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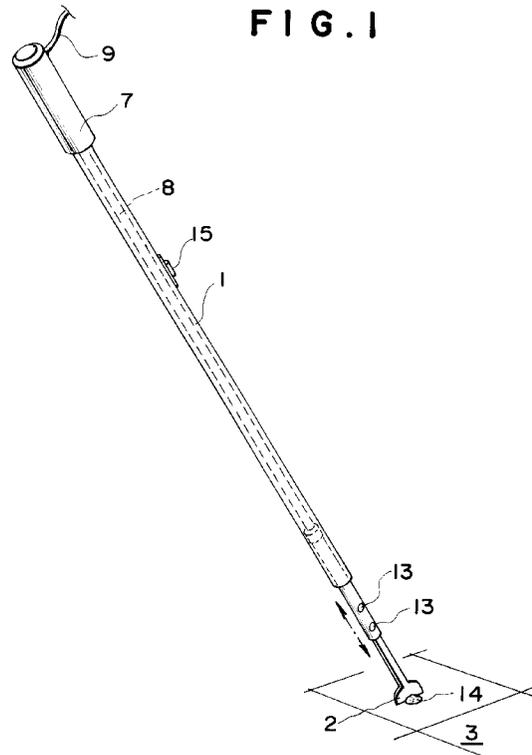
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**Apparatus for scraping detritus from a surface.**

An apparatus for scraping detritus from a surface, comprising a vertically reciprocating scraping blade 2 carried at the lower end of an operating shaft 1 of a suitable length such that detritus such as chewing gum and other substances adhering to the ground can be scraped up while the user is standing upright.



This invention relates to an apparatus for scraping detritus such as chewing gum, dirt and other substances from surfaces such as floor surfaces in buildings e.g. stations, from street pavements, and the like.

Heretofore, in order to remove chewing gum or the like adhered to the surface of a station platform for example, a worker had to use a small hand tool such as a spatula, while bending down or squatting. However, in carrying out such an operation, quite large force is sometimes required, with the result that muscular pain is caused by the necessary working posture, working efficiency is low, and it takes a long time to achieve good results.

It is an object of the present invention to provide an apparatus by means of which adhered substances such as those mentioned above can be quickly scraped off by a user in an unstressful standing working posture.

Thus according to the present invention there is provided an apparatus for scraping detritus from a surface, comprising an operating shaft of a length suitable for operation by a user while standing, a scraping blade carried at the lower end of the said operating shaft, and means for driving the said scraping blade to reciprocate to and fro in the lengthwise direction of the said operating shaft.

In a preferred form of the invention the said operating shaft is at least partly hollow and said driving means comprises a cam housed inside said operating shaft and rotatable by a prime mover and having a cam surface, and a scraping blade support member received in said operating shaft and engageable at its upper end with the said cam surface so as to be reciprocable by rotation of the cam.

By means of apparatus according to the present invention, detritus such as chewing gum, dirt and other substances adhered to floor surfaces and the like can be quickly scraped up by a user while in an easy posture, and thus the working efficiency of such an operation can be substantially improved.

Some embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, which:-

Fig. 1 is a perspective view of a first embodiment of the invention, in use;

Fig. 2 is an enlarged axial cross-sectional view of relevant parts of the apparatus of Fig. 1;

Fig. 3 is a perspective view of a second embodiment;

Fig. 4 is an enlarged perspective view of relevant parts of the apparatus of Fig. 3;

Fig. 5 is an axial cross-sectional view of part of the apparatus of Fig. 3;

Fig. 6 is an exploded perspective view of part of the apparatus of Fig. 3;

Fig. 7 is a cross-sectional view of the main handle of the apparatus of Fig. 3;

Fig. 8 is a cross-sectional view of the on/off

switch of the apparatus of Fig. 3;

Fig. 9 is a perspective view of a detritus collecting box for use with the apparatus of either of the previous embodiments;

Fig. 10 is a cross-sectional view showing the manner of interconnection of the scraping blade and the detritus collecting box;

Figs. 11 and 12 are cross-sectional views illustrating the collection of adhered substances; and

Fig. 13 is a perspective view of another embodiment of a detritus collecting box.

Referring first to the embodiment of Figs. 1 and 2, reference numeral 1 indicates a hollow cylindrical operating shaft of such length that a user can operate the apparatus by pressing a later described scraping blade 2, located at the lower end of the shaft, against the ground surface 3 or the like, while standing upright. As in the another embodiment to be described later, the operating shaft 1 may be provided with a suitable handle for a user to hold.

As shown in Fig. 2, a cam rod 4 rotatable by a primer mover is provided inside the operating shaft 1. The cam rod 4 has a cam surface 4b arranged to rotate about an axis parallel to the length of the operating shaft 1, and is prevented by a thrust bearing 5 and a locking ring 6 from moving in the axial direction. A primer mover 7 is mounted on the operating shaft 1 at the rear end thereof, and the lower end 8a of a rotary shaft 8 arranged to be rotated by the prime mover 7 is connected to the upper end 4a of the cam rod 4 so that the cam rod is rotated by the primer mover 7 by way of the rotary shaft 8. In this embodiment an electric motor constitutes the prime mover 7 and is connected to an outside electric power source through a cable 9, but a battery may be used instead, or indeed an internal combustion engine. The prime mover 7 may be carried by the operator on his back and connected to the apparatus through a flexible shaft or the like, so as to be of the so-called knapsack type. Reference numeral 15 indicates a main switch.

A scraping blade support member 10, engageable at its rear end with the cam surface 4b of the cam rod 4, is housed in the hollow operating shaft 1 so as to be movable by a predetermined stroke in the axial direction of the operating shaft. The scraping blade support member is formed at its rear end with a concavity 10a which houses a ball 11, and has a lateral extension 12 arranged to limit downward movement of the member 10 with respect to the operating shaft 1.

