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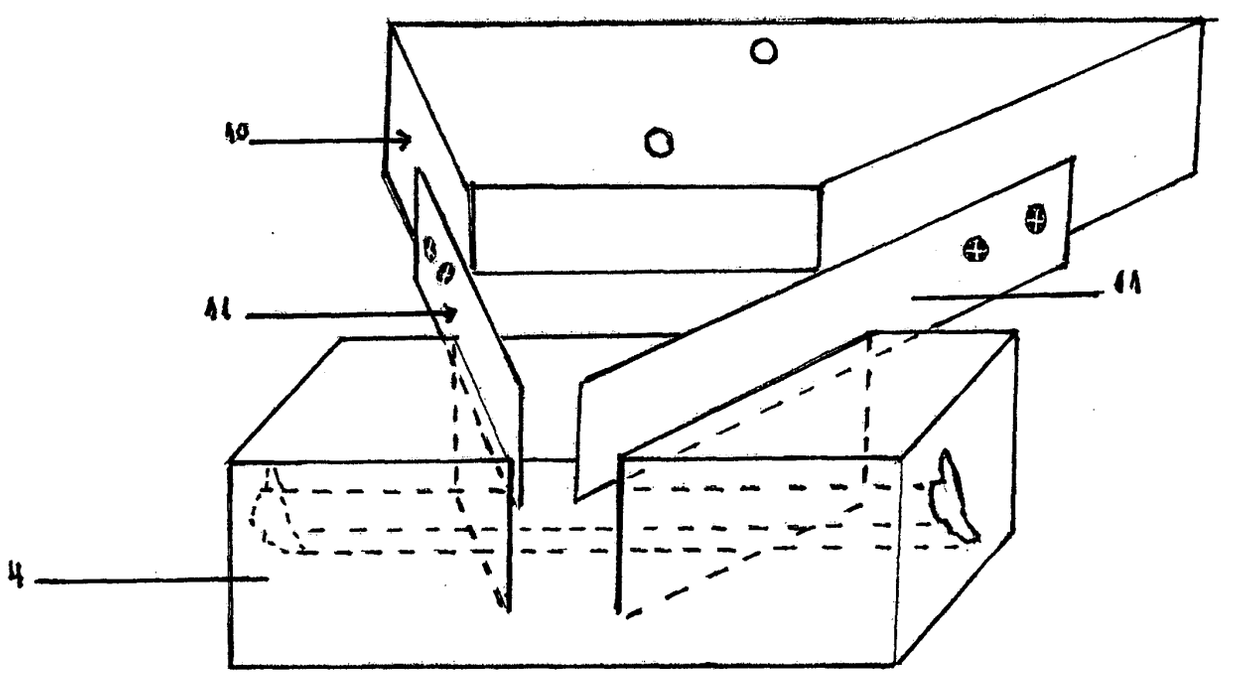
(54) Cutting machine for various types and sizes of multiform rubber

(57) The machine invented allows the cutting of various shapes of rubber without distorting their shape and cross-section. Both sides of the rubber are cut in order to ensure that they meet at the proper angle. It consists of the following: A) a feeding mechanism, which includes a tubular support base (3) formed by mounting rods (13) and spinning wheels (1) for the placement of the rubber; B) a metal base for the cutting mechanism (5), the adjustment and holding mould (4), which has a through cross-section in the middle and slits for guiding the blades, the mobile guiding arm (6), which has above it the angle and degree selection head (10) with the cutting blades (11); C) the workbench, which includes a groove for fastening and aligning the rubber and has a measurement gauge at the bottom.

FIGURE 15a



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Description

[0001] The invention concerns a cutting machine for rubber of various types and sizes, which consists of a support base, a feeder base, the working surface (bench), and the cutting system for the rubber.

[0002] The various shapes of rubber are used for scaling fixed and mobile opening parts of aluminum, wooden, synthetic, and metal doors, in terms of the most appropriate angle of cutting where the two cutting parts meet.

[0003] Current technology provides us various types of scissors for the cutting of rubber: manual, pneumatic, hydraulic, and electrical scissors. The above scissors systems, with their particular design and functioning, succeed in cutting the rubber but do not produce the desired precise result. The methods of scissors existing to this day have the following disadvantages: 1) they do not have the expected corners on the rubber surfaces that are supposed to meet because they cannot create the appropriate angle, due to the peculiarity of rubber when it is cut. 2) Commercial pieces of rubber have various shapes, dimensions, and sizes: for example rubber pieces with chambers, rubber bubbles, rubber in oval shapes and many others, which are present in the market. We do not succeed in cutting the pieces of rubber correctly because of the pressure that is created between the two parts of the scissors. Therefore, the piece of rubber is deformed and consequently cut unevenly. 3) The proper slope and angle in terms of the fastening base of the piece of rubber cannot be achieved. 4) There is not the proper stability of the parts of the piece of rubber; the result of this is that they sway, and when they return to their original position, they do not join properly. In contrast, the advantages of the present invention are the following: 1) It permits the cutting of multiform pieces of rubber in general and of various related types of rubber. 2) It guarantees the stability ofthe angle, and therefore we ensure a proper joining at the corners. 3) It does not allow deformation of the rubber or make its parts uneven, because it comes into special moulds for adjustment and holding multiform pieces of rubber in place. 4) The parts of the base of the rubber are held in place and the proper angle for its cutting is achieved. 5) According to the type and form of rubber, there is an appropriate mould to adapt the piece of rubber and keep it in its place. 6) The cutting machine for rubber is manually operated and can also be operated pneumatically (with compressed air), hydraulically (with oil under pressure), and electrically; therefore, no damage is caused during its operation.

