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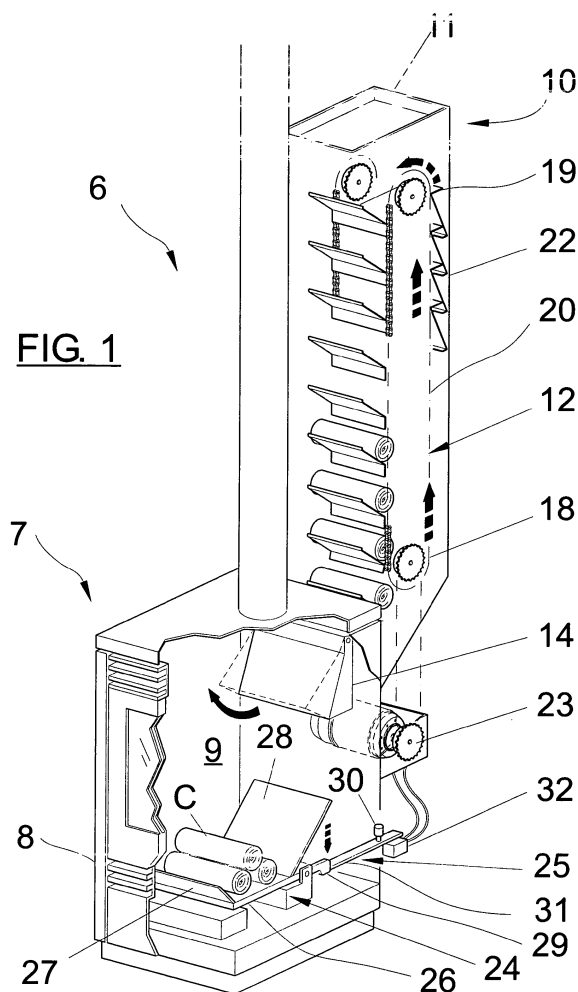
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(54) **Heating appliance automatically supplied with solid fuel**

(57) Heating appliance automatically supplied with solid fuel, comprising a containing/sustaining structure, a combustion chamber provided inside such containing/sustaining structure for the burning of such solid fuel and introducing means supported by such containing/sustaining structure and connected to such combustion chamber for introducing such solid fuel into such combustion chamber, sustaining means set up in mobile fashion inside such combustion chamber to sustain such solid fuel during combustion and controlling means associated with such sustaining means to control such sustaining means, under conditions of insufficient solid fuel loading, into an activating position so to activate such introducing means to introduce such solid fuel to such combustion chamber. Such appliance solves the drawbacks encountered at the state of the art, as it is fitted with an automatic supply system for solid fuel having qualitatively variable shapes and characteristics.



Description

[0001] The object of this invention consists in an heating appliance automatically supplied with solid fuel particularly, but not exclusively, destined for household uses.

[0002] The household heating field has widely diffused heating appliances automatically supplied with solid fuel. In particular, the appliances automatically supplied with a solid fuel of vegetable origin in the form of woody granules or particles commonly known as "pellets" are in widespread use and appreciated because of their obvious environmental and economical qualities. These appliances are essentially constituted of a containing/sustaining structure, a combustion chamber provided in the interior of such containing/sustaining structure to burn such solid fuel, and introducing means supported by such containing/sustaining structure and connected with said combustion chamber so as to introduce such solid fuel into such combustion chamber. The operation of these appliances essentially involves a sequence of a phase of loading the fuel to be burned, a phase of lighting up the combustion, a phase of continuous combustion and a phase of extinguishing the combustion. In the loading phase, the introducing means automatically introduce initial solid fuel into the combustion chamber. In the lighting phase, such initial solid fuel is manually lit by the user or in an automatic manner. In the combustion phase, the introducing means are designed to periodically introduce additional solid fuel to actively sustain the combustion. In the final extinguishing phase, the introducing means interrupt the introduction of the fuel into the combustion chamber, so that the combustion is gradually forced to exhaust itself.

[0003] The main drawback pointed out in these appliances derives from the fact that they are only suitable for the use of a solid fuel of essentially constant qualitative shapes and characteristics, such as the mentioned granular or particulate woody fuel. These appliances are therefore unsuitable for the use of a solid fuel exhibiting qualitatively variable shapes and characteristics, such as piece-wise burning wood where each piece exhibits its own ways and time periods of combustion. In fact, it may occur that a piece of burning wood of small size is incapable of sustaining an active combustion up to the point of introducing a subsequent piece into the combustion chamber, while a piece of substantial size is capable of extending the combustion beyond the point of introducing the subsequent piece into the combustion chamber.

