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(54) Drive mechanism for blinds or mosquito nets

(57) System to control the vertical, horizontal or inclinded movement of curtains, roller curtains, mosquito nets etc. consisting of a geared motor (8) mounted inside the self-winding drum (2), winding and unwinding the curtain or panel acting as a mosquito curtain or roller curtain, while this geared motor (8) features two reduction gears and two opposed shafts (9, 9') and the geared motor (8) is supported by proper equipments (10) by means of one of the lateral supports (11) of the self-winding drum (2), the shafts (9, 9') driven by the geared motor (8), are acting on two worm screws (7) provided with matching threads, which in turn are driving sliders (6) connected to the lower control crossbar (4) of the curtain, mosquito net or roller curtain.

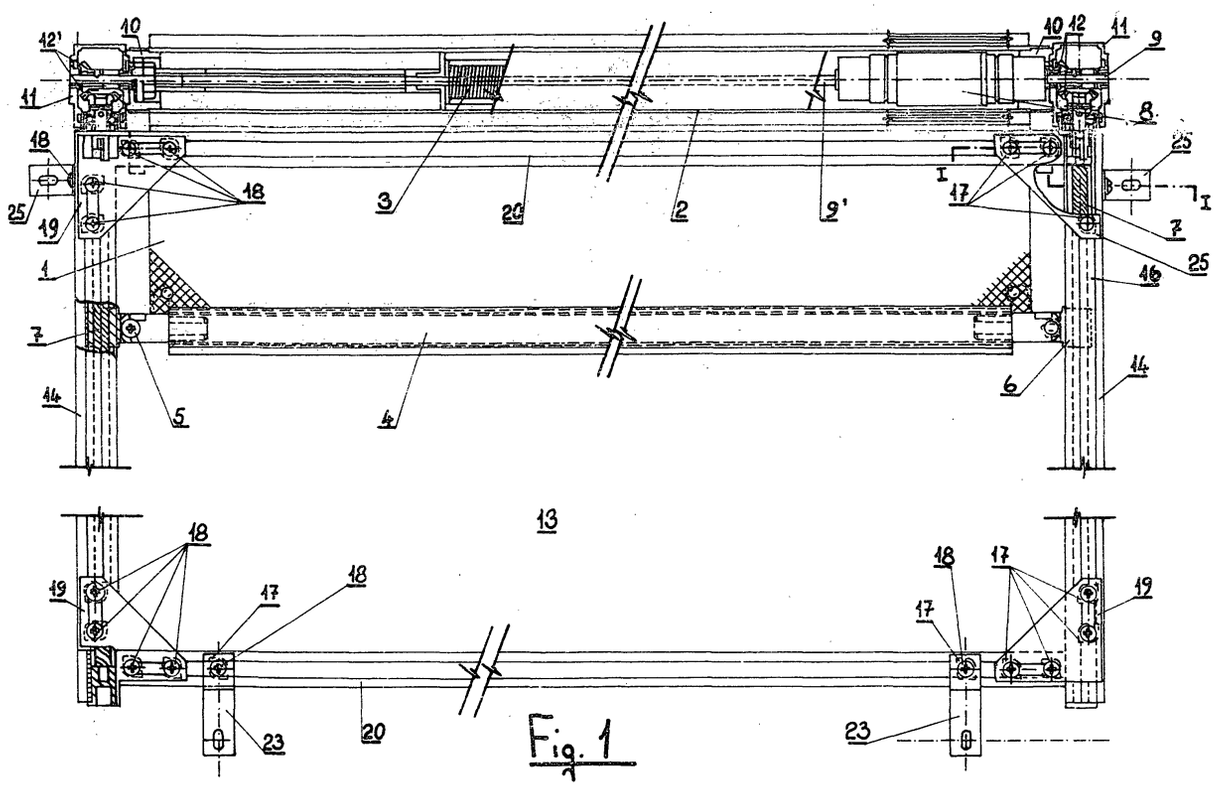

Fig. 1

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Description

[0001] Systems for control of the vertical motion of sunshades so as to cover partially or totally windows or door-windows or any other opening requiring temporary shading are commonly known. These devices are not only used to control sunshades, mosquito nets, roller curtains, etc. of windows and door-windows in residential and industrial buildings, but also for the windows of rail passenger cars, buses, industrial vehicles, watercraft and boats etc.