[0004] The current patent mainly concerns the cutting and holding system for rubber in terms of the proper slope and angle but also, as a functional whole, the feeding mechanism and the measuring gauge. The feeding mechanism consists of the spinning wheels - round bases for placement of the rubber pieces, where the coils of the various types and sizes of rubber are adjusted. The spinning wheels are supported by the mounting rods, which are connected with the metal support base and the metal base of the workbench. The metal base of the workbench is connected on one side to the metal support base, and on the other side to another metallic base that supports the workbench. The table has a groove for aligning the rubber and holding it in place simultaneously. The groove has a measurement gauge at the bottom for the proper selection of the size of the rubber piece. When we choose the type of rubber, we take the coil and place it inside the spinning wheel. At the same time, we choose the mold for adjustment and holding of the multiform rubber, in which we place the rubber that passes below the metal support base. The mold is adjusted and screwed to the metal base of the cutting mechanism. The support base consists of a tubular metal structure on which the metal base of the cutting mechanism is fastened. After this, the base of the cutting mechanism consists of two metal bases that connect to the mobile guiding arm, to which the head for selection of the angle of cutting is adjusted. Two cutting blades are adapted to the cutting angle head, and these enter with vertical pressure, which is applied with the movement handle and is connected to the mobile guiding arm, into the slits for guiding the blades that arc located on the adjustment and holding mould.

[0005] One way to apply the invention is described in figure 1, which presents a perspective of the machine. Figure 2 is a perspective of the tubular metal support base. Figure 3 is a perspective of the metal base of the cutting mechanism. Figure 4 is a perspective of the mobile guiding arm of the cutting mechanism. Figure 5 is a perspective of the metal workbench with the measurement gauge and the grooved guide for alignment and holding of the rubber. Figure 6 is a perspective of the mounting rods. Figure 7 is a perspective of the spinning wheel for multiform rubber. Figure 8 is a perspective of the rubber coil. Figure 9 is a cross-section of the peg holding the spinning wheel in place. Figure 10 is a perspective of the angle selection head for the cutting mechanism. Figure 11 is a cross-section of the cutting blade. Figure 12 is a perspective of the adjustment and holding mould for multiform rubber. Figure 13 is a cross-section of the handle for movement of the guiding arm. Figure 14 shows a cross-section of the peg that holds and fastens the mobile guiding arm to the metal base of the cutting mechanism. Figure 15 is a perspective of the combined operation of the cutting blades with the slots that are present in the adjustment and holding mould.

[0006] Figure 1 shows the cutting machine for multiform rubber in perspective. The spinning wheel (1) on which the rubber coil (2) is placed. We take the end of the rubber from the coil and pass it below the tubular support base (3).

[0007] Next we place the rubber in the adjustment and holding mould (4), which was chosen according to the shape of the rubber, parallel to the direction of the mould and we push the rubber forward in order for it to pass

by the other side of the mould that has a cross-section from one end to the other. The adjustment and holding mould (4) is adjusted and screwed to the metal base of the cutting mechanism (5). The metal base consists of the mobile guiding arm (6) of the cutting mechanism, for which the holding and clamping of both parts occurs with a peg (7), which is connected to the movement handle (8). The mobile guiding arm is also connected to the angle and degree selection head (9), which has two cutting blades (10) made of metal with high standards. The metal support base (3) is connected to the workbench (12), which has metal supports on the other side and has a grooved guide for alignment and mounting in accordance with the measurement gauge. The workbench (12) is also connected to the mounting rods (13) on which the spinning wheels are placed.

[0008] In figure 2 we see a perspective of the metal support base (3) for various dimensions. The holes for connection and clamping (1) connect the metal base of the cutting mechanism (5). The holes for connection and fastening (2) connect the mounting rods (13) and the holes (3) connect the workbench that has an alignment groove with the measurement gauge.

[0009] In figure 3 we see in perspective the base of the cutting mechanism (5), which touches and is connected to the tubular support base (3). In the middle, it has a depth adjustment mechanism and a return spring (4) that does not allow the mobile guiding arm (6) with the cutting blades (11) on it to enter the adjustment and holding mold (4) for multiform rubber. That is, the pressure that is exercised for the cutting of the rubber is such that it does not allow damage to the cutting blades or the adjustment and holding mould. The return spring (4) brings the mobile guiding arm (6) back to its original position in order for the cross-section of the mould (15) for multiform rubber to stay open and for the rubber to pass through.

[0010] Figure 4 shows a perspective of the mobile guiding arm (6) whose holes (7) are connected to the holes (5) in the base of the cutting mechanism (5) where the holding and clamping peg (14) that allows movement of the guiding arm (6) enters. The movement of the mobile guiding arm ends at the depth adjustment mechanism (4) and returns to its original position with the return spring (4). The holes (8) on the front part of the mobile guiding arm (6) connect to the angle -- degree selection head (10) of the cutting mechanism below them, and on top, they connect on top to the movement handle (8) of the mobile guiding arm (6).