[0004] The aim of this invention is to set up an heating apparatus automatically supplied with solid fuel able of solving the drawbacks encountered in the heating appliances according to the prior art described above.

[0005] Within this aim, an object of this invention is to set up an heating appliance fitted with an automatic solid fuel supply system having qualitatively variable shapes and characteristics.

[0006] Not the last object of the present invention is to set up a heating appliance of a simplified design and construction, so as to make it possible to limit its production costs.

5 **[0007]** This aim, these as well as other objects that will be better apparent in the following are achieved by an heating appliance automatically supplied with solid fuel according to the attached claims.

10 **[0008]** According to main characteristics of the invention, the heating appliance advantageously comprises a containing/sustaining structure, a combustion chamber provided inside such containing/sustaining structure to burn such solid fuel and introducing means supported by such containing/sustaining structure and connected to such combustion chamber to introduce such solid fuel into such combustion chamber, sustaining means fitted in a mobile manner inside such combustion chamber to sustain such solid fuel during combustion and controlling means associated with such sustaining means so as to control such sustaining means, under conditions of insufficient loading of such solid fuel, into an activating position to activate such introducing means to introduce such solid fuel to such combustion chamber.

15 **[0009]** This solution allows achieving the object of setting up an heating appliance equipped with an automatic supply system of solid fuel of qualitatively variable shapes and characteristics, because the automatic introduction of the solid fuel into the combustion chamber is regulated based on an objective and characteristic parameter of the combustion itself, as represented by the amount of fuel present in the combustion.

20 **[0010]** Further characteristics and advantages of the invention will become better apparent in the description of an embodiment of the heating appliance automatically supplied with solid fuel as illustrated, for indicative yet not limiting purposes, in the three enclosed drawings, wherein:

- 25 - Figure 1 represents a partially sectionalized view of an heating appliance, according to the invention;
- 30 - Figure 2 represents a first detailed view, on an enlarged scale, of the mentioned introducing means of the heating appliance of the previous figure;
- 35 - Figure 3 represents a second detailed view, on an enlarged scale, of the mentioned introducing means of the heating appliance of Figure 1;
- 40 - Figure 4 represents a third detailed view, on an enlarged scale, of the mentioned introducing means of the heating appliance of Figure 1;
- 45 - Figure 5 represents a fourth detailed view, on an enlarged scale, of the mentioned introducing means of the heating appliance of Figure 1.

50 With reference to the Figures in the enclosed drawings, and initially to the enclosed Figure 1, the heating appliance is indicated as a whole by the reference number 6 and the solid fuel is indicated by the reference symbol C. Such appliance 6 comprises above all a containing/sus-

taining structure, indicated as a whole by the reference number 7, which in turn comprises an enclosing shroud of an essentially parallelepiped shape.

Such appliance 6 further comprises a combustion chamber, designated on the whole by the reference number 9, provided inside such containing/sustaining structure 7 to burn such solid fuel C. In detail, such combustion chamber comprises a space limited on the bottom, top and sides by said enveloping shroud 8.

Such appliance 6 also comprises introducing means 10, supported by such containing/sustaining structure 7 and connected with said combustion chamber 9 to introduce such solid fuel C into such combustion chamber 9. In detail, such introducing means 10 comprise a sustaining body 11 applied in a vertical condition behind such containing/sustaining structure 7, and a conveying device, indicated on the whole by the reference number 12 and supported by such sustaining body 11 to convey such solid fuel C next to such combustion chamber 9, at least one introduction opening provided on such containing/sustaining structure 7 in a rear side position to introduce such solid fuel C into such combustion chamber 9, at least one closing panel hinged to such containing/sustaining structure 7 which assumes a position moved next to or away from such introduction opening 13 to obstruct/liberate such introduction opening 13 and first driving means 15 to drive this closing panel 14 in the moved next to or away from positions. In even better detail, such sustaining body 12 comprises a side door 16 for the manual loading of such conveying device 12 with such solid fuel C, and a sliding panel 17 to accompany such sliding fuel C from the instant of its release from such conveying device 12 to such combustion chamber 9. Such conveying device 12 in turn comprises a first and a second pair of sprockets, respectively designated by the reference numbers 18 and 19, which are axially aligned and set up in the lower and in the upper zone of such sustaining body 11, a pair of chains respectively designated by the reference numbers 20 and 21 engaged with such first and such second pair of sprockets, a plurality of transporting pans 22 anchored to such pair of chains 20, 21 which are assuming a condition of transporting such solid fuel C during the downward motion of such pair of chains 20, 21 and a condition of non-transport of such solid fuel C during the upward motion of such pair of chains 20, 21 and second driving means 23 associated with such containing/sustaining structure 7 and connected to such first pair of sprockets 18 to move such conveying means 12. Finally, such appliance 6 comprises sustaining means, indicated as a whole by the reference number 24, fitted in a mobile manner inside such combustion chamber 9 to sustain such solid fuel C during its combustion and controlling means, indicated as a whole by the reference number 25, associated with such sustaining means 24 to control such sustaining means 24, under conditions of insufficient loading of such solid fuel C, to an activating position to activate said introducing means 10 so as to introduce such solid fuel C into such combustion cham-

