Aug. 24, 1965 F. H. SULLY 3,202,103

FLEXIBLE CAM ACTUATED IMPELLER PUMP

Filed Dec. 21, 1961 3 Sheets-Sheet 1

FIG. 1.

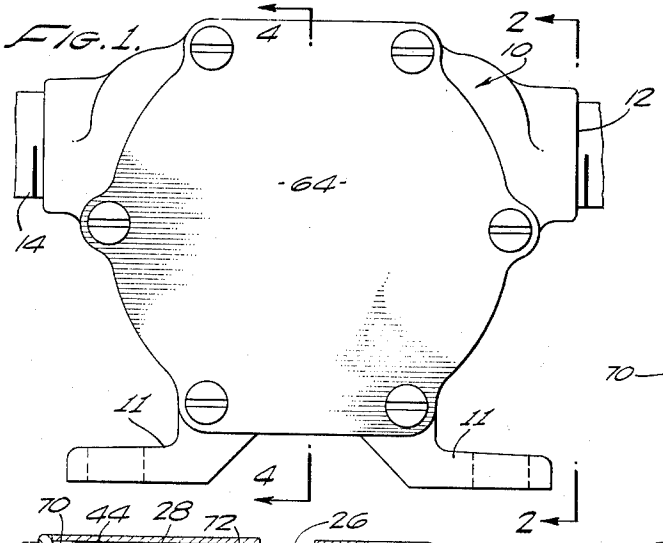


FIG. 9.

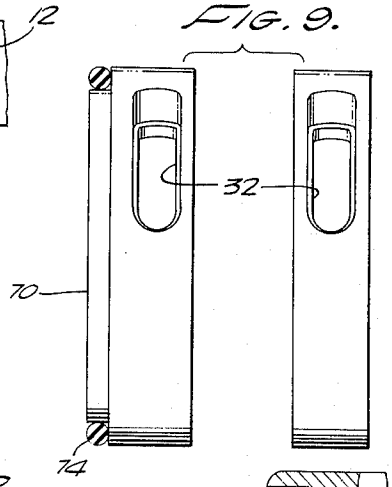


FIG. 2.

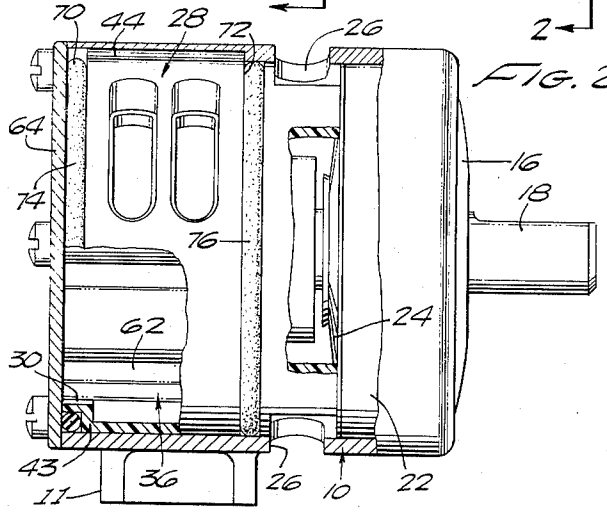


FIG. 10.

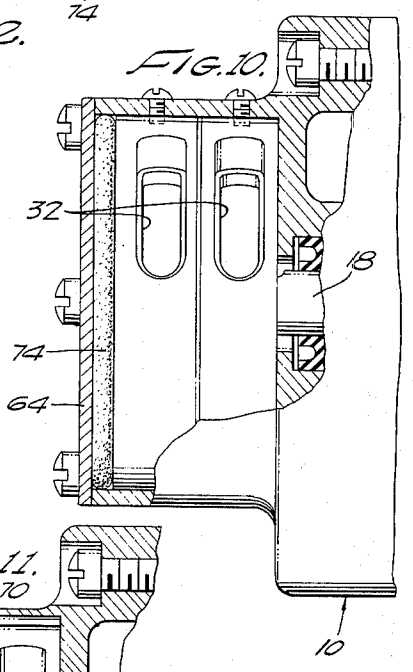


FIG. 3.

