Feb. 11, 1936. E. R. LOCKRIDGE ET AL 2,030,645

DRYING AND MIXING MECHANISM

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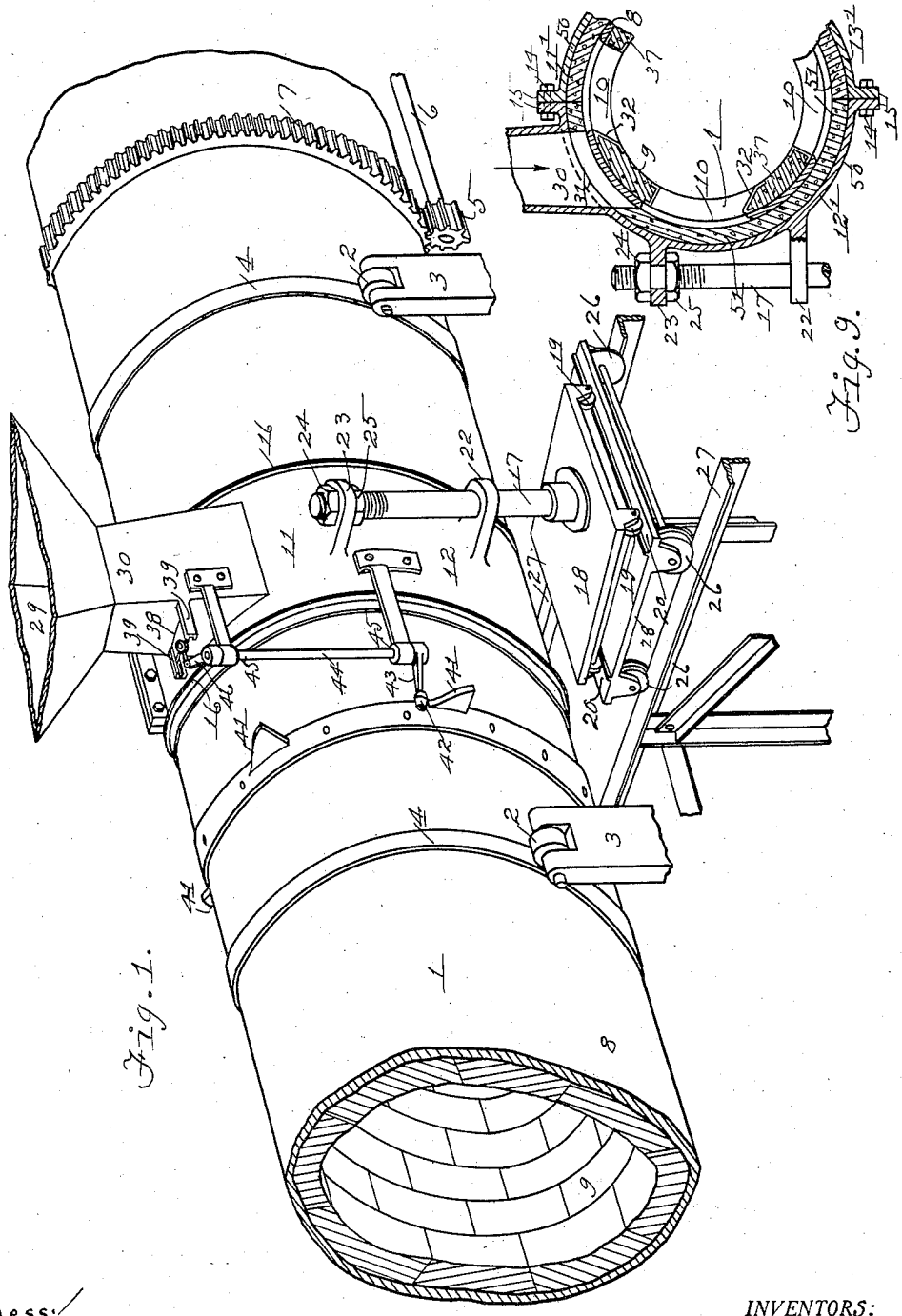


Fig. 1.

Fig. 9.

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Fig. 2.