ber 9. In detail, such sustaining means 24 comprise a receiving cradle hinged on the rear to such containing/sustaining structure 7 so as to receive such solid fuel C. In even greater detail, such receiving cradle comprises a central resting platform 26 to rest such solid fuel C, a containing front wall 27 frontally associated with such central resting platform 26 so as to frontally contain such solid fuel C, and an accompanying rear wall 28 associated in the rear with such central platform 26, so as to accompany such solid fuel C in its descent from such introduction opening 13 to such central resting platform 26. Such controlling means 25 in turn comprise fixed and mobile activating bodies, identified by the reference numbers 29 and 30, respectively, which are in a rear side position associated with such sustaining means 24 to convey such sustaining means 24 to such an activating position, and at least one activating arm 31 that projects from such sustaining means 24 to activate a micro-switch 32 that controls such first and second driving means 15, 23. Finally, such mobile activating bodies 30 are disposed along such activating arm 31.

[0011] The operation of the appliance described above and illustrated in the enclosed figures will become better evident in the description that follows, with particular reference to Figure 1. In accordance with the prior art, the operation of this appliance essentially involves a sequence of a phase of loading the fuel to be burned, a phase of lighting up such combustion, a phase of continuous combustion and a phase of extinguishing the combustion.

[0012] Prior to the start of the loading phase, the introducing means 10 have been manually loaded with solid fuel C by the user, as summarily illustrated in Figure 3. In the loading phase, the sustaining means 24 are initially in a condition of non-loading such solid fuel C. The controlling means 25 consequently act on the sustaining means 24 to dispose the latter into the mentioned activating condition. In detail, the fixed and mobile activating bodies 29 and 30 dispose the resting cradle to lean backward, so as to move the activating arm 31 to the point that its free extremity comes into contact with the micro-switch 32. This contact determines the activation of the solid fuel introducing means into the combustion chamber 9. In even greater detail, such contact provokes the activation of both the first driving means 15 and the second driving means 23. The activation of the first driving means 15 involves the shifting of the closing panel 14 from a position next to the introduction opening 13 to a position moved away from the introduction opening 13, so as to liberate the latter to allow the transit of the solid fuel C. The activation of the second driving means 23 in turn starts the rotation of the first pair of sprockets 18, which in turn drag along the chains 20 and 21, the second pair of sprockets 19 and the transport pans 20. The entire conveying device 12 consequently advances one step, as summarily illustrated in Figure 2. At this point, the transport pan 22 in the lower position releases a piece of solid fuel C, which in sequence slides along the un-

derlying sliding panel 17, crosses the introduction opening 13, slides further along the rear guiding wall 28, and finally disposes itself on the central resting platform 26, as shown in Figure 1. The loading phase continues in the way described, until the load of the solid fuel C on the sustaining means 24 is such as to move such sustaining means 24 away from the mentioned activating position. In detail, the load of solid fuel C acting on the resting pan at some point overcomes the action exerted by the fixed and mobile activating bodies 29 and 30 so as to tilt the same resting pan forward and allow it to assume an operating position. The activating arm 31 is consequently moved away from the micro-switch 32 to deactivate the introducing means 10. In detail, the lack of contact of the activating arm 31 with the micro-switch 32 determines the activation of the first driving means 15 to again dispose the panel 13 to a position next to the introduction opening 13, so as to occlude the latter and to interrupt the action of the conveying device 12. The loading phase is followed by the lighting phase of the solid fuel C introduced into the combustion chamber 9, which occurs manually by the user or automatically. The lighting phase is followed by the continuous combustion phase of the solid fuel C. During such combustion phase, the solid fuel C gradually decreases as a result of the combustion itself, until the load of solid fuel C on the sustaining means becomes insufficient to balance the action exerted by the activating means 25. Such activating means 25 are consequently acting on the sustaining means 24 to again dispose them to the mentioned activating position, so as to initiate an intermediate loading phase that proceeds and terminates in the ways shown above. In order to active the extinguishing phase, the user finally deactivates the supply of electrical power to the introducing means 10, so that the combustion is no longer upheld by fresh solid fuel C, as the latter exhausts itself.