[0002] These generally known devices feature the sliding frame of the curtain in thin flexible material, such as fabric, plastic or other suitable material, the curtain being operated by hand or preferably by a geared motor located on the outside acting as a mechanical drive.

[0003] At its upper end, the curtain is wound around a drum provided with a self-winding coil so that the curtain is automatically rewound under tension so as to prevent its flapping and tattering. At its lower end, the curtain is fastened to a rigid horizontal crossbar, connected by suitable elements to end sliders with matching internal threads, meshing with two lateral worm screws having matching threads.

[0004] In short, when operating the geared motor in either direction, the worm screws will both rotate in one direction or in opposed direction causing lifting or lowering of the threaded sliders which, being connected to the lower crossbar, will move the lower edge of the curtain upwards or downwards. When the curtain is pulled down to cover the window, it unrolls from the upper drum, overcoming the action of the spring, when the curtain is pushed up, it automatically wraps around the drum under the action of the spring.

[0005] These known devices have the drawback of occupying much space, especially in height since the geared motor is mounted outside the supporting and sliding frame of the curtain, so that the bevel gears and driving shaft driving the worm screws and hence moving the curtain, are also located on the outside.

[0006] The invention in question has the aim to eliminate this drawback by mounting the geared motor at the top, inside the rewinding drum of the curtain, thus considerably reducing the space required for the control system, since a driving shaft at the lower end of the curtain supporting frame and external installation of the motor are no longer needed.

[0007] According to this invention, the geared motor has two opposed driven shafts penetrating at both ends in the support housings of the drum, where they are fitted with bevel gears, These bevel gears are driving two worm screws mounted in the uprights of the curtain frame; these worm screws are transmitting by sliders the vertical movement to the lower crossbar to which the curtain is fastened. Therefore, by operating the driving shafts in either direction, the curtain will be raised or lowered under the action or in reaction to the spring of the self-winding drum. This curtain mechanism designed for vertical handling of vertical covering areas, may also conveniently be used for horizontal or inclined motions to cover horizontal or slanting surfaces.

[0008] The invention in question is illustrated in a practical and exemplifying implementation in the enclosed drawings, in which:

Fig.1 shows a front view and partial section of the exemplified curtain control system;
Fig. 2 shows a magnified partial front view of the bearing frame of the curtain in Fig. 1;
Fig. 3 shows a cross section of the lateral structural shape of the frame in which the worm screw is mounted;
Fig. 4 shows a section of the transverse structural shape used for the bearing frame of the curtain;
Fig. 5 shows the horizontal section of the bearing frame of the curtain according to I-I axis in Fig. 1.

[0009] With reference to the above drawings, the thin panel-like curtain 1 in flexible material such as fabric, plastic or other suitable material, is fixed at the upper end and wrapped around a revolving drum 2, fitted with an axial spring 3 for self-winding.

[0010] This curtain 1 is secured at the other free and mobile lower end, for example by stitches or seams, to a horizontal crossbar 4 of any suitable shape, such as a strip or rod etc. in rigid metal or hard plastic material. At both ends of the above mentioned crossbar 4 are detachable links 5 connected to and acting on two internal threaded matching sliders 6 meshing with two lateral worm screws 7 having matching threads. These worm screws 7 are driven simultaneously by a geared motor 8 presenting two reduction gears and two driven shafts 9, 9' mounted inside the self-winding drum 2 and supported by suitable means 10 by one of the lateral supports 11 of the self-winding drum 2.

[0011] By means of the driven shafts 9, 9' and the bevel gear pairs 12, 12' which may reduce the gear ratio, the low voltage geared motor 8 acts on the worm screws 7, which will rotate in the direction imposed by the geared motor thus causing raising or lowering of the threaded sliders 6 which, connected to the lower crossbar 4 of the curtain 1 will push the free end of the curtain 1 up or down. When the curtain 1 is pulled down to cover, for instance, a window 13, it will unroll from the self-winding drum 2 overcoming the opposing action of the spring 3, while, when pulled upwards, it will automatically wind on the drum 2 under the pulling force of the winding spring 3.

