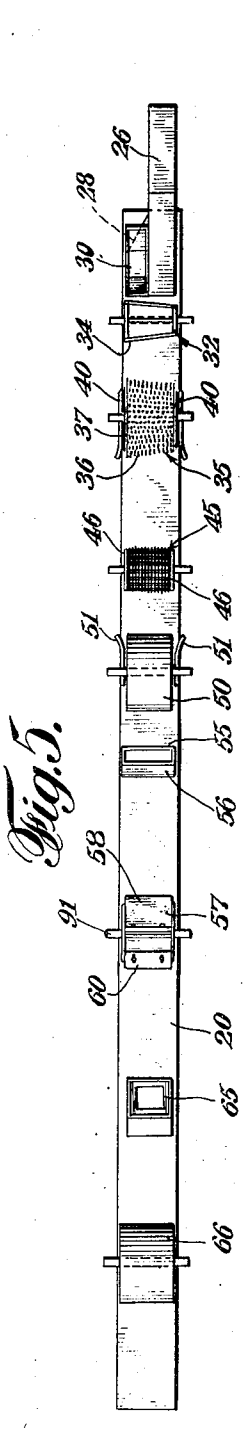


Fig. 5.

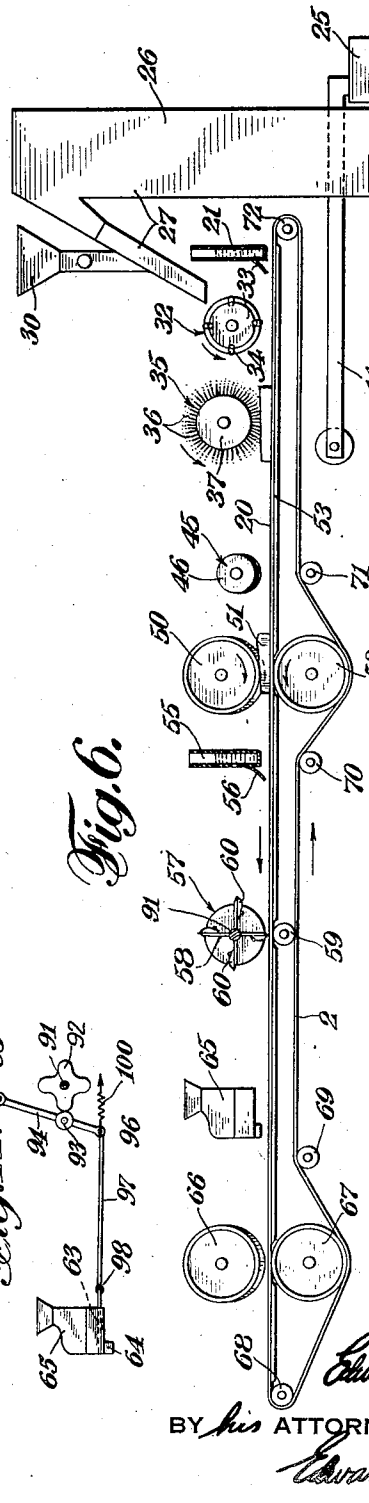


Fig. 6.

Fig. 14.

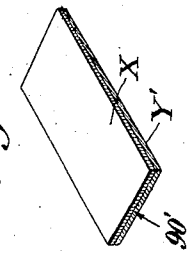


Fig. 13.

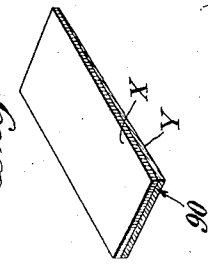


Fig. 12.

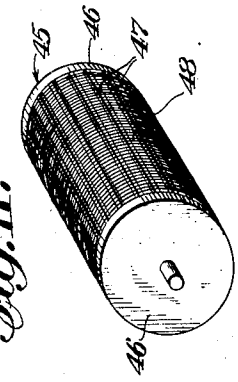


Fig. 11.

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UNITED STATES PATENT OFFICE

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SHINGLE

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Application December 23, 1930, Serial No. 504,243
Renewed December 23, 1935

2 Claims. (Cl. 108—8)

This invention relates to the formation of tapered articles, particularly shingles, from asbestos cement composition.