[0013] It has thus been verified that the appliance described achieves its preestablished aim and objects while overcoming the drawbacks encountered in the appliances made according to the state of the art. In particular, it has been verified that the heating appliance is provided with an automatic supply of solid fuel of qualitatively variable shapes and characteristics, such as wood to be burned in pieces. In particular, it has also been verified that the appliance is of a simplified design and construction, so as to be able to contain its production costs.

[0014] In the practical embodiment, the materials employed, the shapes, dimensions and executive details may differ from those indicated here but be technically equivalent to them, without thereby abandoning the scope of the invention.

Claims

1. Heating appliance automatically supplied with solid fuel, comprising a containing/sustaining structure

and a combustion chamber provided inside said containing/sustaining structure and introducing means supported by said containing/sustaining structure and connected to said combustion chamber to introduce such solid fuel into such combustion chamber, **characterized in that** it comprises sustaining means housed in a mobile manner inside said combustion chamber to sustain said solid fuel during its combustion, and controlling means associated with said sustaining means to control said sustaining means under a condition of insufficient loading of said solid fuel to an activating position in order to activate said introducing means to introduce said solid fuel into said combustion chamber.

2. Appliance, according to the previous claim, **characterized in that** said containing/sustaining structure comprises an enclosing shroud of an essentially parallelepiped form.
3. Appliance, according to claim 1 or 2, **characterized in that** said combustion chamber comprises a space delimited at the bottom, at the top and at the sides by said enclosing shroud.
4. Appliance, according to one or more of the previous claims, **characterized in that** said introducing means comprise a sustaining body applied in a vertical condition and in a position set to the rear of said containing /sustaining structure and a conveying device supported by said sustaining body to convey said solid fuel next to said combustion chamber, at least one introduction opening provided on said containing/sustaining structure in a rear side position to introduce said solid fuel into said combustion chamber, at least one closing panel hinged on said containing/sustaining structure which assumes a position next to/moved away from said introduction opening so as to occlude/liberate said introduction opening, and first driving means to control said closing panel in said next to/moved away positions.
5. Appliance, according to one or more of the previous claims, **characterized in that** said sustaining body comprises a side door for the manual loading of said conveying device with said solid fuel, and a sliding panel to accompany said solid fuel from the point of release from said conveying device to said combustion chamber.
6. Appliance, according to one or more of the previous claims, **characterized in that** said conveying device comprises a first and a second pair of axially aligned sprockets disposed in the lower zone and in the upper zone of said sustaining body, a pair of chains engaged in said first and second pair of sprockets, a plurality of transport pans anchored to said pair of chains that assume a transport condition of said solid

fuel in the downward motion of said pair of chains,
and a non-transport condition of said solid fuel in the
upward motion of said pair of chains, and second
driving means associated with said rear wall and cin-
ematically connected to said first pair of sprockets 5
in order to move said conveying device.

7. Appliance, according to one or more of the previous
claims, **characterized in that** said sustaining means
comprise a receiving cradle hinged on the rear to 10
said containing/sustaining structure to receive said
solid fuel.
8. Appliance, according to one or more of the previous
claims, **characterized in that** said receiving cradle 15
comprises a central resting platform to rest said solid
fuel, a containing front wall frontally associated with
said central resting platform in order to frontally con-
tain said solid fuel, and a rear accompanying wall 20
associated with said central platform in the rear in
order to accompany said solid fuel from said intro-
duction opening to said central resting platform.
9. Appliance, according to one or more of the previous
claims, **characterized in that** said controlling 25
means comprise fixed and mobile activating bodies
associated in a position set behind said sustaining
means to convey said sustaining means into said
activating position, and at least one activating arm 30
projecting from said sustaining means to activate a
micro-switch that controls said first and second driv-
ing means.
10. Appliance according to one or more of the previous
claims, **characterized in that** said mobile activating 35
means are disposed along said activating arm.