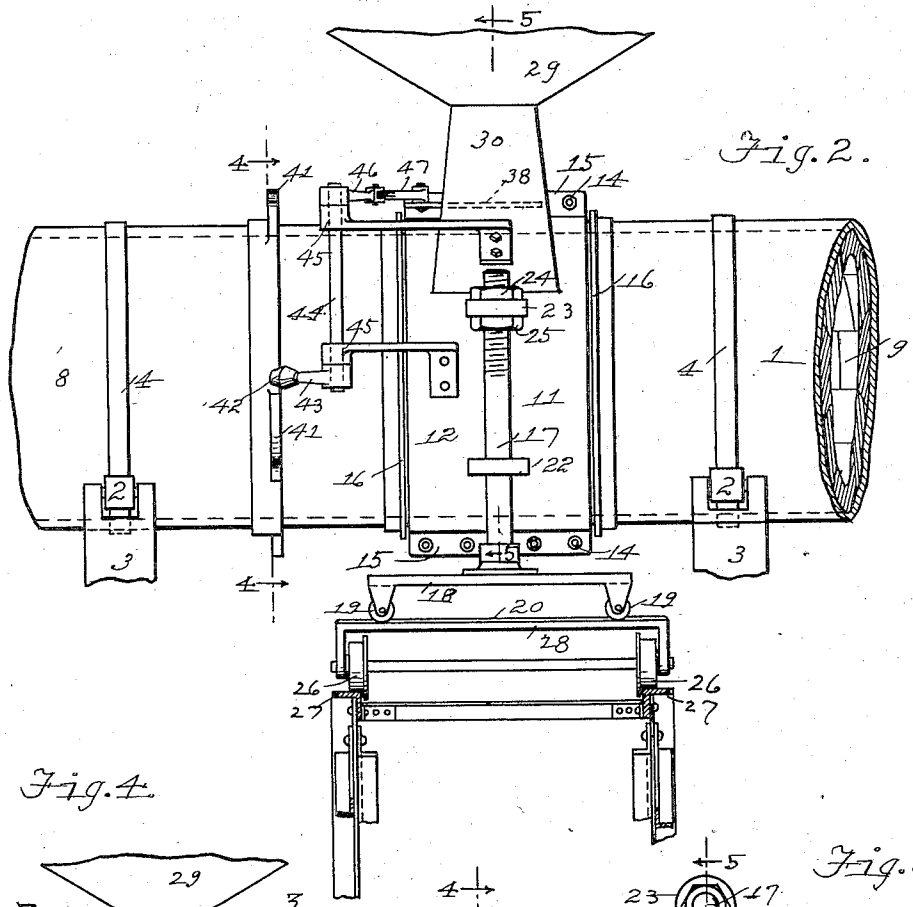


Fig. 4

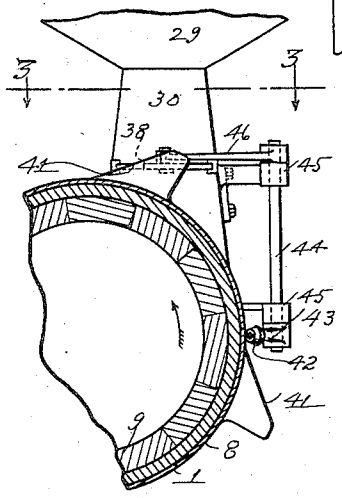
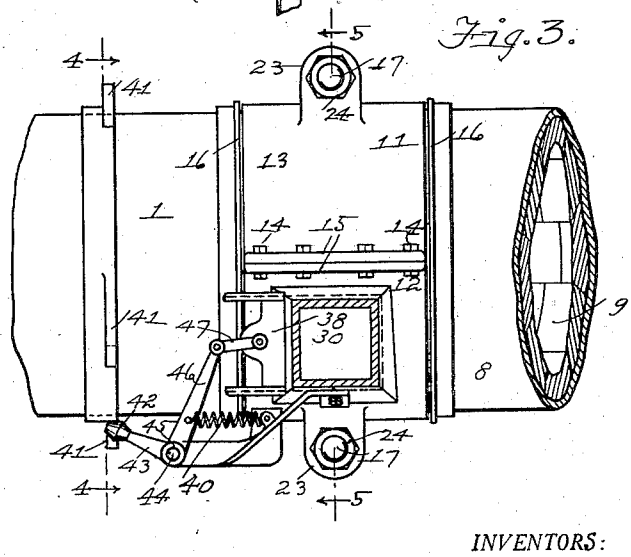


Fig. 3.



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Fig. 7.