The object of the invention is to provide a composition article that will be inexpensive to manufacture and attractive in appearance and strong and durable in use.

In the accompanying drawings illustrating the invention

Fig. 1 is a plan view of a shingle formed in accordance with this invention,

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

Fig. 3 is a plan view of a modified form of shingle,

Fig. 4 is a sectional view thereof on line 4—4 of Fig. 3,

Fig. 5 is a diagrammatic plan view of apparatus for forming shingles in accordance with this invention,

Fig. 6 is a diagrammatic elevational view of said apparatus,

Fig. 7 is a view illustrating a roofing formed of shingles shown in Fig. 1,

Fig. 8 is a diagrammatic sectional view showing the method of decorating the shingle surfaces,

Fig. 9 is a perspective view of a shingle with the decorating layer positioned on its surface,

Fig. 10 is a perspective view of the completed shingle,

Fig. 10*a* is a perspective view of a portion of he shingle of Fig. 10 on enlarged scale.

Fig. 11 is a perspective view illustrating one form of air release roll used in the apparatus shown in Figs. 5 and 6,

Figs. 12 and 13 are perspective views of modified forms of shingles, and

Fig. 14 is a diagrammatic side view of a modification of the coloring means.

In the specific embodiments of the invention shown in the drawings, the shingle 10 of Fig. 1 is of asbestos cement material and of generally square form tapered so that the lower rectangular portion A is thicker than the upper rectangular portion B. Similarly in Fig. 3 the shingle 11 of generally oblong form has its portion A thicker than the remainder B. The upper surface of these shingles may be either plane as indicated in Figs. 3 and 4 or otherwise shaped with any desired contour giving the generally tapered form with thick portion A and thinner portion B.

In such a shingle the thinner portion tends to be the weaker, and the thicker portion has ample strength, and in order to more nearly equalize the strength of the shingle throughout the shingle of this invention may be varied in composition to have stronger material at its thinner portion B than at its thicker portion A. For instance, the proportion of cement in the thinner portion B may be greater than that in the thicker portion A.

In the particular shingle forming apparatus shown in the drawings, an endless belt 20 is provided on a table (not shown) and carrying the shingle composition on its upper surface. Beginning at the right end, (Fig. 6) the belt 20 moving from right to left, as indicated by the arrows, is first wetted on its upper surface with a film of water from the apron of supply tank 21 so that water may readily reach the bottom of the shingle material as it is deposited and formed on the belt.

The main mixer of asbestos cement material is designated 25 and has dry asbestos fibres and cement and filler material supplied to it, and after thorough stirring this material is delivered to a bucket elevator in tower 26 which elevator carries the mixture up and discharges it downward through the slanting chute 27 arranged and directed so as to guide the bulk of the material to be delivered to the left or large size of the taper, the remainder of the material in section 28 of the chute spreading out from the main flow. This side section 28 may also have a variable auxiliary supply of cement or cement asbestos material from the hopper 30 adding to the flow through the spread section 28 cement or a mixture of cement and asbestos without any filler so that the proportionate amount of the live cement or asbestos fibres in the thinner portion of the shingle will be increased and the filler correspondingly reduced.

Both the main and side flows from chutes 27, 28 respectively, are deposited side by side in a continuous mass on the belt 20 just in front of the leveling roller 32 which rotates counterclockwise (Fig. 6) and is formed by end castings 33 and cross tubes 34 set at a taper with relation to the axis of rotation to produce a tapered deposit on the belt 20. This leveling roller 32 permits only a predetermined height of material to proceed with the belt to the picker roll 35, and the rotation of the leveling roller 32 retains a constant excess of material directly in back of it.

The picker roll 35 comprises a large number of wirelike nails 36 driven into the tapered periphery of drum 37, and this roll running counterclockwise (Fig. 6) at relatively high speed (100

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R. P. M.) produces the finished taper on the material delivered from the leveling roller **32**. The picker roll is accurately adjusted so that the desired thickness and taper of shingle is formed. All excess material is scraped off by the side guides **40** at the picker roll and passed down to the screw conveyor **41**, which returns it to the mixer **25** to be recirculated through tower **26** to the supply on the belt.

