

[54] **DEVICE FOR THE SIMULTANEOUS COUPLING AND UNCOUPLING OF A PLURALITY OF FLUID PIPELINES**

[72] Inventors: **Claude Jean Maurice Decot**, Tarbes;
Jean Eugene Darmagnac, Juillan,
both of France

[73] Assignee: **Etat Francais represente par le
Ministre d'Etat charge de la Defense
National-Delegation Ministeriell
pour de la Porte d'Issy, Paris,
France**

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[58] Field of Search.....137/594, 595, 271, 608, 609,
137/614, 614.01

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Primary Examiner—Henry T. Klinksiek
Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A coupling device for simultaneous coupling or simultaneous uncoupling of a plurality of fluid pipelines at low pressure or high pressure, comprises two blocks connectable with each other and each joined to respective pipelines and having the same number of passages for fluid. Each block has in each passage a spring loaded valve normally in closed position and an external control plate is attachable to one block to depress rods acting on the valves of this block and concurrently the valves pertaining to the other block to open both sets of valves and permit fluid flow in either direction through the passages in the blocks.

7 Claims, 9 Drawing Figures

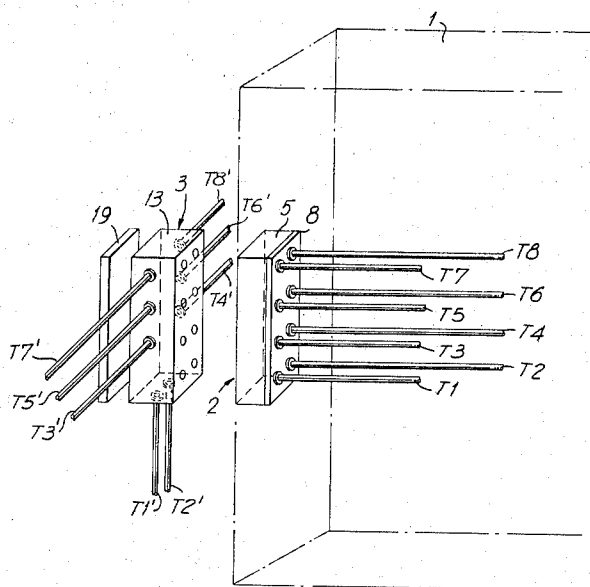


FIG. 1

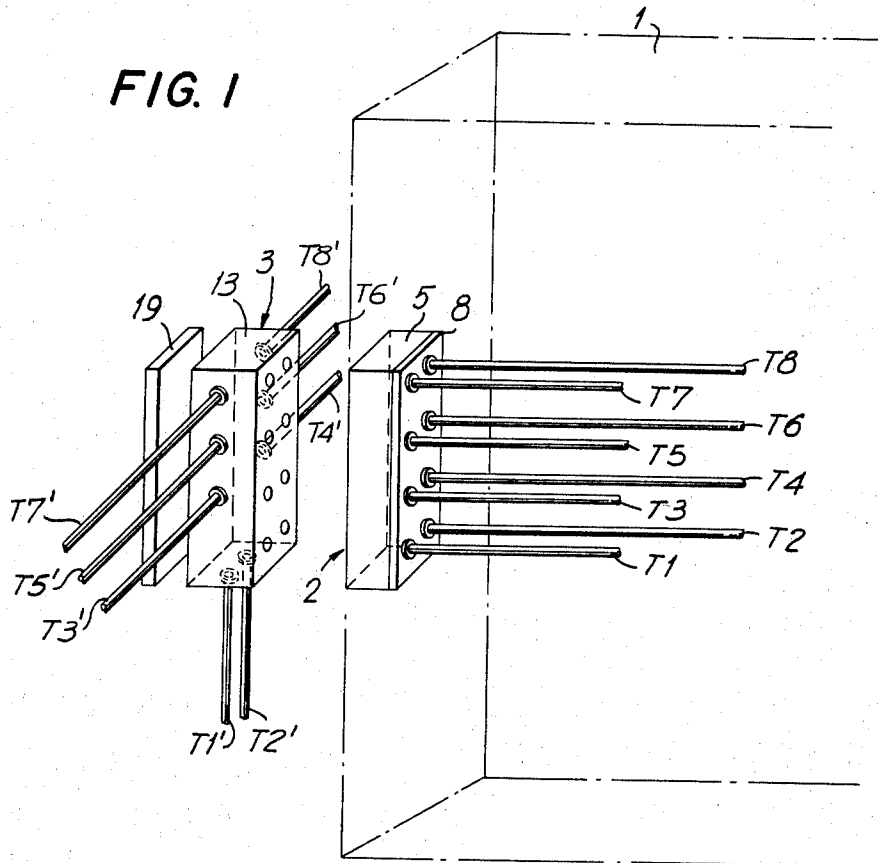


FIG. 2

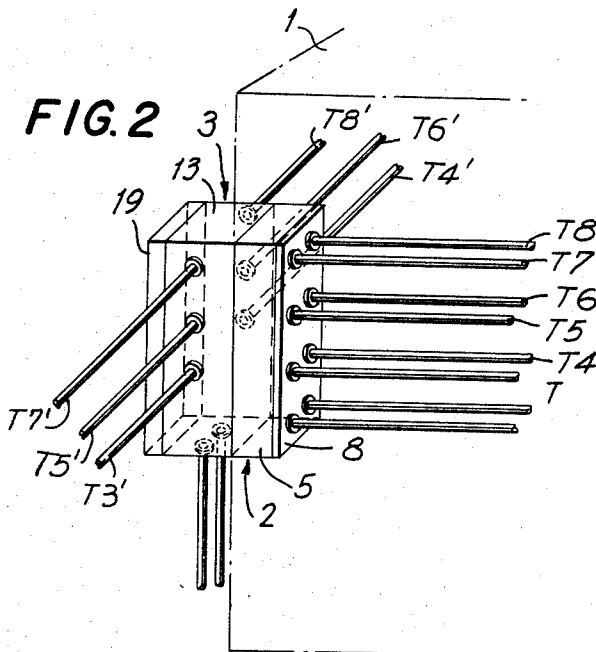


FIG. 3

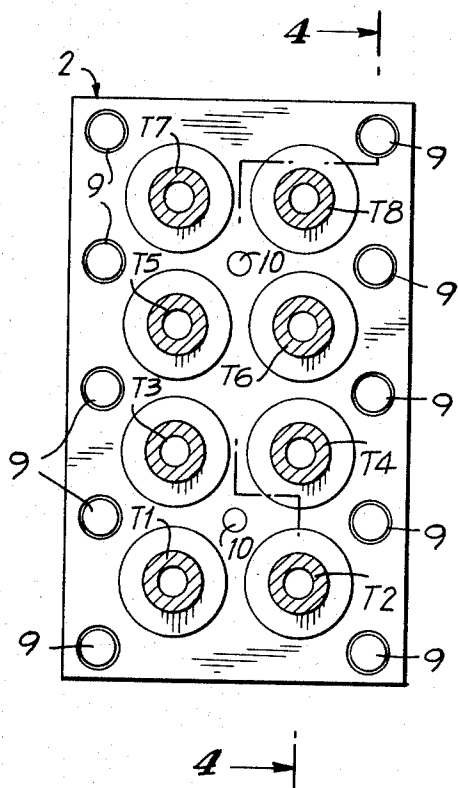


FIG. 4

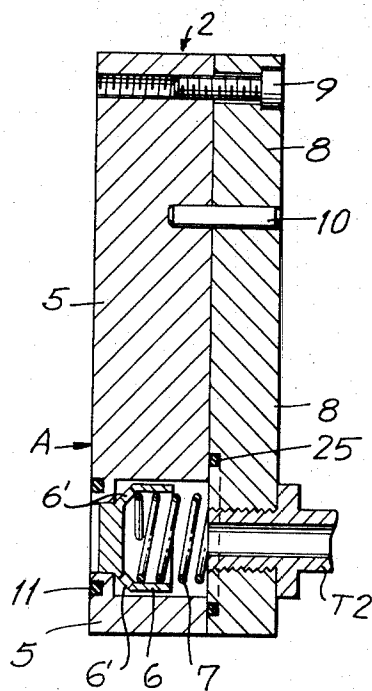


FIG. 5

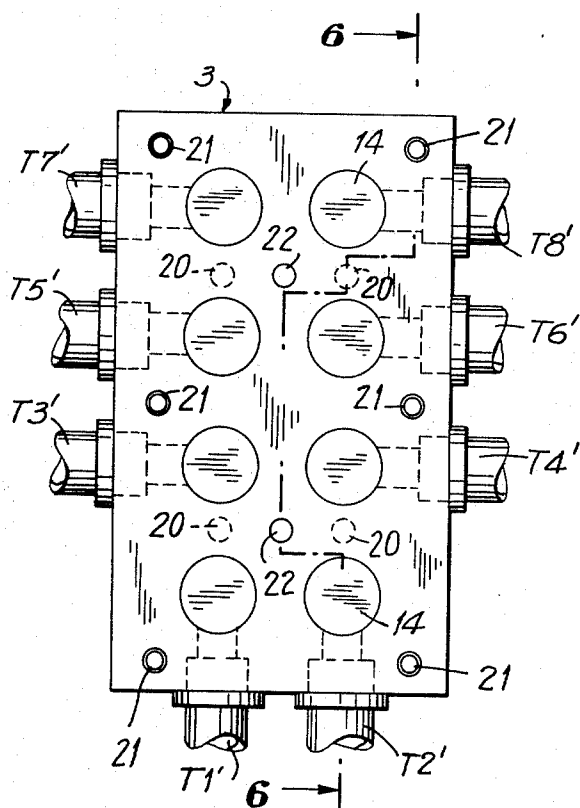


FIG. 6

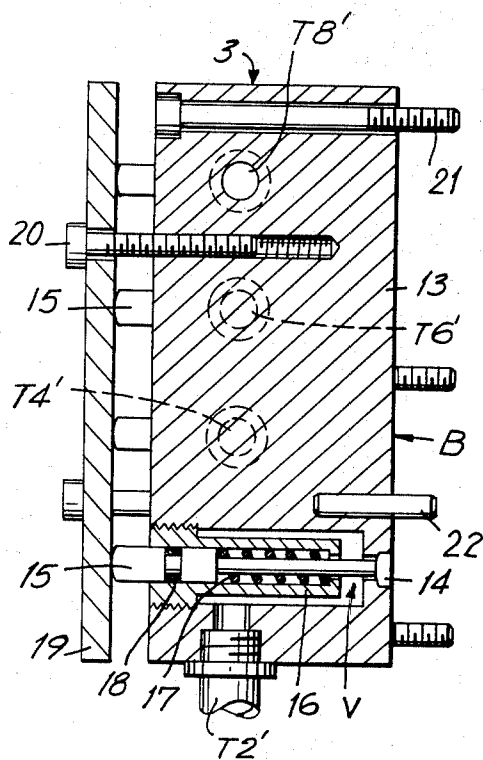


FIG. 7

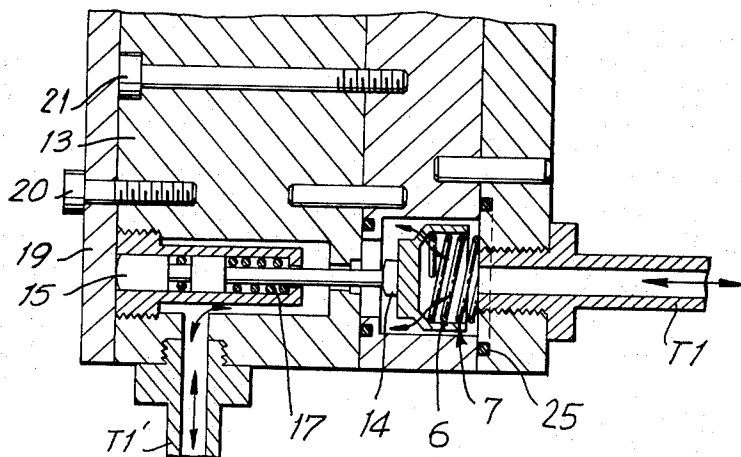


FIG. 8

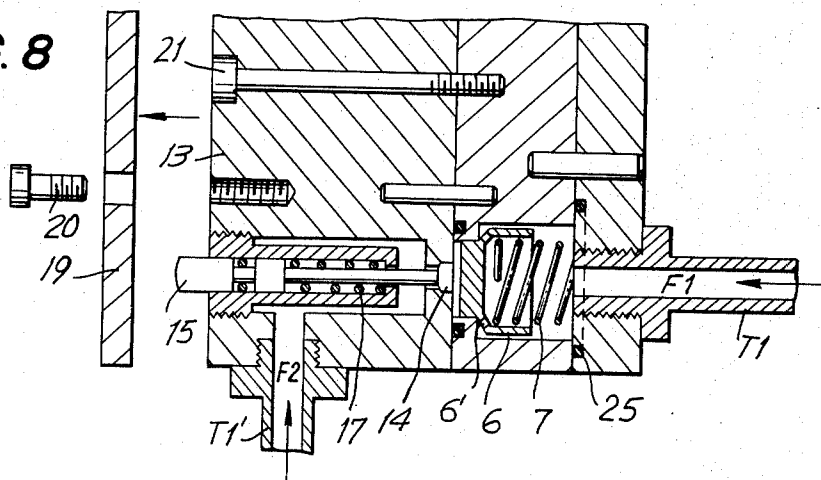
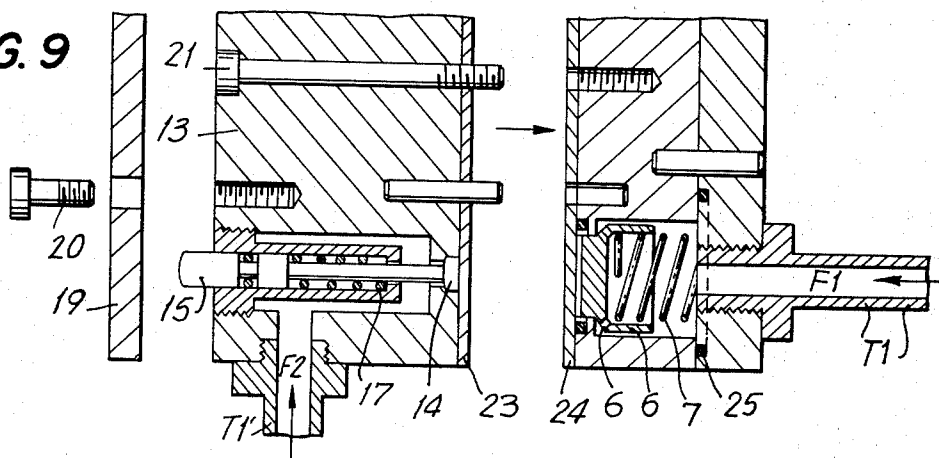


FIG. 9



DEVICE FOR THE SIMULTANEOUS COUPLING AND UNCOUPLING OF A PLURALITY OF FLUID PIPELINES

BRIEF SUMMARY OF THE INVENTION