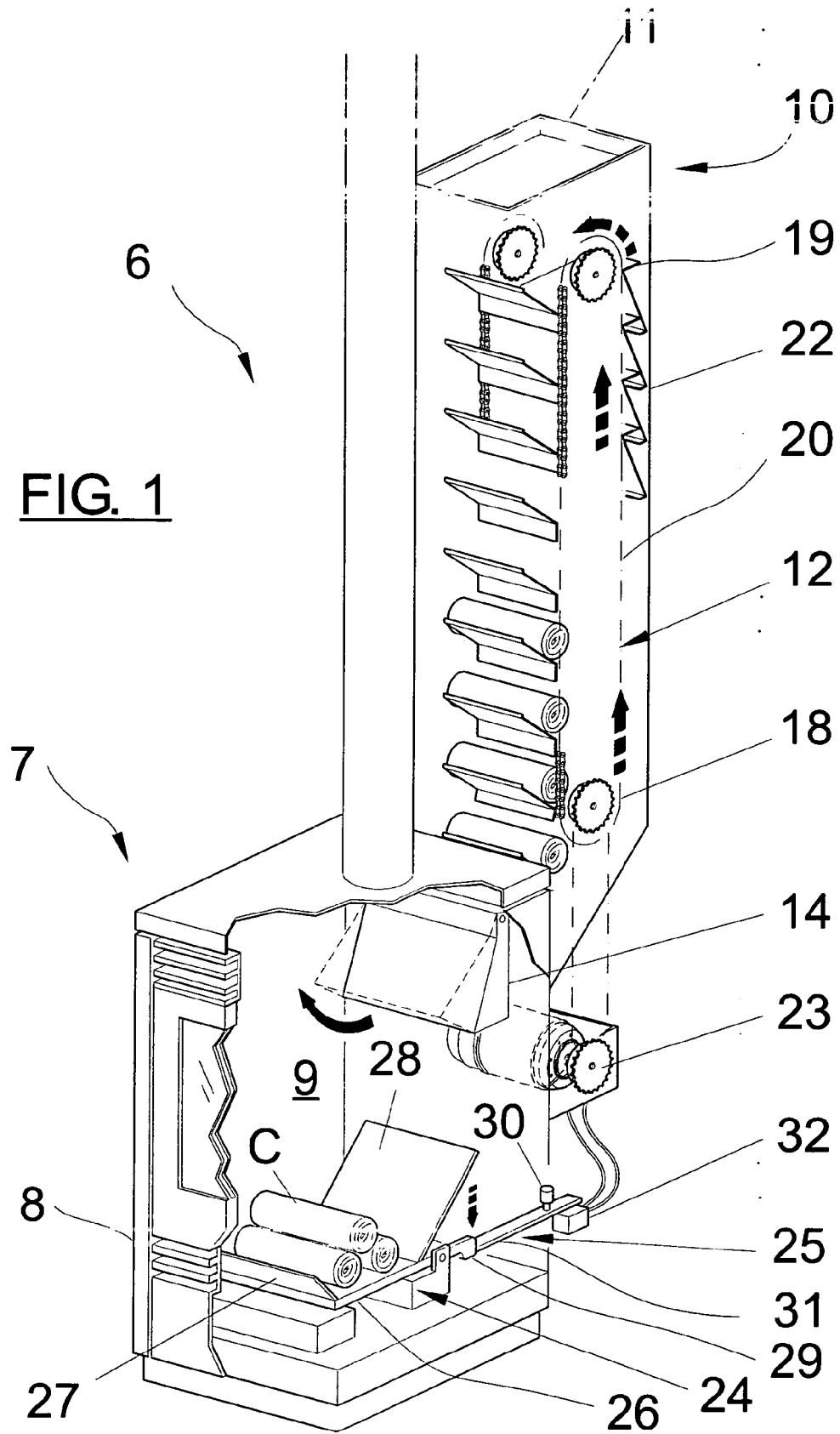
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FIG. 1