The material leaving the picker roll is fluffy and light, and while it is wetted at its lowermost particles on the belt it contains a great deal of entrained air in tenacious films around the particles and fibres. I have found it advantageous to compact this material and force out or release some of the air before pressing the mass to form the shingle surfaces. To thus remove the intermingled air the material on the belt is passed under the air release roll **45**, which reduces the thickness of the deposited material by permitting the escape of the entrained air through the mesh periphery of the roll. This roll comprises the end members **46** and cross strips **47** and peripheral wires **48**, and the weight of the rolls presses the wires sufficiently into the material to have the desired effect. (See Fig. 11.)

The belt then carries the material under the first pressure roller **50** which further reduces the thickness and applies pressure sufficient to give a definite smooth surface to the composition. The roll guides **51** also determine the width of the shingle strip and guide any excess material at the edges in under the roll. The roll **50** is of large size and has its pressure increased to any desired point by adjustable springs or levers, or by adjustable weights pressing down on the shaft of the roll.

All of these parts are adjusted to the desired taper of the material, the rolls **32** and **35** being tapered and rolls **45** and **50** being tipped to rotate on axes properly inclined to follow the taper of the material. The lower roll **52** opposite the upper roll **50** holds the belt **20** against the pressure of the upper roll, the periphery of this roll **52** fitting up through an opening in the supporting table **53** along which the belt **20** runs. Preferably this roll **52** is of cylindrical shape retaining the belt in substantially horizontal position as it passes under the roll.

Water is next added to the material by means of a waterbox **55** having the apron **56** flowing a sheet of water on to the material as it passes under the apron.

The wetted sheet being of a determined width is next cut into predetermined lengths to determine the final dimensions of the shingle. A rotary cutter **57** has its blades **58** spaced peripherally the desired distance apart so that as the end disks of the cutter are rotated by contact with the belt **20** the blades will be carried down to cut through the material on the belt, a cooperating roll **59** being provided to hold the belt against the cutter edge. Preferably each of the blades **58** will be provided with a sliding stripper **60** yieldingly held outward and adapted to slide backward on contact with material and to slide forward to hold the material in position on the belt as the cutter leaves the material.

After cutting the wetted material on the belt is colored from the color box **65**, for instance, by a powdering of colored material distributed in desired manner over the upper surface of the shingle or such portions thereof as are to be colored.

For instance as shown in Fig. 14 the color discharge outlet **64** of color box **65** may have the slide **63** movable so as to vary the color deposit as the shingle passes beneath the outlet. For this purpose the shaft **91** of the cutter **57** carries the cam wheels **92** on each side engaging rollers **93** of levers **94** fulcrumed at **95** and pivoted at **96** to the rods **97** connected at **98** to the slide **63**. Normally the spring **100** will hold the parts toward the right and with the color discharge opening **64** free, but at timed intervals the cams **92** engage the rollers **93** to turn the lever **94** clockwise and move the slide **63** toward closed position.

For instance, the edges of the shingle on each side of the cut may be lighter in color, or not colored at all, by timing the closing of the slide **63** to shut off the outlet **64** as these edges pass the outlet. By changing the shape of the cams **92** and their angular adjustment with relation to the shaft **91**, any desired distribution of the color over the shingle from cut edge to cut edge may be obtained.

The side edges of the shingle may have the coloring control by adjustment of the length of the discharge slot of outlet **64**. For instance by blocking off this slot to shorten it, the side edges of the shingle may be weakly colored, or not colored at all.

Final pressure at the machine is applied to the shingles by means of the roll **66** and its cooperating roll **67**. The upper pressure roll **66** is of generally cylindrical shape and with its axis inclined so as to incline the surface of the roll to correspond with the taper of the shingle. This pressure roll **66** further reduces the thickness and compacts the material, and in particular forms a close adhering bond between the colored matter and the wet material on the belt.

The individual shingles are then removed one by one on a steel strip plate slid over the surface of the belt and under the shingles at a point directly in front of the final pulley or roll **68**. The pulleys or rolls **68**, **69**, **70**, **71** and **72** permit the operation of the belt in continuous form, the belt being driven by means of power applied to the large roll **52**.

