United States Patent [19]

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[11] **3,830,454**

[45] **Aug. 20, 1974**

[54] **DEVICE FOR FIXING AN OBJECT ON A WALL**

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[22] Filed: **Mar. 8, 1973**

[21] Appl. No.: **339,460**

[30] **Foreign Application Priority Data**

Mar. 8, 1972	France	72.8073
May 25, 1972	France	72.18702
Sept. 27, 1972	France	72.34190

[52] **U.S. Cl.** **248/27,** 73/431

[51] **Int. Cl.** **G12b 9/00,** H02b 9/00, H01h 9/08

[58] **Field of Search** 248/27; 220/36; 73/431, 73/273; 269/47, 49, 52

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Primary Examiner—J. Franklin Foss

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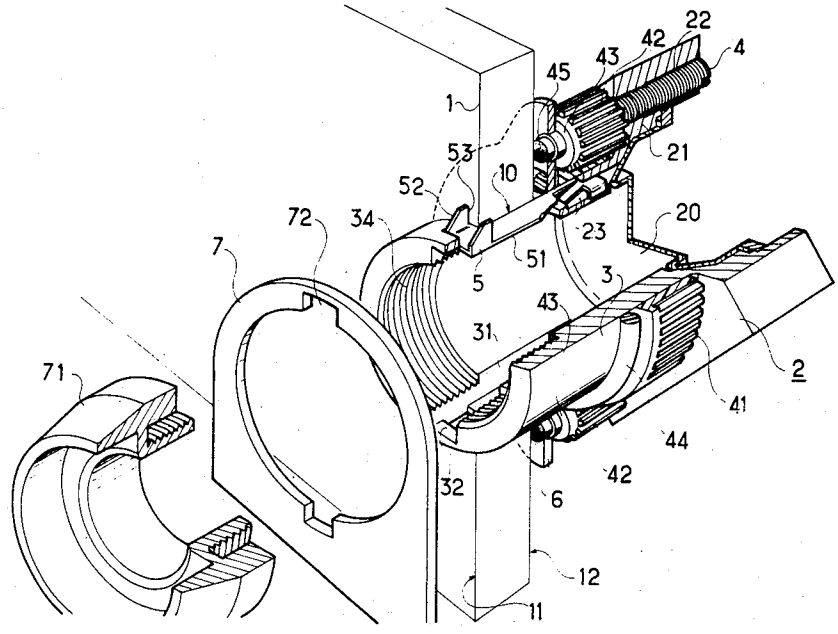
[57] **ABSTRACT**

Device comprising a body whose base is surmounted by a cylindrical head intended to be inserted and held in an opening provided in the wall, characterised in that it comprises clamping means comprising, on the one hand, screws provided with means for synchronising their movement, arranged in tappings formed in the periphery of the body parallel to the axis of the cylindrical head and leading, round the latter, towards the rear face of the wall and, on the other hand, clamps for reacting against clamping forces developed by the screws and pressure against the front face of the wall.