[0011] In Figure 5, we see a perspective of the workbench (12), which on one side is connected to the tubular support base (3) and on the other, to the metal supports, where there are holes that connect the mounting rods (13). In the front, the workbench (12) has along its length a grooved guide for the alignment of the rubber with a measurement gauge at the bottom. The groove with the measurement gage is located along the same line with the adjustment and holding mould (4) for the rubber in order for the length of the rubber to be the one desired for its cutting.

[0012] Figure 6 is a perspective of the mounting rods (13) that are connected on one side to the tubular support base (3) and on the other, to the metal supports of the workbench (12). They have holes through which the spinning wheels (1) are held fast by means of clamping pegs (9), in order for them to turn comfortably and for the rubber to unwrap from the coils (2) that are placed inside the spinning wheels.

[0013] Figure 7 is a perspective of the spinning wheel for multiform rubber. The spinning wheel (1) consists of a disk in its lower part for the support of the coil, which at its center is connected to a cylindrical tube and has one hole where the clamping peg (9) of the spinning wheel fits, in order to allow it to spin easily.

[0014] Figure 8 is a perspective of the coil for multiform rubber. The coil is placed on the spinning wheel (1) and adjusted in order to turn and for the rubber to unwrap. Multiform rubber pieces are present on the market in the form of a coil for their easy use.

[0015] In Figure 9, we see a cross-section of the clamping peg (9) for the spinning wheel (1). It connects the mounting rods to the spinning wheels.

[0016] Figure 10 is a perspective of the angle - degree selection head of the cutting mechanism. The head may be made of metal, plastic, or aluminum. As long as the selection of the degrees and angle of the rubber is made, we manufacture the respective head. The head has two fins at its edges, where the cutting blades (11) are attached by screws; they stand out at its front edge, where they almost join each other. On top, the head has two holes where the front of the mobile guiding arm (6) is attached by screws.

[0017] Figure 11 is a cross-section of the cutting blade. It is manufactured in a resistant metal (steel), and the lower part of its edge is sharp. Its rear side bears two holes where the fins of the angle - degree selection head of the cutting mechanism (10) are attached by screws.

[0018] Figure 12 is a perspective of the adjustment and holding mold for multiform rubber, for at least three types of rubber. It can be made of plastic or aluminum. At its center, it has a through cross-section for the choice of the cut for the rubber. Its cross-section is open from one end to the other in order for the rubber to adjust, to be fastened, and to pass through easily. It has two slits to guide the blades, built in accordance with the degrees chosen on the angle - degree selection head of the cutting mechanism (10) and they are the ones that hold the cutting blades (11) firmly in place during their penetration of the mould. They reach the end of the mould's cross-section and not the end of the adjustment and holding mould. In the same drawing, we see several designs of multiform pieces of rubber, for which the respective adjustment and holding moulds can be manufactured.

[0019] Figure 13 presents a cross-section of the

movement handle for the guiding arm. It is a tubular construction, with holes on one end that is attached by screws to the upper part of the mobile guiding arm and on the other end it has a compact rubber casing.

[0020] Figure 14 presents a cross-section of the peg that holds and clamps the mobile guiding arm to the tubular base of the cutting mechanism. It consists of a compact cylindrical tube with a thread on each end for the fastening of the mobile guiding arm and the tubular base of the cutting mechanism.

[0021] Figures 15a and 15b are perspectives of the combined operation of the angle and degree selection head (10) and the cutting blades (11) with the blade guiding slits of the adjustment and holding mould (4). Here we see the exact functioning of the cutting system with a combination of the head, the cutting blades, and the adjustment and holding mould.

Claims

1. A cutting system for multiform rubber, **characterized by** the fact that it consists of an adjustment and holding mould (4), the guiding arm (6) and the cutting angle - degree selection head (10) that has two cutting blades (11).

2. According to Claim 1 the adjustment and holding mould for multiform rubber (4) has the shape of a rectangular parallelogram and it can be made of plastic or aluminum. In the middle, it has a thorough cross-section for the selection of rubber pieces, where the rubber adjusts and is held fast, as are the slits guiding the blades.

3. According to Claim 2 the complete cross-section of the adjustment and holding mould (4) is manufactured according to how we want the rubber to be cut (sideways or vertically). According to the shape of the rubber, the cross-section can be from 1 centimeter to 4 millimeters larger, upward and to the side, in order for the rubber to pass through more easily. In the cross-section, the rubber fits exactly at the bottom in order for the adjustment and fastening of the rubber to cause it to be cut perfectly without any risk of altering its shape.

4. According to Claim 2 the slits guiding the blades that are located on the adjustment and holding mould (4) and at its central point, and they reach the end of the cross-section of the rubber and not the end of the mould. They have the same cutting angle as the angle and degree selection head (10), which is attached to the cutting blades (11) that enter the rubber vertically with precision in order to cut it. The diameter of the slits is from 1 to 3 millimeters, in order to avoid swerving or breaking of the cutting blades (11). The cross-sections for rubber of various sizes are always located at the same distance from the front of the adjustment and holding mould (4), in order to achieve the proper cutting of the rubber in terms of its length.