When a shingle of generally square outline is to be produced, the cutter **57** is used having its blades **58** so spaced as to give a distance between cross cuts substantially equal to the distance from side to side of the shingle material on the belt. When a shingle of rectangular form as shown in Fig. 3 is to be formed a cutter **57** is used for its cutting blade edges more closely spaced. In other respects the operation of the machine in forming the shingle of Fig. 1 or Fig. 3 is substantially the same.

The contours of the surfaces of the various rolls **35**, **45**, **50** and **66** may be altered to give any desired convexity or concavity to the surface of the shingle. For simplicity in description surfaces having straight line elements have been assumed, but it is obvious that if these rolls, and particularly rolls **50** and **66**, are made convex, the surface of the shingle will be correspondingly concave, for instance as shown in Figs. 2 and 4.

After removal from the machine and before initial set of the cement, the shingles are pressed between surfaces conforming to their final shape. Then they are cured by being kept moist during the remainder of the setting and are then ready for use.

I have found it advantageous to provide a decorative surface by pressure after the formation of the shingle and while or before it is under-

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going its initial set. Each shingle 11, for instance, as it is removed from the machine on its steel plate 80 (Fig. 9) has a heavy fabric layer 81 placed over it and pressed against its surface by the under surface of the plate 80 above it in the final pile in which the shingles with the interposed plates are assembled for pressing. The fabric strip 81 is woven of heavy threads or yarns, and portions of these threads are removed to interrupt the surface of the fabric and give a decorative design effect that may be very widely variable.

For instance by removing all of the horizontal lengths from the portion of the fabric piece as indicated at 82 only the vertical threads or yarns will remain. Consequently, when the fabric pieces are placed on the shingles and with the portions 82 on the thickened portions of the shingles to be exposed on the roofing, the threads or yarns during the pressing will form deep lines in highly variable manner in the surface of the shingle. The particular effect of these lines is to give an appearance corresponding to weathered shingles.

Other means such as wires, dies and the like, may be used to give the lined effect but with the flexible fabric material the free lengths of the strands between the end portions 83, 84 will arrange themselves in infinitely variable manner as the strips are placed on the shingles. Consequently, no two shingles will be the same in appearance, and the striped areas 85 and blank areas 86 will be distributed and entwined in different manner in each case. At the same time the characteristic line effect will be shown by all of the shingles thus marked.

When the deep closely spaced lining extends longitudinally as shown, it is positioned substantially in vertical planes on the roof and is particularly effective in giving a weathered appearance. As the direction of lighting changes during the day the shadows shift, but the line effect is permanent and characteristic, and adds depth and softness to the coloring.

Where a "moss" effect is desired the shingle will preferably be made with a dark under color such as black, for instance by coloring the material with a black pigment distributed through it or by depositing the black on the surface of the strip on the belt. Then over this dark coloring is superposed a green coloring and the lining gives the final moss appearance as of a weathered wood shingle, as illustrated in Fig. 10*a*, for instance, showing a portion of Fig. 10 in enlarged scale.

In laying a roof with shingle 10 of Fig. 1 the shingles are placed with their diagonal axes vertical and with the thick portion A downward either to the right or left. In either position the lower point C of the shingle is thicker than the upper point D thereof, and the lower portions C overlap the upper portions D (Fig. 7). Preferably the tapered edges 75 of the portions D will face each other on the roof and similarly the thickened untapered edges 76 will also be facing, and to effect this in each course the shingles will alternate in position so that a shingle with its thick edge 76 to the right will have on each side of it a shingle with its thick edge 76 to the left. In such positions the shingles will fit and overlap in proper relation to give weather-tight joints, and in such a roofing the taper or thickening of the shingle renders the exposed edges of the shingles thick and prominent, giving an appearance of depth to the roofing. With the shingle 10 of Figs. 1, 2 and 7 the taper of the shingle runs diagonally 45° to the vertical and either right or left, and this gives a variable effect as shown in Fig. 7.