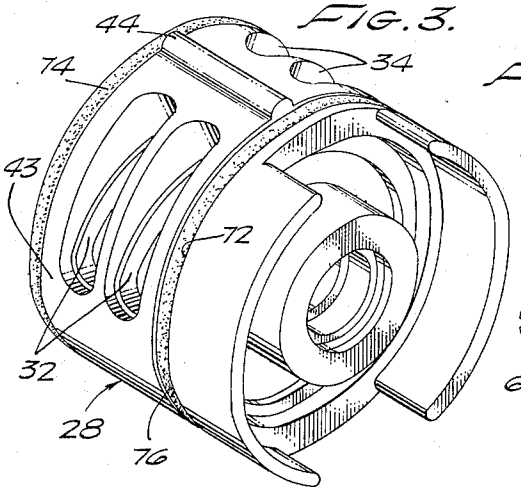
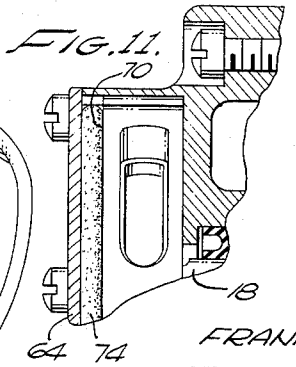


FIG. 11.



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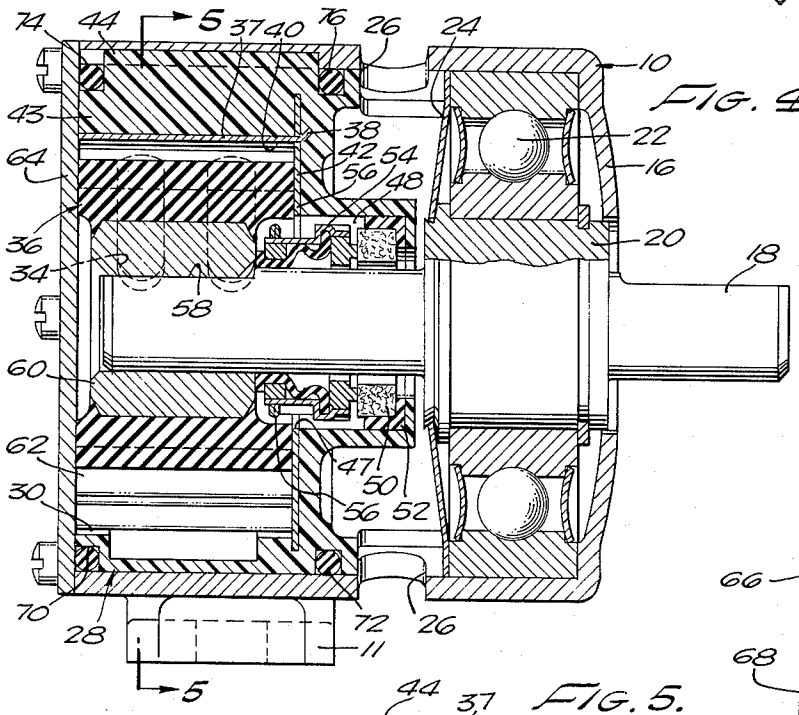


FIG. 4.