5. According to Claim 4 the angle and degree selection head (10) is screwed onto the front and lower part of the mobile guiding arm (6) and 1 to 5 millimeters of it are located behind the adjustment and holding mould (4) in order for it to pass by the rear part of the adjustment and holding mould (4) and to allow the entry of the cutting blades (11) for the entire length of the complete cross-section. It is made of plastic or aluminum and permits the selection of the degrees at which we wish to cut the rubber, from 0° to 65° on each side where the cutting blades (11) are attached.

6. According to Claim 5 the cutting blades (11) are **characterized by** the fact that they are made from metal according to high standards (steel), that the lower part of them is sharp and they project along the length of the angle and degree selection head (10), where they are attached by screws along a length from 3 to 7 centimeters, with a thickness ranging from 0.2 millimeters to 1 millimeter.

7. According to Claim 1 the mobile guiding head (6) is made of plastic or metal or aluminum and is connected to the tubular base of the cutting mechanism (5) and to the fastening and clamping peg, with the point of connection between the peg, the mobile guiding arm (6), and the tubular base being at the height of the complete cross-section of the adjustment and holding mould (6), in order for the cutting blades (11) to be in a horizontal position when they are located at the center of the cross section, so as to avoid circular movement by the mobile guiding arm (6). In this way, the vertical contact of the cutting blades (11) with the slits guiding the blades is ensured. The mobile guiding arm (6), approximately at the middle of its lower part, bears a depth adjustment mechanism, which consists of a height adjustment screw. With a vertical movement of the mobile guiding arm (6) that comes into contact with it, the result is that the cutting blades (11) do not strike the adjustment and holding mould (4). At the same time, we can achieve an adjustment so that at the lower part of the rubber, a small point 1 millimeter in size is not cut, in order to achieve removal of any edge trimmings by pulling the rubber for the next cut. The movement handle for the cutting mechanism (8) is screwed onto the top front part of the mobile guiding arm (6).

8. According to Claims 2 and 3, the adjustment and holding mould (4) has a through cross-section for multiform rubber.

The cross-section for the various sizes of rubber pieces is located at the same distance from the front of the adjustment and holding mould (4) in order to achieve the proper cutting of the rubber in terms of length.

9. According to Claims 4, 5, and 6, the slits for guiding the blades are manufactured in accordance with the angle and degree selection head (10) that has the cutting blades (11) on top. That is, whatever number of degrees we choose for the angle and degree selection head (10), that many are the degrees for the blade guiding slits, where the cutting blades enter (11), and these have the same angle as the angle and degree selection head (10) and the blade guiding slits.

10. According to Claims 2, 3, 4, 5, 6, and 7, the cutting machine can be attached to an automatic electric feeding system, with an electronic measurement gauge, in order to increase the production of cut multiform rubber. The order to move the mobile guiding arm (6) may be manual, pneumatic (compressed air), hydraulic (oil under pressure), or electrical. For greater production of the cutting machine, we may place more than one cutting system in a row and next to each other, and slightly in front of the previous adjustment and holding mould, in order for the rubber to have freedom of movement. In addition, they can have one common workbench with each cutting machine having its own measurement gauge and alignment and fastening groove in order not to change the adjustment and holding moulds.