In laying the shingles of Fig. 3 these are simply arranged in usual manner in overlapping rows with the thickened portions A overlying the thinner portions B of the shingles underneath. Where these shingles are decorated, as shown in Fig. 10 for instance, the markings will give depth and variability to the exposed portions of the shingles and avoid monotonous flat effects. It is obvious that the marking resulting from the process illustrated in Figs. 8 and 9 may be widely varied depending upon the way in which the flexible decorating layer is formed; the lining instead of being vertical may be horizontal or diagonal, or both, and may be interrupted by narrow or wide cross marks positioned as desired, the particular form of fabric marker being merely illustrative of one specific application.

The shingle of this invention is simple and inexpensive in formation and strong and durable in use. The surface markings are deep and permanent and give an appearance to the exposed portion of the shingle that is similar to thatch or weathered wooden shingling. As previously explained the thinner portion of the shingle may be made of stronger composition than the thick exposed end so as to give a substantially even strength throughout the length of the shingle, the extra filler material being progressively increased toward the thicker end and evenly distributed throughout the body of the thicker filler from face to face.

If preferred the surplus filler material, such as sand or used cement, may be concentrated mainly on one surface or the other of the thick exposed end, and, if on the other face, may be used to give a coarse granular effect there. To effect this concentration of the surplus filler over one of the faces of the shingle it is only necessary to position the supply of surplus filler material preferably in advance of the picker roll 35 with means to deposit this filler material on the belt ahead of the deposit of the dry asbestos-cement-filler composition, or the deposit may be made on the top of the previously deposited asbestos-cement-filler.

The resulting shingle will then have a substantially homogeneous composition throughout one portion, and its other portion will have a different composition with a higher percentage of filling material. For instance, as shown in Figs. 12 and 13, the tapered shingle 90 or the untapered shingle 90′ may be formed with a layer X (vertically lined) of asbestos cement material having a relatively low filler content and with another layer Y or Y′ (diagonally lined) of asbestos cement material having a relatively high filler content, the two layers merging very gradually together so as not to have any sharp line of demarcation between them. In the shingle 90 of Fig. 12, it is obvious that the shingle may be reversed in position to have the layer Y either lowermost as shown, or uppermost in reversed position. It is preferable as shown to have the layer X of low filler content of substantially constant thickness and to taper the layer Y of high filler content so as not to weaken the thinner portion of the shingle. In the flat shingle 90′ (Fig. 13) the layer X of low filler content and the layer Y of high filler content may be of equal or any desired relative proportionate thickness, and are preferably of even thickness throughout.

While the filler material used to vary the pro-

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portion of the cement has been described as sand or used cement, it is obvious that other filler materials may be used, such as reclaimed asbestos fibre, marble dust, ground glass, wood flour, and the like, or that the asbestos or other fibrous ingredient may form the filler, and that variations in the composition and the relative proportion of the cement may be determined by the relative proportion of the fibrous or other material used in admixture with the cement.

For instance where the composition is homogeneous throughout the shingle, it may have 58% Portland cement, 17% asbestos fibre and 25% inert filler, which preferably is finely ground and inert, and should not deteriorate or absorb moisture. In order to vary the composition to strengthen the shingle a mixture consisting of 75% cement and 25% asbestos fibre may be used in the thinner portion of the shingle. Then the percentage of filler in the thicker portion of the shingle may be increased, for instance, to the extent of 40% filler, 15% asbestos fibre and 45% cement.

I claim:

1. A plurality of shingles of asbestos and Portland cement composition, each shingle being generally rectangular in shape and having formed and set in its exposed surface on a roof a plurality of longitudinally extending sinuous impressed lines of variable depths generally parallel to the longest sides of the shingle, said lines being closely spaced and irregularly interlaced and distributed throughout the exposed surface so as to give a weathered effect and the lines on different shingles being differently formed by loose, flexible strands of die means so that no two shingles repeat the same interlacing and spacing of said lines.

2. A plurality of shingles of asbestos and Portland cement composition, each shingle being generally rectangular in shape and having formed and set in its exposed surface on a roof a plurality of longitudinally extending sinuous impressed lines of variable depths generally parallel to the longest sides of the shingle, said lines being closely spaced and irregularly interlaced and distributed throughout the exposed surface so as to give a weathered effect showing two colors irregularly in accordance with the particular disposition of said lines and the lines on different shingles being differently formed by loose, flexible strands of die means so that no two shingles repeat the same interlacing and spacing of said lines.

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