16 Claims, 3 Drawing Figures



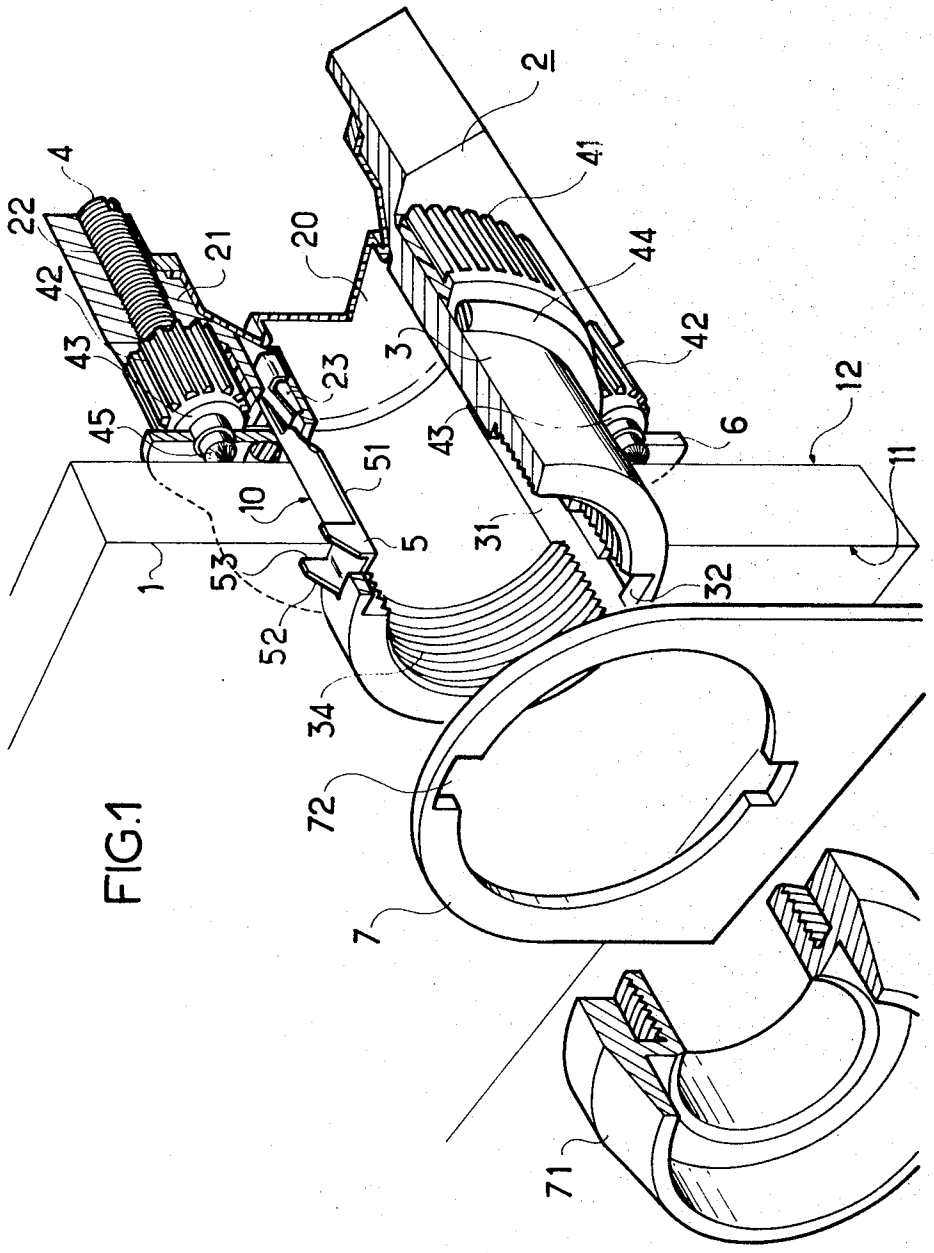

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FIG.1

FIG.2

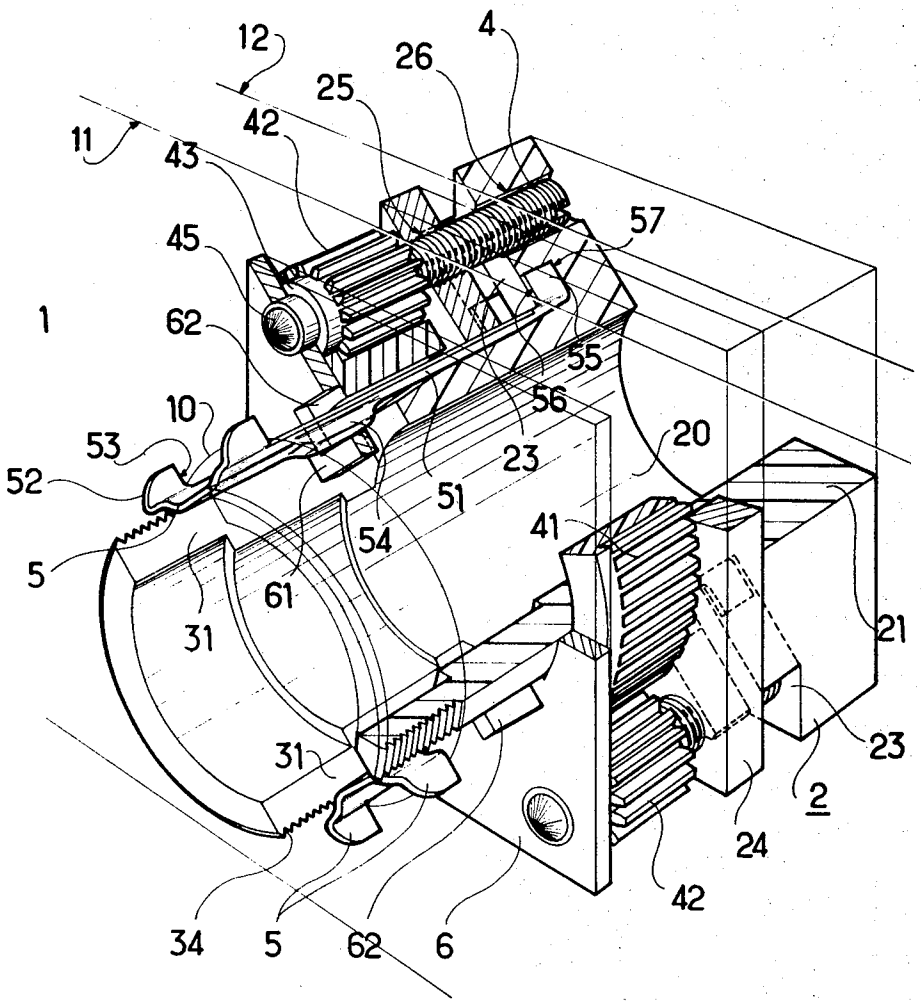
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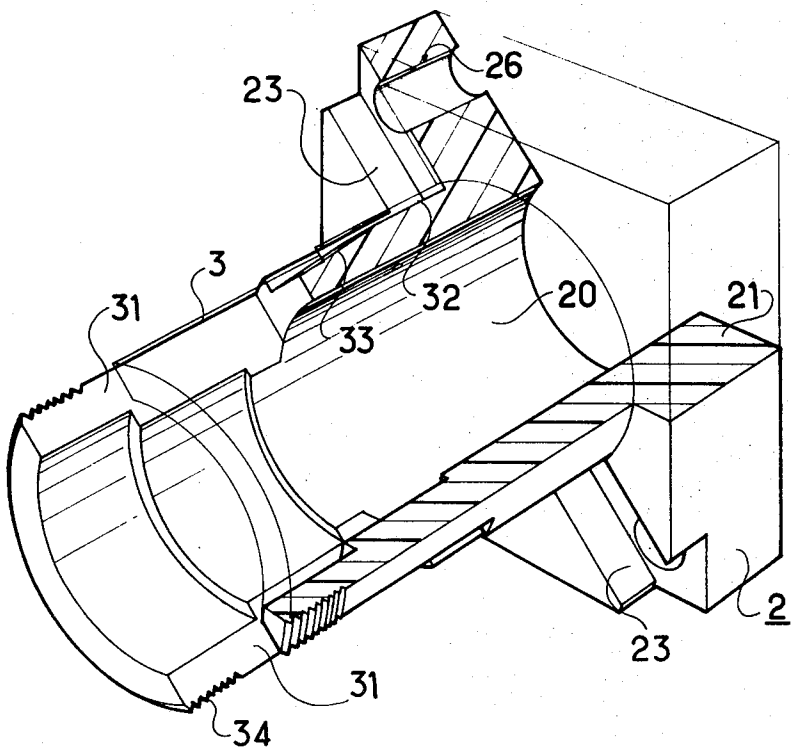
FIG.3



DEVICE FOR FIXING AN OBJECT ON A WALL

The invention concerns fixing devices which are installed in an opening made in a wall with a view to supporting various objects or appliances. It applies more particularly to the fixing, on a body and through that body, of appliances for operating an electric installation such as indicators, switches, control knobs, arranged on the front face of a switchboard, as well as to their active auxiliaries arranged on the rear face, such as contacts, supply units, wiring, connections.

The most current fixing device thus comprises a body having a threaded front portion which is fixed, in an opening formed in a wall, by means of a nut arranged on the front face of the table and co-operating with another screw arranged on the rear face of the switchboard.