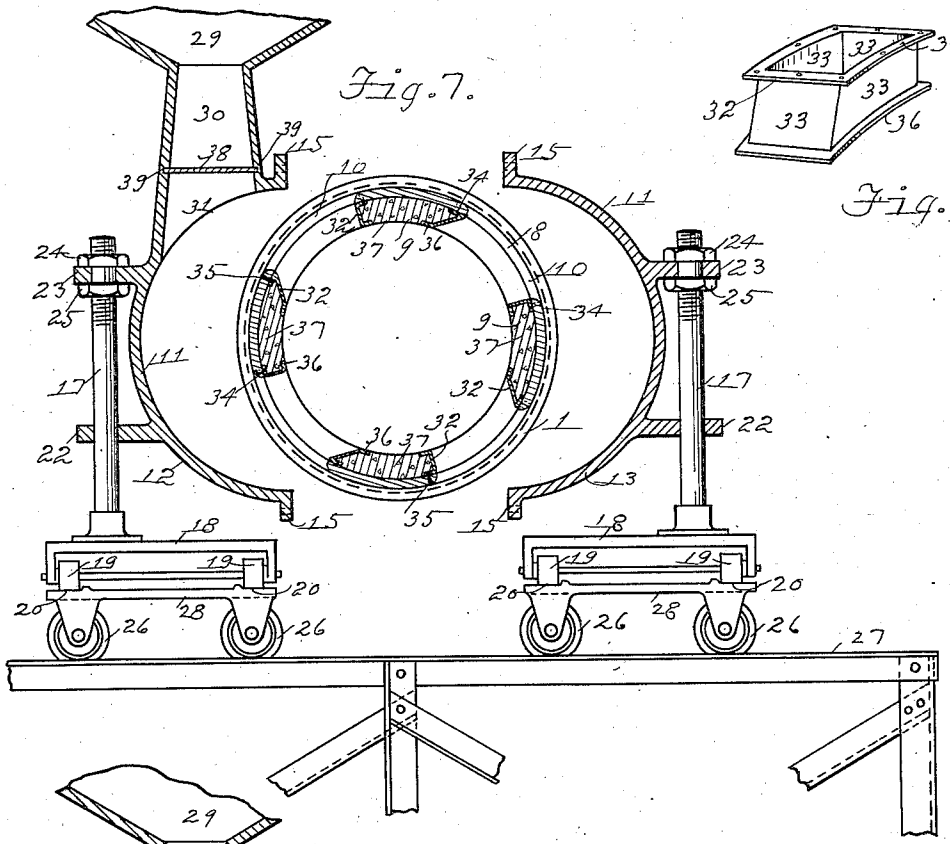


Fig. 8.

Fig. 5.

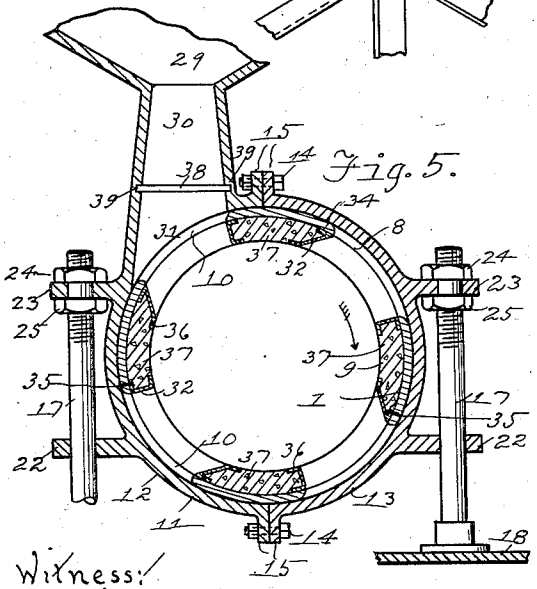
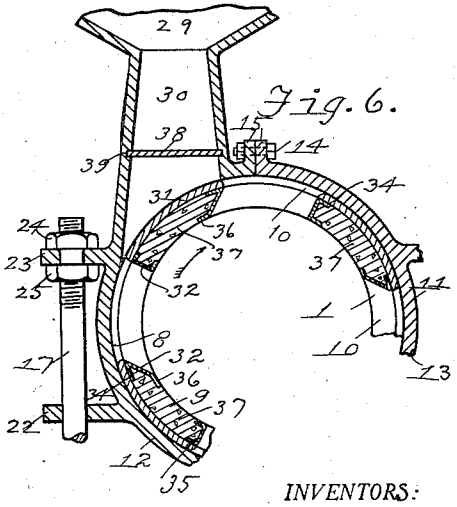


Fig. 6.