The present invention relates to a device for the speedy and simultaneous coupling of a plurality of pipelines, e.g. low-pressure or high-pressure hydraulic piping, without leakage of liquid and without entrance of air.

Numerous quick-connecting double-acting check valves are known for joining pipelines without liquid leakage and without entrance of air; because of such valves the pipeline so fitted does not drain after uncoupling and does not leak after coupling, thus resulting in an appreciable saving of time.

Although the use of such valves improves the service and simplifies maintenance of the equipment, there are still several drawbacks including the following:

one valve is required for each line to be connected; the valve has to be manually operable in order to achieve coupling or uncoupling;

at least one of the two lines leading to the valve has to be yieldable since their locking or unlocking is accompanied by a relative displacement of the two lines of pipe;

For the reasons set forth above, employment of such valves has proven to be impractical and comparatively high in installation cost.

An object of the invention is to provide a coupling device which avoids the above-mentioned drawbacks.

In accordance with the invention, a coupling device is provided which comprises first and second blocks connected to respective pipelines which are to be selectively joined in communication and unjoined. Each block has a flow passage therein communicating with a respective pipeline, and the blocks can be detachably connected together so that a flow passage in one block is in communication with a flow passage in the other block. Each passage of each block contains a valve means closing its respective passage, and a plate is mountable on one of said blocks for jointly opening both valve means in associated communicating passages of the blocks to provide a flow path from one pipeline to another.