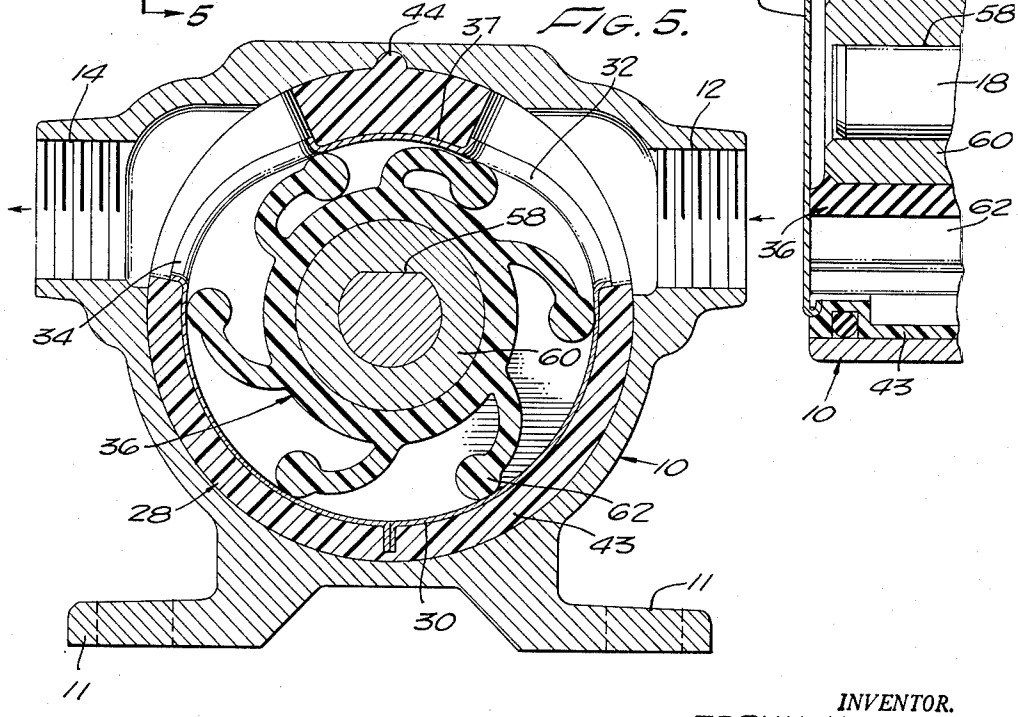


FIG. 5.

FIG. 8.

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FLEXIBLE CAM ACTUATED IMPELLER PUMP

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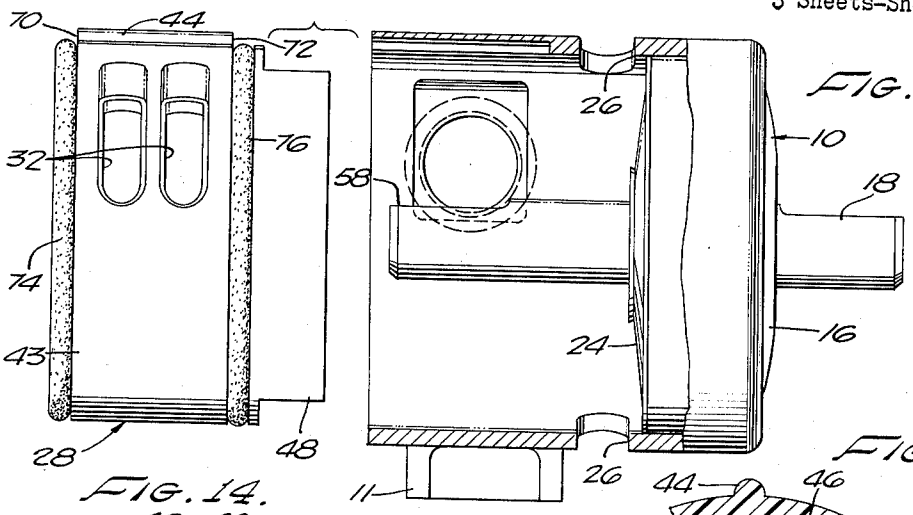


FIG. 6.

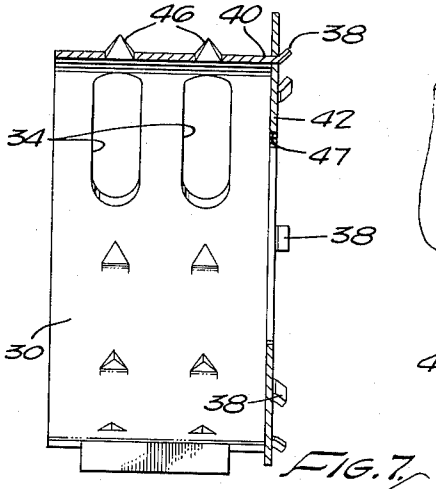


FIG. 14.