[0012] The matching threads of the worm screws 7 and of the sliders 6 have a wide lead angle with respect to the transverse horizontal plane so that, in case of failure of the electromechanic drive, the curtain may be hand operated with reversible driven motion. When manually operated, the curtain is dragged and its inertial resistance keeps the curtain in the chosen position.

[0013] In this way, the curtain smoothly opens and

closes by balanced control, without any risk of getting stuck and will remain in a stable position.

[0014] The location of the geared motor inside the upper drum 2 reduces the space required for the control system in question as compared with known solutions.

[0015] The curtain as described above is mounted in a frame which makes it particularly functional and well structured. The lateral uprights will consist of box-type sections 14 featuring a slot 15 which during assembly will be facing inwards the window plane. The worm screw 7 and relative slider 6 are placed in each box-type section 14, whereas the slot 15 allows passage and lengthwise sliding of the link 5 of the slider 6 connecting the crossbar 4 of the curtain 1.

[0016] The box-type section 14 has a C-shaped configuration 16 on one side, normally on the inner side of the opening to be protected, with inward facing flanges suitable to house one or more small, rhomboid shaped plates 17 fitted with set screws 18 for blocking an external plate 19 which is here triangular shaped for exemplification, acting as a link between the lateral box type sections 14 and the upper and lower cross members 20.

[0017] These cross members 20 should preferably be H-sections, the two opposed heads forming double opposed C-shaped recesses 21, 22 and inward bent flanges. One of the C-shaped recesses 21 receives one or more small, rhomboid shaped plates 17 fitted with screws 18 blocking the external plate 19 having the task to connect the two lateral box type sections 14 to the cross members 20. The same recess 21 permits to secure the cross members 20, in particular the lower cross member, to the fixed wall around the windows or door-windows by means of shaped elements 23 blocked by one or more small rhomboid plates 17 provided with screws 18.

[0018] A fastening system in loco for the lateral sections 14 is also provided because the box type section 14 features adjacent to the C-shaped configuration 16, a further C-shaped configuration 24 with inward bent flanges apt to receive one or more rhomboid shaped plates 17 fitted with screws 18 to secure the section 14 to the wall by means of the shaped element 25.

[0019] Obviously, the lateral sections 14 and the cross members 20 may also have another configuration and their connecting system may also be different.

[0020] The curtain, subject matter of this invention, may be mounted in a vertical plane to cover vertical windows or door-windows and it may also be mounted in a horizontal or inclined plane to cover windows, door-windows or any other horizontal or inclined lighting or aeration opening (domes or skylights).

[0021] Obviously, the above invention, the description of which is intended as standard and not as a limitation, may be subject to variations and adjustments depending on its envisaged applications while remaining within the scope of this invention.

Claims

1. System to control the vertical, horizontal or inclined movement of sunshades, mosquito nets, roller curtains etc. consisting of:

   - a thin curtain (1) in flexible material, one end of which is wound around a revolving drum (2) provided with a self-winding axial spring (3), while this curtain may be replaced by a suitable panel acting as mosquito net or by strips forming roller curtains,
   - a horizontal crossbar (4) in rigid material fixed in some way to the lower free and mobile end of the curtain (1),
   - sliders (6) with internal matching threads connected to both ends of the crossbar (4) by means of links (5),
   - worm screws (7) with matching threads meshing with the internal threads of the sliders (6),
   - a low voltage geared motor (8) operating the worm screws (7),
   - a frame (14, 20) consisting of lateral and transverse sections connected by links (17, 18, 19),

   characterised in that the geared motor (8) is mounted inside the self-winding drum (2) and features two reduction gears and two opposed driven shafts (9, 9') and is supported with proper means (10) by one of the lateral bearing elements (11) of the self-winding drum (2) thus reducing the total space required by the control system subject matter of this invention.