Each valve means may comprise a flap with spring means acting on the flap to urge the same to closed position. The flaps of the associated passages of the blocks are in face-to-face engagement when in closed position and one of said flaps includes a pushrod which is engaged by said plate means to open both flaps simultaneously.

In further accordance with the invention, the blocks can not be disconnected before the plate is removed in order to insure that the valves return to their closed positions. This is achieved by covering the fasteners attaching the blocks together by the plate.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a coupling device in disconnected condition,

FIG. 2 shows the coupling device in connected condition,

FIG. 3 is a front view of one of the blocks of the coupling device,

FIG. 4 is a sectional view taken on line 4—4 in FIG. 3,

FIG. 5 is a front view of the other of the blocks of the coupling device,

FIG. 6 is a sectional view taken on line 6—6 in FIG. 5,

FIG. 7 is a sectional view showing the coupling device in coupled position with the valves thereof open,

FIG. 8 is a sectional view showing the coupling device in coupled position with the valves thereof closed, and

FIG. 9 is a sectional view showing the coupling device in uncoupled position.

DETAILED DESCRIPTION

FIGS. 1 and 2 show a coupling device for use in a plant equipped with hydromechanical control members.

In this embodiment, a plurality of hydraulic members $T_1 - T_8$ are connected inside a detachable header 1, the other hydraulic members $T_1' - T_8''$ being outside the header. The coupling device allows speedy, simultaneous coupling of all the inside lines $T_1 - T_8$ to all the outside lines $T_1' - T_8''$.

The coupling device consists chiefly of two parallel piped blocks 2 and 3 each having as many orifices as there are pipelines to be united. Block 2 is fastened to the header 1. Each block contains a spring biased flap (as will be explained in detail later) for each of its orifices for preventing any fluid leakage during uncoupling. When the two blocks are coupled together, a control plate 19 can be fastened to a surface of the block 3 provided for that purpose, such plate 19 keeping all the flaps of the device in open position thereby allowing the fluid to travel in all pipelines in either direction. When the control plate 19 is removed, all the flaps of the device return to their closed position thereby preventing any flow of the fluid. Only when the control plate is removed can the two blocks be uncoupled.

Block 2 shown in FIGS. 3 and 4 comprises a lightweight alloy body 5 in which are seated eight valve flaps 6 and corresponding flap springs 7.

The flaps 6 have conical portions provided with several holes 6' therein for the passage of fluid. A stop plate 8 serves as a bearing surface for the springs and additionally allows threaded engagement to the pipelines $T_1 - T_8$ inside the header. Plate 8 is fastened to body 5 by means of screws 9, after engagement of the plate on centering studs 10 on body 5. A seal between the plate 8 and the body 5 is obtained by packings 25 integral with the body 5.

A face A of body 5 serves as a bearing surface for block 3 and a seal is provided between the blocks 2 and 3 at each of the pipelines by eight packings 11 secured in body 5 by gluing.

Block 3 shown in FIGS. 5 and 6 comprises a lightweight alloy body 13 in which are seatings of eight valve devices V as well as eight threaded orifices for pipelines $T_1' - T_8''$.

The eight valve devices V each comprises a flap 14 screwed into a push rod 15, the flap-and-push rod assembly being slidable in a guide 16. A spring 17 acts against the push rod to urge the flap to its closed position. The push rod is sealed by a packing 18.

The valve devices V are so fixed that the push rod surface area subjected to the fluid pressure applied by the associated pipeline orifices is greater than the sur-

face area of the flap subjected to the same pressure in order to bias the flap to closed position.

The block 3 comprises a plate 19 pressing against the heads of the eight push rods 15 when the four screws 20, between body 13 and plate 19, are tightened. By tightening or loosening the screws 20 the assemblies of push rod 15 and flap 14 serve to close and open the valve devices V.

Face B of body 13 is intended to be placed against the working surface A of body 5 at the time of connection of the two bodies by tightening the six screw 21. Two centering studs 22 are force-fitted into body 13 to allow the bodies 13 and 5 to be located in position without risk of error on coupling.

The operation of the device is as follows:

In a "Coupled Position," blocks 2 and 3 are assembled and the valves are open. FIG. 7 shows this configuration.