This device has great bulk, made necessary by the space required for enabling the counter-screw to be manipulated, to the detriment of the appliance housed in the rear face.

A known improvement for partly overcoming that disadvantage consists in providing the counter-screw with a circular toothed ring meshing with a drive gear which is arranged on the side of the counter-screw and which may be adjusted by means of a screw-driver.

This improvement nevertheless has various drawbacks, and more particularly the fact that at the time of tightening the counter-screw, the fixing device as a whole tends to turn, in relation to the wall, in the opposite direction to the counter-screw. Moreover, the installing of that fixing device requires simultaneous access to both the faces of the wall, this not being possible when the wall has large dimensions.

The aim of the present invention is firstly a device for fixing an object on a wall, not having these disadvantages.

Moreover, it appeared an advantage to be able to have available on the rear face of the fixing device, the whole of the space facing the body for previous installing of the appliance before the assembling thereof on the wall; it also appeared an advantage to be able to proceed from the rear face of the switchboard with the withdrawal of the appliance which is arranged thereon, with a view to the maintenance or even to the modification or replacing thereof, without forasmuch removing the fixing device as a whole.

The present invention has moreover for its aim various improvements to that fixing device with respect to the previously mentioned advantages.

The present invention has for its object a device for fixing an object on a wall comprising a body whose base is surmounted by a cylindrical head intended to be inserted and held in an opening made in the wall, characterised in that it comprises tightening means comprising, on the one hand, screws provided with means for synchronising their movement, arranged in tappings formed in the periphery of the body parallel to the axis of the cylindrical head and leading out, around the latter to the rear face of the wall and on the other hand, reaction clamps for resisting the tightening forces generated by the screws and for bearing against the front face of the wall.

According to one characteristic of the invention, the clamps constitute a projection which is retractable when the cylindrical head passes under the edges of the opening the wall; the clamps are in the shape of a hook having, on one side, a ramp inclined towards the front

end of the cylindrical head and, on the other side, a ridge which is perpendicular to the head, the said hook being supported by an elastic strip arranged in a longitudinal slot of the cylindrical head formed on the periphery.

According to another characteristic, the clamping means comprises a bearing plate, provided with holes for passing the ends of the screws, for which it forms a bearing, installed on the cylindrical head.

According to a particular embodiment, the elastic strip comprises before the hook, a longitudinal rib bearing on the opposite face to that supporting the said hook against the edge of a port formed in the bearing plate.

According to another characteristic, the body comprises a fixing plate through which tappings are formed, the said plate being provided with an opening through which the cylindrical head is inserted so as to be removable with respect to the said fixing plate.

Other characteristics and advantages of the device will become apparent from the following description with reference to embodiments given by way of examples and illustrated in the drawings.

FIG. 1 is a general perspective cutaway view of a fixing device according to the invention.

FIG. 2 is a general perspective cutaway view of an improved variant of a device according to the invention.

FIG. 3 is a perspective view of the removable portion of the body according to FIG. 2.

In the figures, the fixing device has been shown only partly, to enable a better illustration thereof.

The fixing device is installed through the opening **10** in the wall **1**, which comprises a front face **11** and a rear face **12**. It is constituted by a body which, as an assembly **2**, comprises a base **21** surmounted by a cylindrical head **3** having its end pointed forwards. The body is hollow and has a passage **20** with a view to enabling communication between the appliances to be fixed on the front end and the accessories to be arranged inside the passage and on the space facing the rear face of the base **21**. That appliance, which does not form a part of the invention, has not been shown, so as not to complicate the figures excessively.

The cylindrical head **3** which is intended to be inserted in the opening **10** is provided, at its periphery, with clamping means which comprise on the one hand, screws **4** exerting a thrust on the rear face **12** of the wall **1** and, on the other hand, reaction clamps **5** pressing against the front face **11** of the wall **1** and against the tightening forces exerted by the screws **4**.

The screws **4** are arranged in tappings **22** formed in the base **21** of the body **2** parallel to the axis of the head **3** and leading out round the latter towards the rear face of the wall **1**.