FIGURE 1

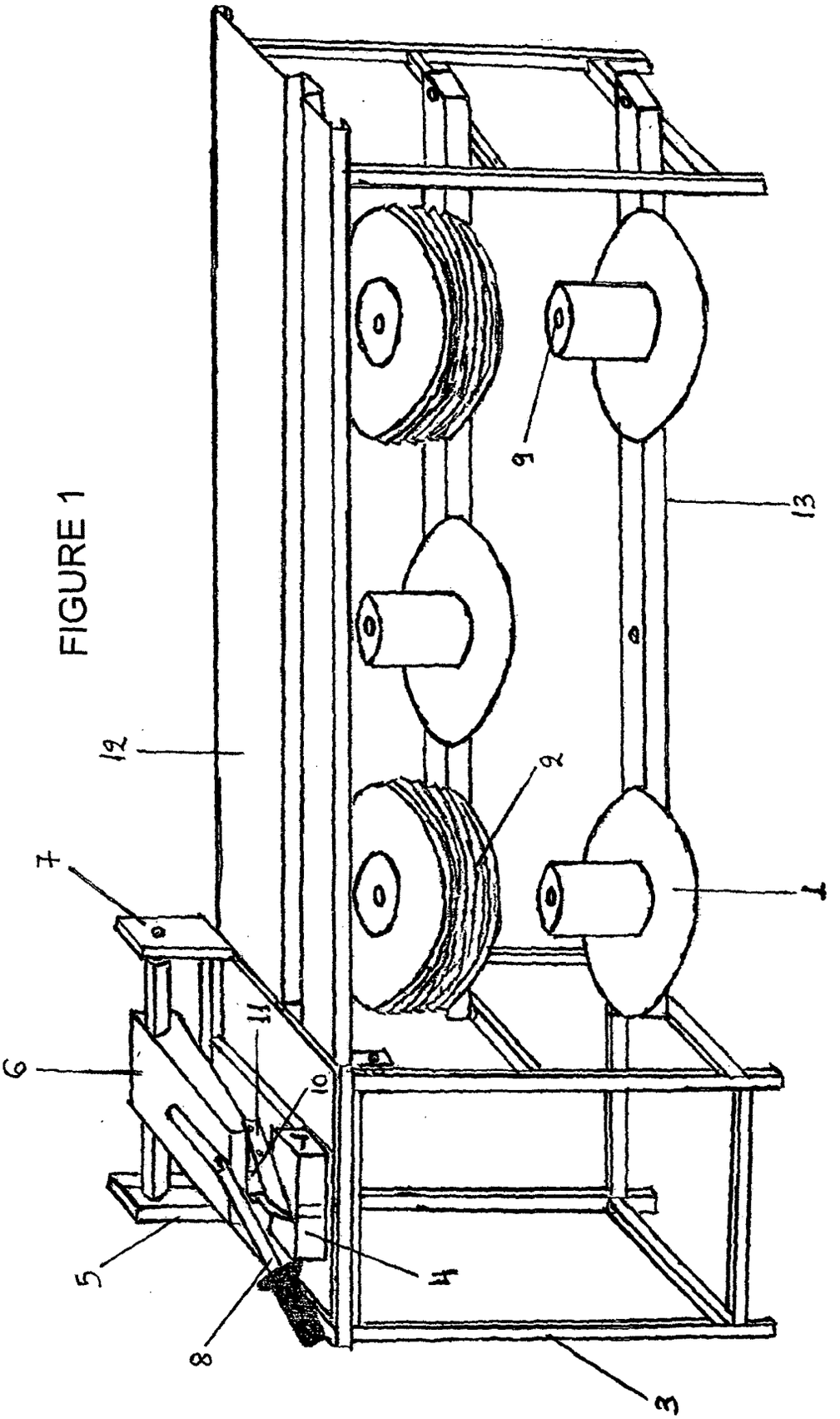


FIGURE 3

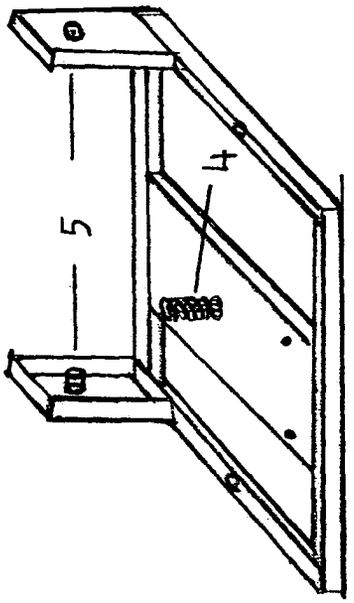


FIGURE 4

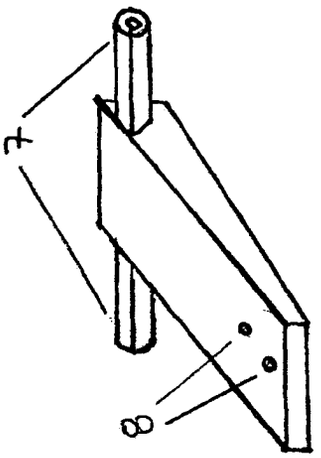


FIGURE 2

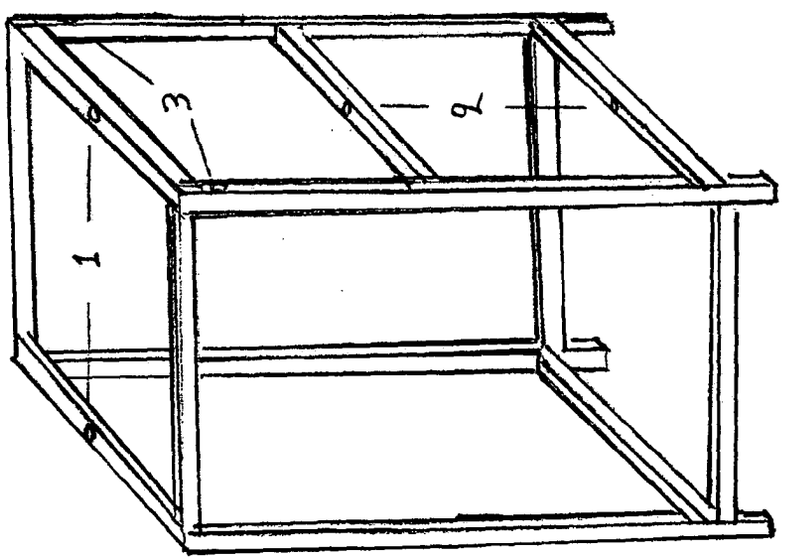


FIGURE 5

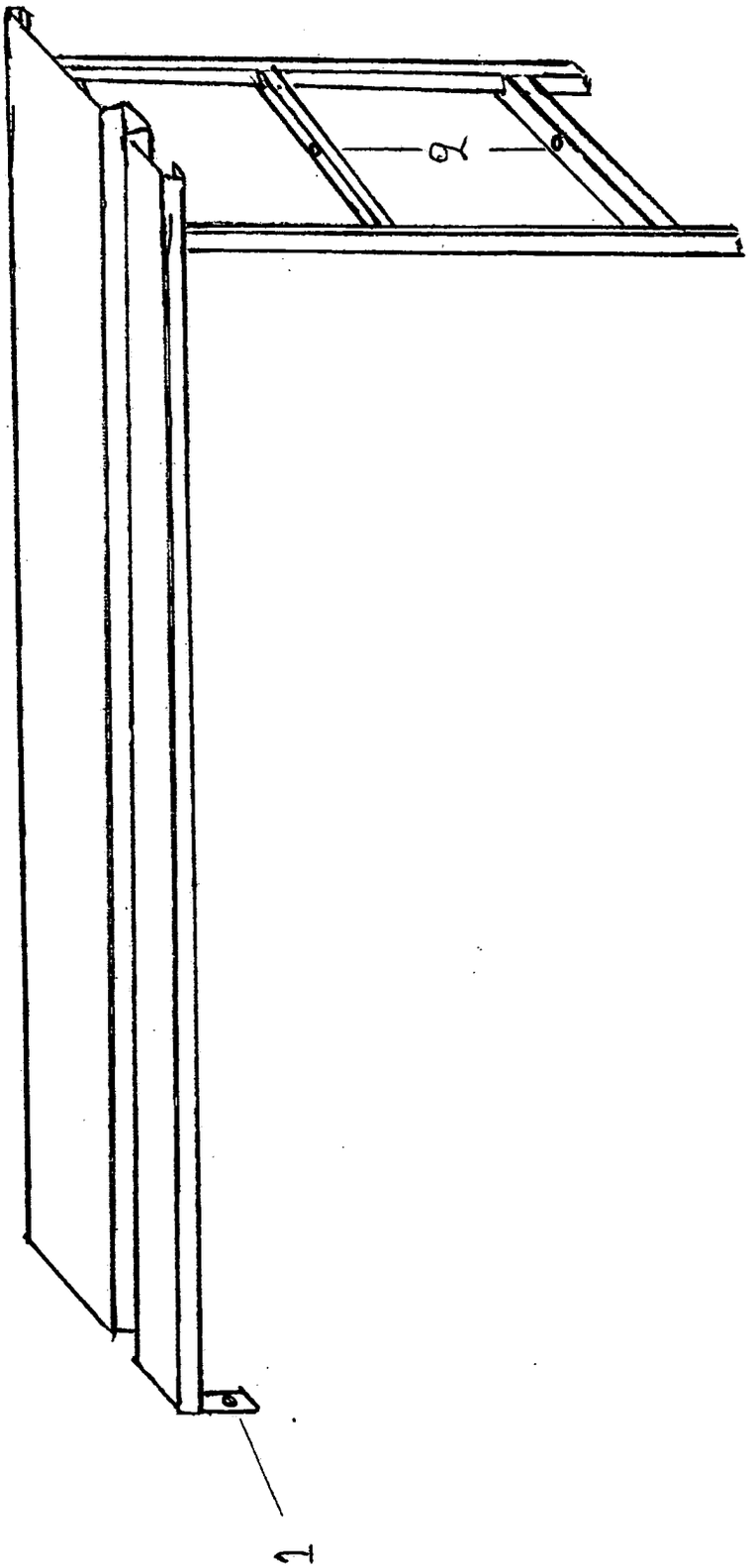