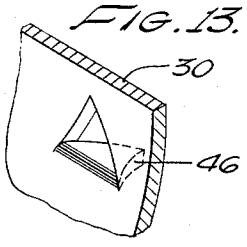


FIG. 13.

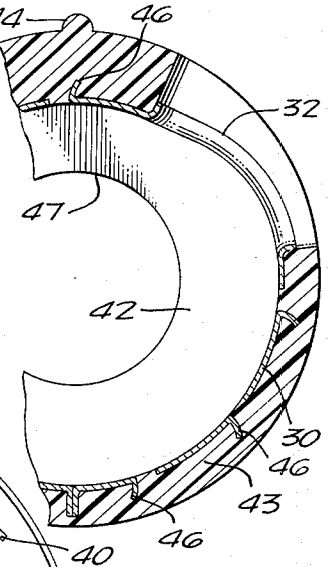


FIG. 12.

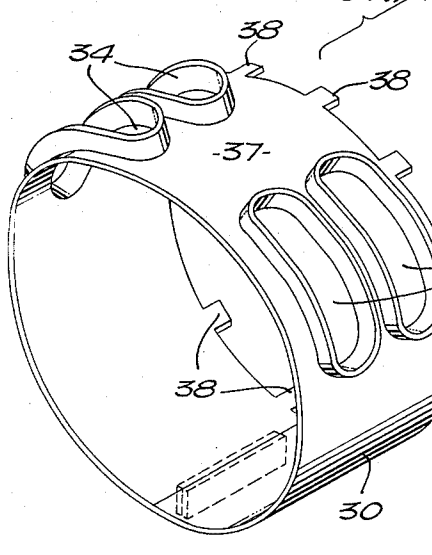
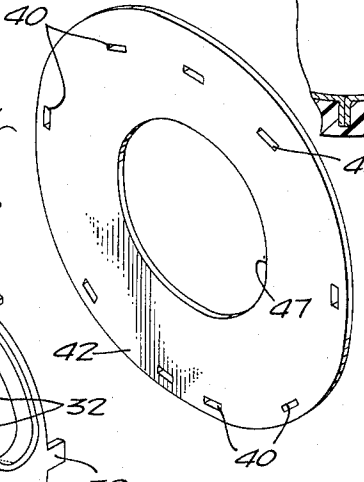


FIG. 7.



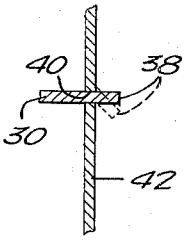


FIG. 15.

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FLEXIBLE CAM ACTUATED IMPELLER PUMP

Frank H. Sully, La Mirada, Calif., assignor to Western Brass Works, Los Angeles, Calif., a corporation of California

Filed Dec. 21, 1961, Ser. No. 161,130
6 Claims. (Cl. 103—117)

This invention relates to pumps and more particularly, to flexible impeller type pumps.

The pumps with which this invention is concerned utilize a method of pumping wherein a given volume of liquid such as water, is compressed and then released. An impeller of rubber, natural or synthetic, or of other suitable material, is rotated on a shaft in a housing and deflection of the impeller blades between the inlet and outlet of the pump is caused by an offset or cam section to vary the volume.

An object of this invention is to provide an improved pump of this general type at a greatly reduced cost.

A further object of this invention is to provide a pump which can readily be repaired even in the field with a minimum of equipment.

Still a further object of this invention is to provide a pump wherein all parts subject to wear, are readily accessible for repair or replacement without dismantling of the pump from connecting piping.

Still a further object of this invention is to provide an internal periphery for the housing which has no sharp edges to injure the impeller.

Other objects and advantages will be readily apparent from the following description.

In the drawings:

FIGURE 1 is an end view of a pump embodying this invention.

FIGURE 2 is a view taken along line 2—2 of FIGURE 1.

FIGURE 3 is a perspective of the pump cartridge.

FIGURE 4 is a view taken along line 4—4 of FIGURE 1.