The operating of the screws **4** comprises synchronising means constituted by a toothed ring **41** meshing with the gears **42** supported by the screws and assembled free to rotate on the cylindrical head. The toothed ring could just as well be replaced by a notched ring.

The ends of the screw **4** are supported by a bearing plate **6** arranged facing the rear face **12** of the wall **1** on which they are crimped; that plate **6** acts simultaneously as a bearing for the ends of the screws **4** and as a stop for the shoulders **43** facing the gears **42**. The plate **6** comprises a central hole enabling the insertion

of the cylindrical head and of the strips **51.** An elastic washer **44** inserted between the plate **6** and the rear face **12** of the wall, forms a clamping ring and a sealing ring.

By manipulating a single screw by means of a screw driver, the simultaneous advancing of the set of screws **4** as well as of the plate **6** in the direction of the rear face **12** of the wall **1** is obtained.

The washer **44** may be omitted; the end **45** of the screws **4** which are point screws, thus press against the rear face **12** of the wall **1,** into which they penetrate.

The clamps **5,** which, by bearing against the front face **11** of the wall, ensure the holding of the cylindrical head **3** in the opening **10** of the wall **1,** are constituted by hooks forming retractable projections arranged on the periphery of that cylindrical head, retracting at the time of its insertion under the edges of the opening **10,** then moving away as the front face **11** of the wall **1** bears on it to resist a withdrawing motion. For that purpose, the hooks **5** are supported by elastic strips **51;** they comprise, moreover, on their front side, an engagement ramp **52,** and, on the other side, a ridge **53** perpendicular to the cylindrical head **3** which bears, after clamping, against the front face **11.**

The elastic strips **51** are housed in longitudinal slots **31** cut out on the periphery of the cylindrical head **3** and held with a certain longitudinal play at their rear end in recesses **23** in the shape of longitudinal grooves extending the slots **31** towards the base **21.** That rear end of strips **51** comprises, for that purpose, a curved cut-out portion arranged in the recess **23.** The slots **31** are limited, on the front portion of the cylindrical head **3** by stops **32.**

When the cylindrical head **3** is inserted in the opening **10** of the wall **1,** the hooks **5** are pushed back by the edges of the opening **10** towards the base **21** and draw the elastic strips **51** right into the bottom of the recess **23;** then, because of the inclined ramp **52,** the hooks **15** are driven into the slots **31** until the rib **53** has passed the front face **11.** The elasticity afforded by the strips **51** brings the hooks **5** into their normal position, that is, the ridge **53** against the edge of the front face of the opening **10.** During the tightening of the screws **4,** the hooks **5** are pushed by the front face **11** of the wall **1** against the stops **32.** In that position, they can then no longer be pressed down towards the inside of the slots **31,** this having the effect of locking the hook and thus of preventing the withdrawal of the cylindrical head outside the opening of the wall **1.**

For the withdrawal of the device, the screws must be loosened, this having the effect of enabling the unlocking of the hooks **5,** pushing them backwards. Due to the longitudinal play, these assembling and dismantling operations are made much easier.

Various systems enable the locking of the hooks **15** to be effected. In the example shown, the body being made of a moulded substance, the hooks **5** make imprints in that substance when they are tightened. But the stop **32** may also be provided with a step cooperating with the front end of the hook which ensures that locking at the time of tightening.

Such a fixing device does not require, when installing it through an opening in the wall, any attention on the front face. On the other hand, its removal requires attention on the front face to effect the pressing down of the hooks after unlocking; nevertheless, it does not enable all the space arranged on its rear face to be made available for the previous assembling of the appliance, for an access must be kept for at least one screw control head, nor various maintenance, modification or replacement operations on the appliance requiring the dismantling of the body to be effected.

The example of embodiment of the invention described in FIGS. **2** and **3** afford improvements making it possible to overcome these drawbacks. The same designations are used therein under the same reference numerals as in FIG. **1,** but various modifications have been made.