2. Control system as described in claim 1, ***characterised*** **in that** each driven shaft (9, 9') of the geared motor (8) controls by univocal rotation of bevel gear pairs (12, 12'), the lateral worm screws (7) driving the sliders (6) which in turn are acting on the crossbar (4) and on the mobile end of the curtain (1).

3. Control system as described in claim 1, ***characterised*** **in that** each lateral section (14) is a box type section featuring a longitudinal slot (15) for passage and lengthwise sliding of the element (5) linking the slider (6) to the crossbar (4) of the curtain (1) and featuring on both adjacent sides two longitudinal C-shaped configurations (16, 24) with flanges bent inwards to secure the lateral sections (14) to the cross members (20) and to fasten the curtain frame to the fixed bearing structure.

4. Control system as described in claim 1, ***characterised*** **in that** each horizontal cross member (20) consists of an H-section featuring two opposed heads forming longitudinal opposed C-shaped recesses (21, 22) with inwards bent flanges, so that the C-shaped recesses will permit to connect the

cross members (20) to the lateral sections (14) and to secure the frame to the fixed bearing structure.

5. Control system as described in claim 1, ***characterised*** **in that** preferably triangular shaped plates (19) are fitted at the nodes connecting the lateral sections (14) to the cross members (20), these plates (19) being fastened by screws (18) to the small rhomboid shaped plates (17), inserted between the recess (16) of the lateral section (14) and the recess (21) of the cross member (20).

6. Control system as described in claim 1, ***characterised*** **in that** shaped elements (23, 25) are provided to secure the frame to the fixed supporting structure by means of screws (18) and small rhomboid shaped plates (17) inserted in the recess (24) of the lateral section (14) and the recess (21) of the cross member (20).

7. Control system as described in claim 1, ***characterised*** **in that** it may be mounted vertically to protect vertical window or door-window openings or may be mounted horizontally or inclined to cover horizontal or inclined surfaces such as domes, skylights, etc.

8. Control system as described in claim 1, ***characterised*** **in that** the thread angle with respect to the horizontal plane of the worm screw (7) and of the slider (6) is such as to ensure easy manual operation and stability of the curtain (1) in case of failure of the electromechanical system.

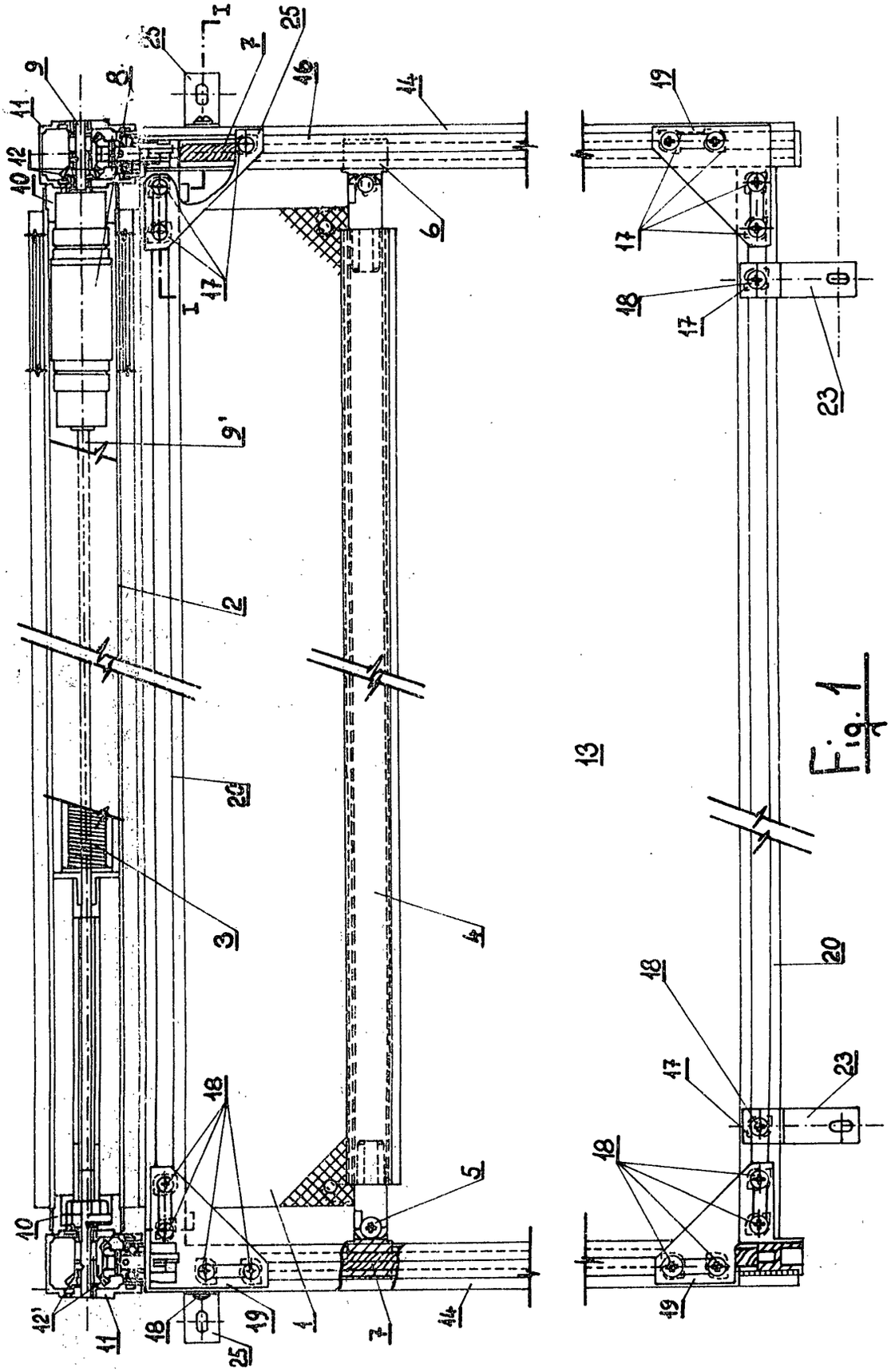
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Fig. 1