FIGURE 6

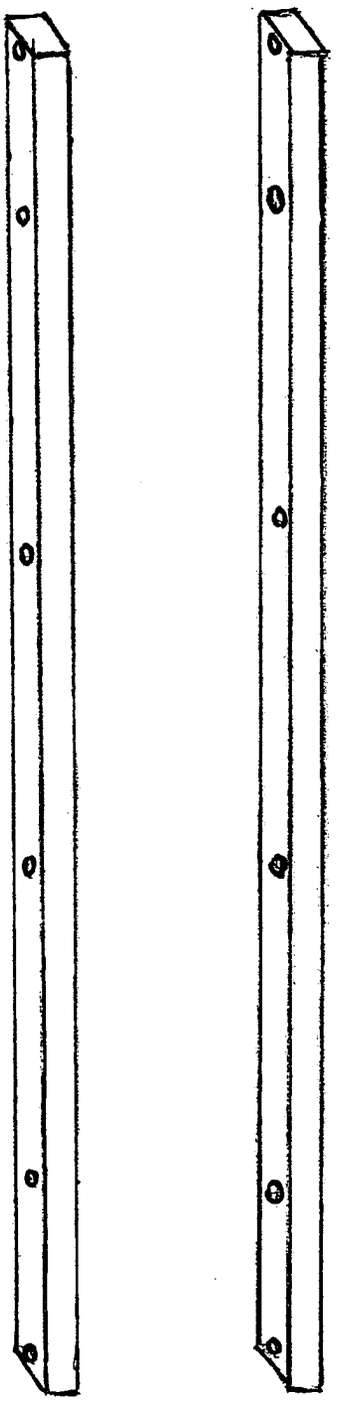


FIGURE 9

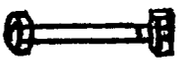


FIGURE 8

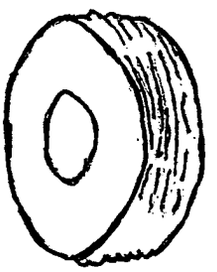


FIGURE 7

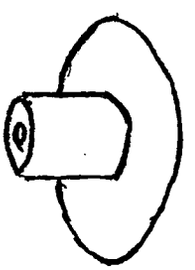
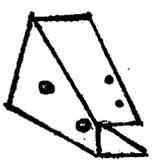