Th body which is shown as a whole at **2** comprises on the one hand, a removable portion consisting of a base **21** surmounted by a cylindrical head **3** and, on the other hand, a fixing plate **24.**

The screws **4** are recessed in tappings **25** formed in the fixing plate **24** of the body **2,** parallel to the axis of the head **3** and leading out round the latter, towards the rear face of the wall. Facing these tappings, simple holes **26** for passing the screw heads through are arranged in the base **21.**

The elastic strips **51** are housed in longitudinal slots **31** cut out of the periphery of the cylindrical head **3,** but their end is open. These slots **31** are extended by a longitudinal groove **32** provided, at the front, with a tapering portion **33** on the slot **31** and lead out at the back into a recess **23** of the base of the body **2.**

The elastic strips **51** comprise, before the hooks **15,** a longitudinal rib **54** forming a projection on the opposite face to that which bears the hooks **5.** The length of that rib is such that, when the ridge **53** bears against the front face **11** of the wall **1,** it bears against the edge of a port **62** formed in a tab **61** of the bearing plate **6,** arranged in the slot **31.** The rear end of the blades **51** is provided with lateral tabs **55** limited by two ridges perpendicular to the cylindrical head **3,** the one bearing against the edge of the fixing plate **24,** the other, **57** abutting against the bottom of the recess **23.**

Assembling is effected as follows. Firstly, the fixing assembly consisting of the fixing plate **24,** the bearing plate **6,** the screws **4,** the gears **42,** the toothed ring **41** and the strips **51** which are inserted by the and comprising tabs **53** through the ports **62** in the plate **6** is assembled. To be able to keep the strips **51** in place, with their ridge **56** bearing against the edge of the fixing plate **24,** the front end of the cylindrical head **3** is inserted through the rear face of the fixing plate **24** so that the rear ends of the strips be engaged firstly in the slots **31,** then, due to a tapering portion **33,** in the groove **32,** until the ridges **57** abut on the bottom of the recess **23** of the base **21** of the body **2.** The device then has, at its front, the hooks **5** facing the slots **31.**

To be able to engage the fixing device through the opening **10** of the wall **1,** it is necessary for the hooks **5** to be able to undergo a retracting movement on passing under the edge of the opening **1.** For that purpose the operation of the hooks **15** must be such that the strips **51** react in an elastic manner, it is therefore necessary to shorten, by manipulating the screws **4,** the distance between the bearing plates **6** and the fixing plates **24** for the locks **54** to avoid bearing against the edges of the ports, **62** in the plate **6** while they are set in front of these ports.

The fixing device may then be engaged through the opening **10** in the wall **1;** due to the engaging ramps **52** and to the elasticity afforded by the strips, the clamps retract on passing and fall back into position again, so

that the ridges 53 perpendicular to the cylindrical head are placed against the front face 11 of the wall 1. On tightening the screws 4, a tightening of the wall 1 between the ends of the screws 4 and the ridges 53 of the hooks 5 is obtained; moreover, during that operation, the ribs 54 bear against the edges of the ports 62 in the beaning plate 6, this making the strips 51 rigid and then preventing any retracting movement of the hooks in relation to the edge of the opening in the wall 1, by the bending of the elastic strip.

The fixing device being thus fixed to the wall 1, it is then possible to remove the removable portion of the body 2, that is, only the cylindrical head, the other parts constituting the fixing assembly remaining fixed against the wall. The appliance and its accessories may then be assembled on the rear face of the body 2 or through its hollow inside space, and the cylindrical head 3 may again be installed through the fixing assembly, where it remains slip fitted through the various parts in which it passes.

Thus, all the rear surface afforded by the base of the body 2 is available for housing the appliance without its being necessary to keep an access for the heads of the tightening screws.

Moreover, for assembling the fixing assembly, it may be an advantage to use, instead of the removable portion of the body, an auxiliary mandrel which is not so bulky and comprises only the replica of the machinings concerned. The fixing assemblies may then be installed on the wall previous to the installing of the appliance which they are supposed to hold in place, this being a very great advantage for assembling large switchboards.

Furthermore, these devices may be used for reference marking the appliance by means of drill plates. A thread 34 arranged on the front end of the cylindrical head enables an indicator drill plate 7, which may be seen in FIG. 1, to be laid against the front face 11 of the wall 1 by means of a hood 71 capable of being screwed onto the thread 34.