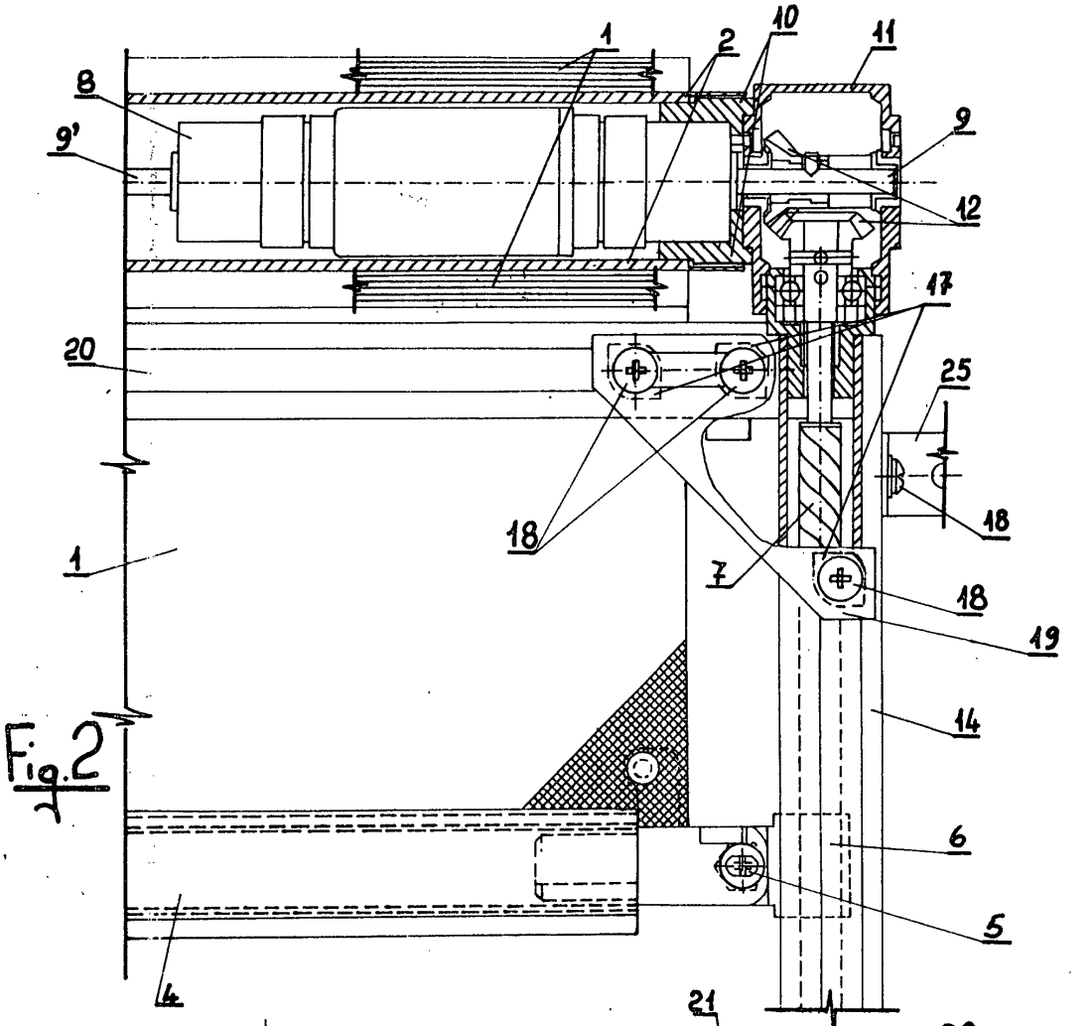

Fig.2

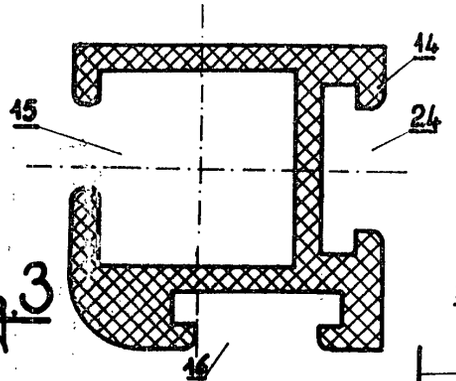

Fig.3