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Patented Feb. 11, 1936

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UNITED STATES PATENT OFFICE

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DRYING AND MIXING MECHANISM

Everett R. Lockridge and Louis W. Meyer,
Petoskey, Mich.

Application August 22, 1935, Serial No. 37,328

14 Claims. (Cl. 214—18)

The present invention relates to drying and mixing mechanisms and structures; and its object is, generally, to provide such a mechanism and structure improved in respects hereinafter appearing; and more particularly, to provide such a structure comprising a hollow rotatable cylindrical element having a port or ports through its side for introduction of the material to be operated on, and a closure member for such openings; and such a closure member comprising separably mounted sections; and to provide means for governing the supply of material to said rotatable element controlled by the rotation thereof; and to provide improved ports through the side of said element for introduction of said material.

These and any other and more specific objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the illustrative structure and mechanism particularly described in the body of this specification and illustrated by the accompanying drawings, in which:

Figure 1 is a view in perspective of a structure and mechanism for drying or mixing materials;

Figure 2 is an elevational side view thereof;

Figure 3 is a top view of the same, shown partially in section taken on line 3—3 of Figure 4;

Figure 4 is a transverse sectional view thereof taken on line 4—4 of Figures 2 and 3;

Figure 5 is a transverse sectional view of the same taken on line 5—5 of Figures 2 and 3;

Figure 6 is a like view, but showing the cylindrical element turned to a different position;

Figure 7 is a like view, but showing the halves of the closure member in separated position;

Figure 8 is a view in perspective of a thimble for a port through the side of the cylindrical element;

Figure 9 is a view similar to Figure 6, but with parts broken away, illustrating a modified construction of the closure member.

The structure illustrated by these drawings includes a long hollow cylindrical element designated generally 1 approximately horizontal but inclined vertically sufficiently for the passage therethrough of the material operated on. Said element 1 is mounted for rotation as on the supporting rollers 2 pivoted on supports 3 on which rollers said element's track bands 4 travel, said element being slowly rotated as by the pinion 5 of the drive shaft 6 meshing with the large gear 7.

The cylindrical element 1 is a metallic shell 8, which for some purposes desirably has a brick lining 9. A port or, as illustrated, a plurality of angularly spaced ports 10 extend through the side of said element whereby the material is introduced into its interior. These ports are held closed to retain the material by a circular closure member designated generally 11 which comprises two separable sections, the halves 12, 13, detachably connected as by threaded bolts 14 extending through the flanges 15 of said halves. In their connected position, this closure member extends axially of the cylindrical member 1 far enough between its annular shoulders 16, 16 to retain the material from passing out through said ports 10. This closure member thus forms a bearing in which the cylindrical element 1 rotates.

To permit longitudinal expansion and contraction of element 1, the closure member 11 supporting the same is mounted as by posts 17 on platforms 18 having wheels 19 rolling on tracks 20 parallel with member 1; and, to vertically adjust the position of the closure member these posts extend through lugs 22, 23 of said halves and have threaded upper ends carrying nuts 24, 25 adapted to be turned into engagement with the lugs 23.

To gain access to that portion of cylindrical element 1 which is surrounded by the halves 12, 13, in order to make repairs, remove material which may have obstructed or clogged the ports 10 or for other purposes, said halves are detached and moved to the separated position shown in Figure 7. These halves are suitably mounted to effect such separation as by providing at least one of them—as the half 13—(and, as shown, desirably both of said halves) with wheels 26 rolling on tracks 27 which extend transversely of the cylindrical element 1, said wheels being pivoted on the carriages 28 which have the tracks 20.

The material to be operated on, introduced into the cylindrical element 1 through its ports 10, passes downwardly from a suitable source of supply, as the hopper 29, through a chute 30. This chute opens at 31 into the cylindrical element 1 at one side of the axis thereof, as shown in the views, so that the material is received on the upwardly moving side of its inner surface to be better disintegrated and mixed by the rotation of said element. The ports 10 extend in a direction approximately aligned with that of the chute as shown so that the material will pass into element 1 more directly and without obstruction. These ports 10 are lined with thimbles 32 having sides 33 contacting the sides of the ports, and these thimbles have outer flanges 34 fastened as by rivets indicated at 35 to the

shell 8 and flanges 36 engaging the inner side of the brick lining 9.