FIGURE 5 is a view taken along line 5—5 of FIGURE 4.

FIGURE 6 is diagrammatic view illustrating insertion of the pump cartridge into the pump body.

FIGURE 7 is a diagrammatic view illustrating assembly of the wear plate.

FIGURE 8 is a partial section illustrating a modification.

FIGURE 9 is a side elevation of the two-part sleeve of a further modification.

FIGURE 10 is a fragmentary section illustrating one form of mounting this latter modification in the pump.

FIGURE 11 is a view similar to FIGURE 10 illustrating a further form of mounting this latter modification in the pump.

FIGURE 12 is a fragmentary section of a modified form of securing the sleeve to the body.

FIGURE 13 is a perspective of a segment of the modified sleeve.

FIGURE 14 is an end view of the modified sleeve.

FIGURE 15 is a fragmentary section illustrating the securing means of the wear plate assembly as shown in FIGURE 7.

Referring first to the embodiment of FIGURES 1 through 7, a pump housing 10 having legs 11 is formed by a suitable casting having a bore therethrough and a threaded inlet 12 and outlet 14 suitable for receiving inlet and outlet piping or the like. At one end of housing 10 an end wall 16 is provided having a central opening receiving a driven shaft 18. The shaft is driven by, for example, a motor (not shown), and has an enlarged area 20 supported by bearing 22 in housing 10. A shield

24 isolates the bearing and shaft from the remainder of the pump housing which has a series of ports 26 adjacent the shield permitting air circulation for cooling. Insertable into the housing 10 is an offset or cam forming element 28. This element is formed by an inner sleeve 30 which is preferably fabricated from a thin strip of a suitable metal such as brass, having the inlet ports 32 and outlet ports 34 punched therein with the edges thereof rolled as best seen in FIGURE 7 to provide smooth edges thereto. The strip is of the thickness of the impeller generally designated 36 (see FIGURES 4 and 5), and has its ends secured together in any suitable fashion such as braising. The main portion of the element is cylindrical except for the portion 37 between the ports which flattened for a purpose hereinafter to be described. At one extremity of the sleeve 30 thus formed may be provided a series of tabs 38 which project through suitable openings 40 in wear plate 42 and are bent back securing the wear plate to the sleeve.

A suitable plastic filler material such as polytetrafluoroethylene or similar relatively inert material 43 is then molded around the sleeve 30 and wear plate 42 and shaped to slidably fit into housing 10. This filler may have a suitable bead 44 formed the length thereof which fits into a suitable groove in the housing to prevent rotation. In FIGURES 12 through 14 a modification is illustrated wherein holes are punched in the strip form sleeve 30 to create protrusions 46 which securely lock the sleeve and filler material 43 against relative movement.

The driven shaft 18 projects through the filler material and wear plate 42 which has a suitable central bore 47 therethrough into the interior of sleeve 30. The filler material is molded to form a chamber 48 on the opposite side of wear plate 42 which receives a felt washer 50 and its retainer 52 and a further seal 54 which prevents leakage along shaft 18. The seal 54 may have lugs 56 thereon which abut wear plate 42 and provide for removal of the seal when the sleeve, wear plate and filler material are removed from housing 10.

The shaft 18 within sleeve 30 is provided with a flattened area as at 58. The impeller is formed on a sleeve 60 of brass or other suitable material having a bore therethrough matching the flattened area of shaft 18 keying the sleeve to the shaft for rotation therewith (see FIGURE 5). The impeller itself 62 is of any form well known to those skilled in the art and may take a form similar to that described in Briggs Patent No. 2,189,356 issued February 6, 1940, formed of natural or synthetic rubber or other suitable material.

To enclose the impeller within sleeve 30, a cover plate 64 may be bolted to the end of housing 10 as seen in FIGURE 4 or the end of the sleeve may be rolled back to form a flange 66 over which an end plate 68 is curved as seen in the modification of FIGURE 8.

The filler material 43 may be formed with suitable grooves 70 and 72 therein to receive O-rings 74 and 76 to releasably hold the pump operating parts in the housing 10.