FIGURE 11

FIGURE 10



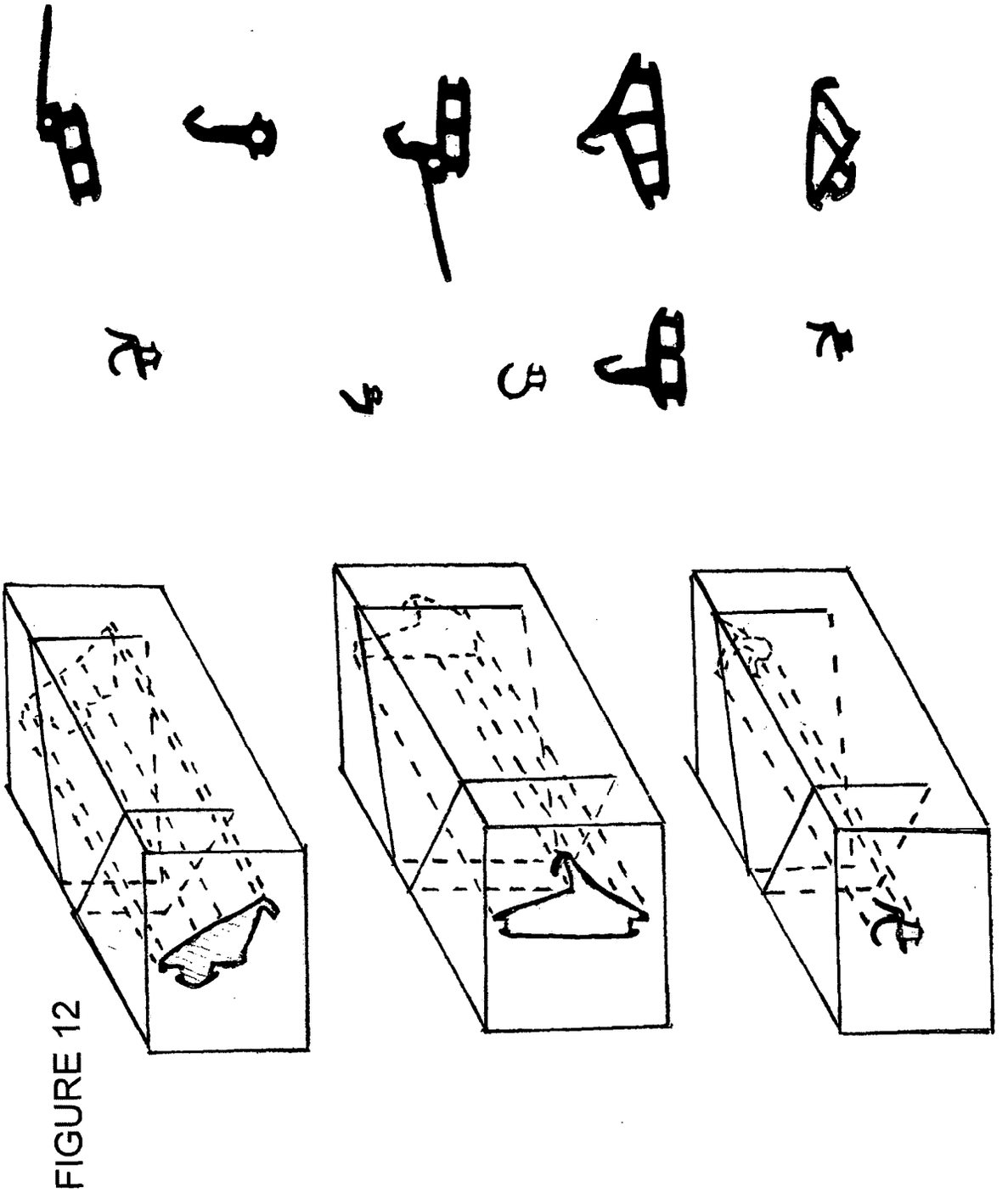


FIGURE 12

FIGURE 14

FIGURE 13

FIGURE 15a

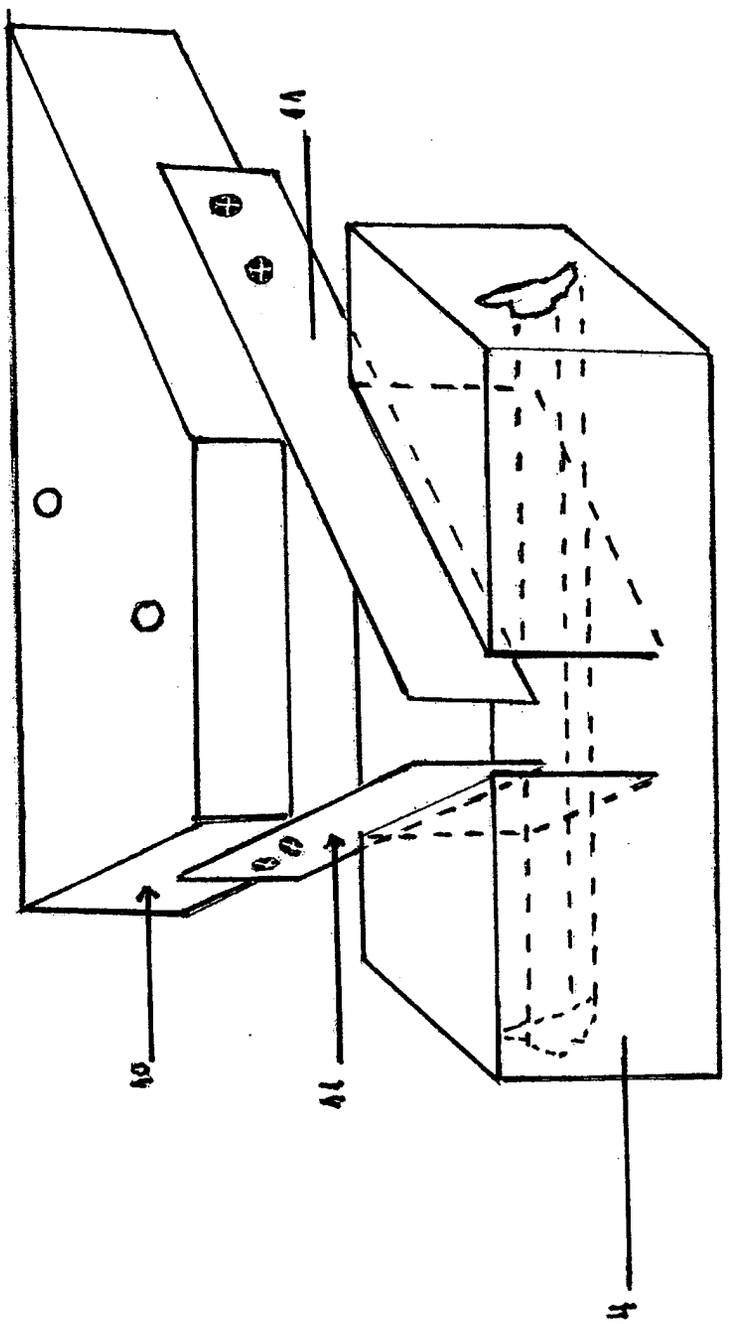
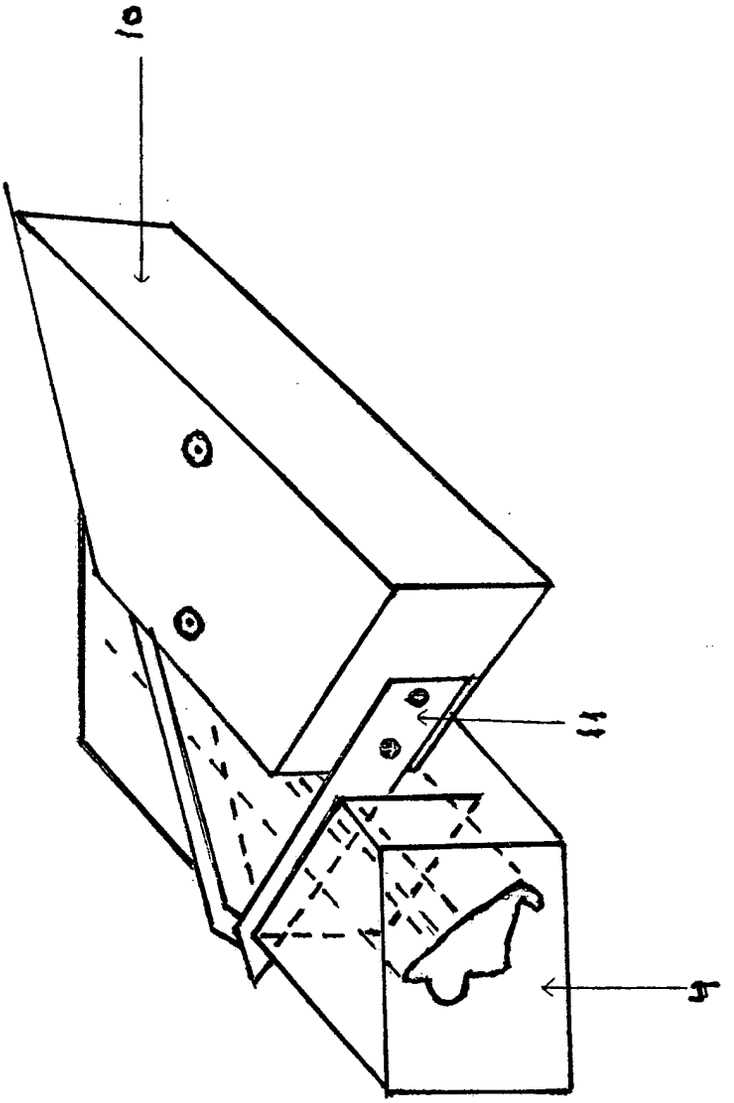


FIGURE 15b



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EUROPEAN SEARCH REPORT

Application Number
EP 04 38 6022

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 September 2004	Rabolini, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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