As the rotation of the cylindrical element 1 brings the ports 10 successively into registration with the mouth 31 of the chute 30, as seen in Figure 5, the material falls into said element; but in other turned positions thereof in which the chute is closed by one of said element's portions 37 between said openings as seen in Figure 6, the material will rest on said portion. Desirably however and to more completely control the flow of material through the chute, this chute is provided with a valve, which in the shown construction is a gate 38 slidable in bearings 39 to closed position by a spring 40 shown in Figure 3.

The cylindrical element has angularly spaced cams 41 (one for each opening 10) on which cams rides the roller 42 on the arm 43 of a rock shaft 44 pivoted at 45 on the closure's half 12 and having an arm 46 connected by a link 47 with said gate valve to open the same by said cams at intervals corresponding with the registration of the corresponding ports 10 with the mouth 31 of the chute 30.

Any suitable and well known means, where necessary or desired, may be employed to heat the cylindrical element 1 as a rotating kiln to dry the material therein; any suitable means or power may be applied to said element to rotate it; and any suitable means may be used for conveying the material into the chute or through the ports 10 into said cylindrical element.

It will be seen that a mass of material for making cement or the like may be dehydrated, or a mass of wet grain or the like may be dried, and that materials of different kinds may be thoroughly mixed by passing the same through this rotating cylindrical element.

In the modified construction illustrated in Figure 9, the closure's sections 12', 13', comprise the metallic shell portions 50 and their inner brick linings 51, such linings and the brick lining 9 of the cylindrical member 1 being provided to shield the metallic shells from excessive heating when the structure is employed as a heating kiln.

The invention being intended to be pointed out in the claims, is not to be limited to or by details of construction and arrangement of any particular embodiment thereof illustrated by the drawings or hereinbefore described.

We claim:

1. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the port and a reverse movement opening the port.

2. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position wherein the closure forms a rotary bearing for said element and closes the port and a reverse movement opening the port.

3. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of detachably connected sections embracing the sides of said element and closing the port and mounted for transaxial separating movement when detached to open the port.

4. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising detachably connected halves embracing the sides of said element and closing the port, at least one of said halves being mounted for transaxial separating movement from the other half when detached therefrom to open the port.

5. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of detachably connected halves embracing the sides of said element and closing the port, said halves being mounted for movement parallelly with the axis of said element and at least one of said halves being mounted for transaxial separating movement from the other half when detached therefrom to open the port.

6. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of detachably connected halves embracing the sides of said element and closing the port, said halves being mounted for vertical adjustment and for movement parallelly with the axis of said element and at least one of said halves being mounted for transaxial separating movement from the other half when detached therefrom to open the port.

7. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a track extending transversely of said element; carriages movable on said track and having tracks extending parallelly with the axis of said element; platforms movable on the second-mentioned tracks respectively; threaded posts on the platforms respectively having nuts; a closure comprising detachably connected halves movable on the posts respectively to adjusted positions held by the nuts, the carriages being movable on the first-mentioned track to a position wherein the halves embrace said element and close the port and movable reversely when the halves are detached to open the port.

8. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the port and a reverse movement opening the port; a chute for material passing into said element through the port, said chute extending in a direction aside from the axis of said element.

9. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port extending through its side in a direction aside from the axis of said element; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said

element and closing the port and a reverse movement opening the port.

10. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port extending through its side in a direction aside from the axis of said element; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the port and a reverse movement opening the port; a chute for material passing into said element through the port, said chute extending correspondingly with the port in a direction aside from the axis of said element.

11. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a plurality of angularly spaced ports through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the ports and a reverse movement opening the same; a chute for material passing into said element through the respective ports; a normally closed valve in the chute; means for opening the valve operated by the rotation of said element to a position wherein the respective ports register with the outlet of the chute.

12. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a plurality of angularly spaced ports through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the ports and a reverse movement opening the same; a chute for material passing into said element through the respective ports; a normally closed valve in the chute; means for opening the valve operated by the rotation of said element to a position wherein the respective ports register with the outlet of the chute, said means including angularly spaced cams on said element, and means operated thereby and connected with the valve.

13. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and including an outer shell and an inner lining with a port extending through the shell and lining; a hollow thimble in the port, fastened to the shell and having a flange engaging the lining; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the port and a reverse movement opening the port.

14. A mechanical organization comprising, in combination: a hollow cylindrical element mounted for rotation about its approximately horizontal axis and having a port through its side; a closure comprising a pair of sections mounted for transaxial relative movement to a position embracing the sides of said element and closing the port and a reverse movement opening the port, said element and said sections respectively comprising a metallic outer shell portion and a heat-insulating lining portion.

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