According to one aspect of the invention, the hooks 5 constitute fool-proof means for the use of the drill plate 7. For that purpose, the upper hook 5, as well as the notch 72 of the drill plate 7 have a greater width than the others, this defining a single portion for installing the drill plate. It is then sufficient for the fixing device to comprise, on its rear face, reference marks enabling the position which any reference drill plate will assume when it is subsequently installed to be known, so that this installing is thereby made much easier.

It is also possible to give the hook configuration 15 at the end of the cylindrical head an irregular distribution and to give a corresponding configuration to the notches of the reference drill plate so as to lead to a single position for installing the drill plate.

It is obvious that the invention is no way limited to the embodiments which have just been described and illustrated, and which have been given only by way of example; more particularly, certain arrangements may be modified or certain means may be replaced by equivalent means.

I claim:

1. Device for fixing an object on a wall comprising a body whose base is surmounted by a cylindrical head intended to be inserted and held in an opening made in the wall, characterised in that it comprises tightening means comprising, on the one hand, screws provided with means for synchronising their movement, arranged in tappings formed in the periphery of the body parallel to the axis of the cylindrical head and leading out, around the latter to the rear face of the wall and on the other hand, reaction clamps for resisting the tightening forces generated by the screws and for bearing against the front face of the wall.

2. Fixing device according to claim 1, characterised in that the said clamps comprise a hook forming, on the periphery of the cylindrical head, a projection which is retractable when the head passes under the edges of the opening when it is inserted.

3. Fixing device according to claim 2, characterised in that the said hook comprises, on one side, a ramp inclined towards the end of the head and a ridge perpendicular to the head on the other side.

4. Fixing device according to claim 3, characterised in that the said hook is supported by an elastic strip arranged in a longitudinal slot in the cylindrical head formed on its periphery.

5. Fixing device according claim 4, characterised in that the tightening means comprise, installed on the cylindrical head, a bearing plate provided with holes for passing the ends of the clamp screws for which it constitutes a bearing, through.

6. Fixing device according to claim 5, characterised in that the clamp screws are point screws.

7. Fixing device according to claim 4, characterised in that each slot, in which an elastic strip is arranged is limited, at the end of the head facing the hook which it bears, by a stop, the said strip being held by the said head with a longitudinal play in a recess arranged near the base.

8. Fixing device according to claim 7, characterised in that the said stop comprises a step locking any retraction of the hook when the latter is brought close to the stop.

9. Fixing device according to claim 5, characterised in that the said strips comprise, before the hook, a longitudinal rib bearing, on the opposite face to that supporting the said hook, against the edge of a port made in the said bearing plate.

10. Fixing device according to claim 9, characterised in that the body comprises a fixing plate through which the tappings are made, the said plate being provided with an opening through which the cylindrical head is installed so as to be removable in relation to the said fixing plate.

11. Fixing device according to claim 10, characterised in that each slot is extended by a longitudinal groove having, at its inlet, a tapering portion and leading into a recess in the portion of the base of the body arranged facing the fixing plate and in which is slid the opposite end of the hook of a strip, the said end comprising a lateral tab limited by two ridges perpendicular to the cylindrical head, one of which bears against the edge of the fixing plate, the other abutting in the bottom of the said recess.

12. Fixing device according to claim 1, characterised in that the said synchronising means comprise, on the one hand, a gear fixed to the shank of each of the screws and, on the other hand, a notched belt which is installed on the cylindrical head and which drives the gear of each screw.

13. Fixing device according to claim 1, characterised in that the screws are at an equal distance from the cylindrical head and in that the said synchronising means

comprise, on the one hand, a gear fixed on the shank of each of the screws, and, on the other hand, a circular toothed ring which is mounted idle on the cylindrical head and which meshes with the gear of each screw.

14. Device according to claim **2,** characterised in that the hooks constitute, in co-operation with the corresponding notches, of a reference drill plate arranged in front of the wall and round the cylindrical head, a reference marking means.

15. Device according to claim **14,** characterised in that the hooks and the notches have a different width.

16. Device according to claim **14,** characterised in that the hooks and the notches are arranged in an irregular distribution.

* * * * *