Therein plate 19 is seen tightly fastened against body 13 by means of the screws 20. This causes the push rods 15 to displace into the interior of the block 13. The flaps 14 and flaps 6 are thereby moved with the pushrods and leave their seatings. Consequently, fluid flow can be established in one direction or the other. In FIG. 7 fluid flow is shown by the arrows through the holes 6' in the conical part of flap 6. The pressure loss is comparatively low in either direction.

In the "Coupled Position," in FIG. 8 the valves are closed. This configuration is obtained by disassembling the four screws 20 and removing plate 19, which operation can be effected with the hydraulic plant under pressure or not. If pressure is applied to pipeline T₁, the push rod 15 is urged under the action of both the spring 17 and the fluid pressure in a direction to press flap 14 against its seating. Under the action of spring 7 and the fluid pressure in pipeline T₁, flap 6 also comes to rest on its seating. Flow can not be established in the direction of arrow F₁.

If fluid pressure is applied to pipeline T₁', the force exerted by the fluid pressure on the push rod results in keeping flap 14 shut, the flow therefore not being able to be made in the direction of arrow F₂.

This coupling device can therefore also be used as a shut-off valve, since the fastening or removal of plate 19 results in allowing or blocking the flow in both directions.

FIG. 9 shows the device in "Uncoupled Position," blocks 2 and 3 being separated and the valves being closed.

Uncoupling is obtained by dismounting the six screws 21, and then separating the blocks 2 and 3. The bearing plate 19 covers the heads of the screws 21 and permits uncoupling to be effected only if plate 19 has itself already been removed. For the same reasons as given previously, flaps 14 and 6 are closed, preventing any flow of liquid when pressure is applied to the pipelines T₁ or T₁'. There cannot be any leakage of liquid therefore upon uncoupling of blocks 2 and 3, even if the hydraulic plant is under pressure.

When the device is uncoupled guard plates 23 and 24 are placed on blocks 5 and 13 as shown in FIG. 9 to prevent the incursion of spray on the flap faces or damage through impact on the working faces A and B.

The present invention is used on plants equipped with hydromechanical drives and it can be employed in all cases where quick and frequent coupling or uncoupling of multiple pipelines are required without loss of liquid.

In particular, the coupling device facilitates periodic upkeep and servicing of all hydromechanical controlled plants and also of equipment using liquid or gaseous chemicals which would be dangerous or troublesome if spilled during uncouplings of pipelines.

What is claimed is:

1. A coupling device comprising first and second blocks connected to respective pipelines which are to be selectively joined in communication and unjoined, each block having a flow passage therein communicating with a respective pipeline, a first valve in each passage of said first block which is movable inwardly into said first block to open the respective flow passage, a second valve in each passage of said second block which is movable outwardly from the second block to open the respective flow passage, a pushrod coupled to each second valve and traversing said second block to project beyond an outer face of the second block, means for connecting said blocks together such that the valves in one block are in face-to-face registry with corresponding valves in the other block and a plate attachable to said outer face of the second block to operate the pushrods of the second valves simultaneously and cause the second valves to move outwardly of the second block and move into the first block to depress the first valves inwardly in the first block and open said first valves whereby the flow passages in the two blocks are in respective communication with one another.

2. A coupling device as claimed in claim 1 wherein said pushrod has a surface area exposed to pressure in the corresponding flow passage greater than the surface area of the associated valve to bias the valve under hydraulic pressure in said passage to closed position.

3. A coupling device as claimed in claim 1 comprising seal means in one of said blocks around each passage therein for sealing said blocks when they are connected together.

4. A device as claimed in claim 1 comprising a guide in each passage in said second block defining a chamber for said pushrod, said pushrod having a shoulder forming a tight piston sliding in said chamber and a spring mounted in said chamber between the shoulder and said guide urging the pushrod in a direction to open the corresponding second valve.

5. A device as claimed in claim 1 wherein said means which connects the blocks together comprises fasteners which are covered by said plate and rendered inaccessible thereby.

6. A coupling device as claimed in claim 1 comprising guard plates attachable to said blocks when the latter are disconnected to protect the connectable surfaces thereof and the valves in said passages.

7. A coupling device as claimed in claim 1 comprising guide means between said blocks for positioning the same for connection so that the respective passages thereof are aligned.

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