As seen in FIGURE 9, the sleeve 30 may be cut or formed in separate sections mounted singly as seen in FIGURE 10 or multiply as viewed in FIGURE 10 for pumps of varying capacity.

In operation the drive shaft 18 of a suitable electric-motor has mounted thereon by suitable bearing means a housing 10. The housing may be bolted through legs 11 to a suitable support.

The operating parts of the pump are then inserted into housing 10 as a capsule or unit with the driven shaft projecting through the seal 54 and wear late 42 into sleeve 30. Impeller 62 is then mounted on shaft 18 and an end or cover plate applied. As the impeller is rotated a

given volume of water enters inlets 32 between adjacent impeller blades and is compressed by the offset or cam ramp 37 until the outlets 34 wherein it is permitted to expand and discharge from the pump. If any of the parts subject to wear require repair or replacement, the cartridge may be easily removed from the housing to permit such action.

While what hereinbefore has been described as the preferred embodiment of this invention, it is readily apparent that alterations and modifications may be resorted to without departing from the scope of this invention and such alterations and modifications are intended to be included within the scope of the appended claims.

I claim:

1. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller and an inert filler material connected to and surrounding said sleeve and supporting same in said housing, and a wear plate having a central opening through which said driven shaft may pass attached to said sleeve and abutting said impeller and the blades thereof to form a pump chamber, said sleeve, said filler material and said wear plate forming a single unit slidably removable from said housing.

2. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller and an inert filler material connected to and surrounding said sleeve and supporting same in said housing, and a wear plate having a central opening through which said driven shaft may pass attached to said sleeve and abutting said impeller and the blades thereof to form a pump chamber, said sleeve having at least one inlet and one outlet port and being cylindrical in shape having a portion offset toward said shaft between said ports, said sleeve, said filler material and said wear plate forming a single unit slidably removable from said housing.

3. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller, a wear plate connected to said sleeve and abutting said impeller and the blades thereof to form a pump chamber and having a central opening through which said driven shaft may pass, a body of inert filler material, said sleeve and said wear plate being encompassed by said body of material, said body of material, said sleeve and said wear plate forming a single unit slidably mountable in said housing, said sleeve having at least one inlet and one outlet port and being cylindrical in shape having a portion offset toward said shaft between said ports, said ports having the edges thereof rolled back forming a smooth edge, said body of inert filler material having ports formed therein corresponding to said ports of said sleeve.

4. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller and an inert filler material connected to and surrounding said sleeve and supporting same in said housing, and a wear plate abutting said impeller and the blades thereof to form a pump chamber and having a central opening through which said driven shaft may pass attached to said sleeve, said filler material encompassing said wear plate, and forming a seal receiving chamber adjacent the opening in said wear plate, said sleeve, said filler material and said wear plate forming a single unit slidably removable from said housing.

5. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller and an inert filler material connected to and surrounding said sleeve and supporting same in said housing, said sleeve having at least one inlet and one outlet port and being cylindrical in shape having a portion offset toward said shaft between said ports, said sleeve having attaching means adjacent one end thereof and a wear plate abutting said impeller and the blades thereof attached thereby to said sleeve, and said filler material encompassing said wear plate, and forming a seal receiving chamber adjacent the opening in said wear plate, said sleeve, said filler material and said wear plate forming a single unit slidably removable from said housing.

6. In a pump of the type having a housing receiving a driven shaft and an impeller having a plurality of blades thereon mounted upon said shaft the combination of a sleeve surrounding said impeller forming a surface contacting the blades of said impeller and an inert filler material connected to and surrounding said sleeve and supporting same in said housing, said sleeve having at least one inlet and one outlet port and being cylindrical in shape having a portion offset toward said shaft between said ports, said ports having the edges thereof rolled back forming a smooth edge, said sleeve having attaching means adjacent one end thereof, and a wear plate abutting said impeller and the blades thereof attached thereby to said sleeve, said filler material encompassing said wear plate, and forming a seal receiving chamber adjacent the opening in said wear plate, said sleeve, said filler material and said wear plate forming a single unit slidably removable from said housing.

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