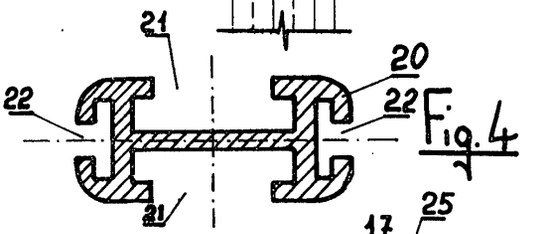

Fig.4

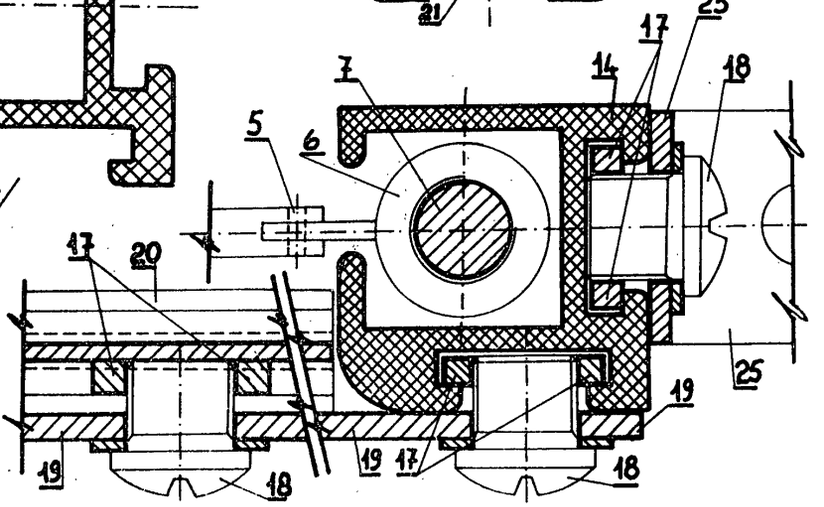

Fig.5