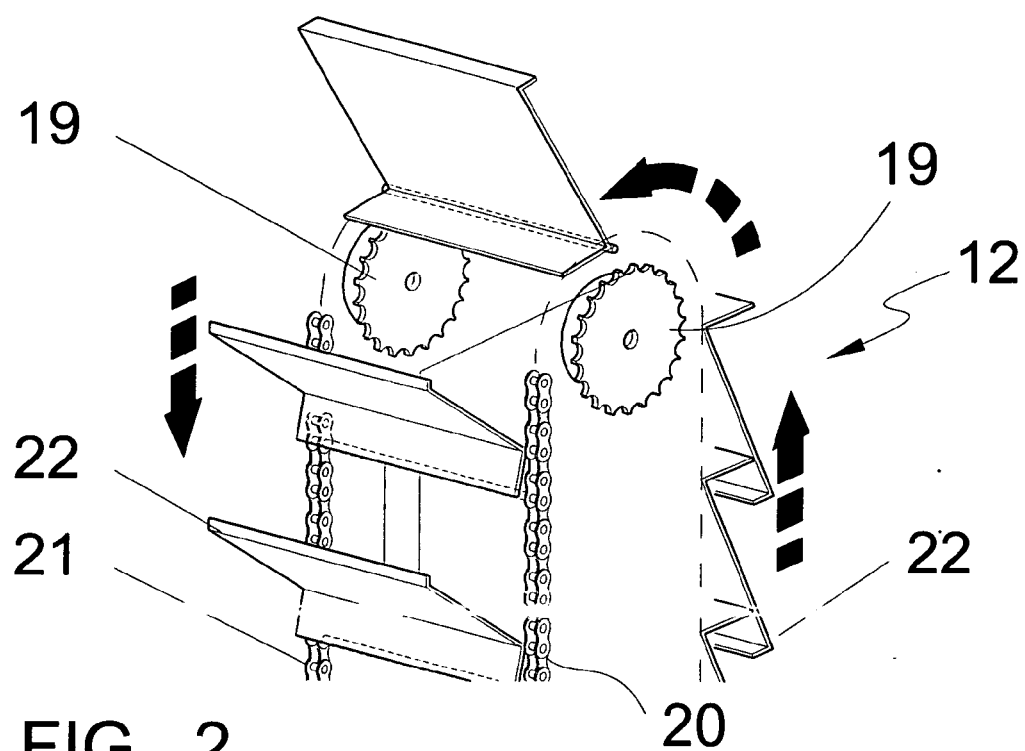


FIG. 2

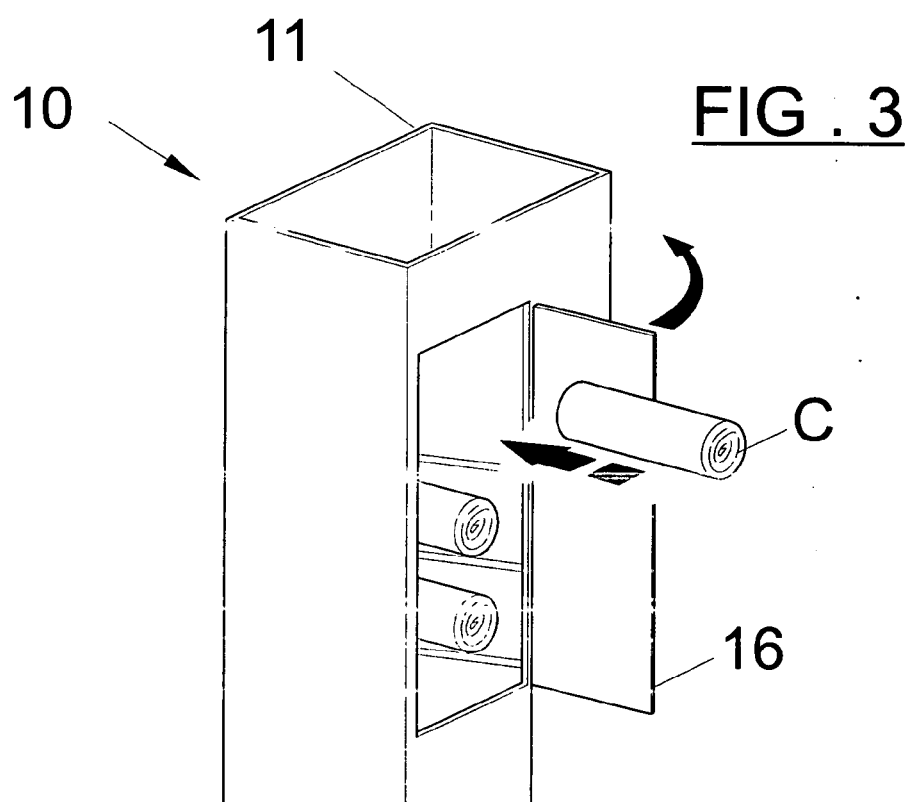


FIG. 3