The cam surface 4b of the cam rod 4 is formed to cause the scraping blade support member 10 to reciprocate in the axial direction when the ball 11 engages the cam surface. A semi-spherical convexity may be formed at the rear end of the member 10, in place of the ball 11.

A scraping blade 2 in the shape of a flat spatula is fixed to the lower end of the scraping blade support

member 10, by screws 13.

In operation, when the main switch 15 is switched on, the prime mover 7 causes the cam rod 4 to rotate. Then, if the scraping blade 2 is pressed against the ground surface 3 or the like, as shown in Fig. 1, by means with the operating shaft 1, the rear end of the scraping blade support member 10 will be pressed against the cam surface 4b through the ball 11, and the member 10 will reciprocate axially together with the scraping blade 2. As a result the scraping blade will enter between the ground surface 3 and a substance 14 such as chewing gum adhered thereto, so that the said substance 14 may be scraped off.

In the apparatus of the above described embodiment, even when the switch 15 is on, unless the scraping blade 2 is pressed against the ground surface 3, the scraping blade 2 will not reciprocate and will thus be safe. This is because when the scraping blade support member 10 and the scraping blade 2 hang down, without contacting the ground surface 3, their weight causes the ball 11 to be disengaged from the cam surface 4b, and in particular from the up-standing part thereof, and consequently the scraping blade 2 does not reciprocate. On the other hand, when work is started and the scraping blade 2 is pressed against the ground surface 3, the blade will reciprocate.

Figs. 3 to 6 show another embodiment which is the same in its essential features as the embodiment of Figs. 1 and 2 but is a more refined design. The main differences from the first embodiment are, first, that the operating shaft 1 is provided with two handles 16, 17 so as to be easier to operate; second, the operating shaft is provided with a housing 18 for a battery or the like so as to be conveniently operable in the absence of mains electric power; third, an electric motor 7 is provided adjacent to the cam rod 4; and fourth, a locking member 12a for the scraping blade support member 10 is provided at the tip of the operating shaft 1.

The locking member 12a for the support member 10 is substantially L-shaped, with one leg thereof being inserted in a slot 19 formed in the support member 10 and the other leg fixed to the tip of the operating shaft 1 by screws 20.

The two handles 16 and 17 comprise a main handle 16 and a sub-handle 17. The main handle 16 is provided at the rear end of the operating shaft 1 and the sub-handle 17 between the ends of the shaft. The main handle 16 is formed as a loop, and carries a trigger type on/off switch.

Referring to Fig. 7, the on/off switch comprises a main switch body 21 located internally of the main handle 16, a switch lever 22 for operation by the user, and biasing mean in the form of a spring 23 which pushes the switch lever 22 away from the main switch body 21.

The main switch body 21 is connected to the elec-

tric motor 7 through lead wires 24 so as to control the operation of the electric motor. A switch button 21a is provided in the main switch body 21, facing the switch lever 6.

The switch lever 22 is shaped as a yoke, with actuating parts 22a, 22b at its respective ends and a central operating part 22c which contacts the button 21a. The switch lever is arranged so that the operating part 22c faces the switch button 21a with predetermined spacing therebetween and the two actuating parts 22a, 22b protrude through holes 25a, 25b in the handle 16. The distance between the actuating parts 22a, 22b is slightly more than the width of a typical adult's hand.

Two elongate holes 22d, 22e, extending parallel to each other, are formed in the respective actuating parts 22a, 22b. Spindles 26, 27 fixed at both ends to the inside of the handle 16 extend through the holes 22d, 22e. The switch lever 22 as a whole is urged away from the main switch body 21 by the biasing spring 23, so that the spindles 26, 27 always contact the elongate holes 22d, 22e at the ends 28a, 28b thereof nearer to the main switch body 21, and a predetermined spacing is thereby maintained between the switch button 21a and the operating part 22c.

In operation, if the user pushes for example the actuating part 22a, against the force of the spring 23, the switch lever 22 tilts about the spindle 27 associated with the other actuating part 22b, as shown in Fig. 8. As a result, the operating part 22c pushes the switch button 21a of the main switch body 21, which results in the switch going on. When the actuating part 22a is released the switch lever 22 is returned to its original position by the force of the spring 23 which results in the switch going off. The same effect is achieved by operating the actuating part 22b.

During long-term operation of the apparatus to scrape off detritus such as chewing gum or the like, the side of the tip 2a of the scraping blade 2 which contacts the ground surface 3 will wear. Therefore, in order to uniformly use both sides of the tip of the scraping blade, the apparatus should be turned over from time to time. This being so, with the on/off switch constructed as described above, it is advantageous that a user can operate the switch using either of the actuating parts 22a, 22b, without changing his working posture.

The apparatus constructed as described above may be used together with a detritus collecting box 30 as shown in Figs. 9 to 13.

The detritus collection box 30 comprises a case 31 of inverted U-shaped transverse cross-section, having a top wall 31a and left and right side walls 31b, 31c, and is adapted to be removably attached to the scraping blade 2 of the apparatus. Thus grooves 32b, 32c are formed near the bottom of the inside faces of left and right side walls 31b, 31c of the case 31, to slidably receive the side edges of the scraping blade.

Preferably the case 31 is made of transparent plastics material so that the amount of detritus collected can be seen.

As shown in Fig. 10, the case 31 can be attached to the scraping blade 2 by sliding the scraping blade along the grooves 32b, 32c until the tip 2a of the blade extends an appropriate distance from the front edge of the case 31. The scraping blade 2 is then gripped at its opposite edges between the side walls 31b, 31c of the case 31, so that the case cannot readily slip down any further. However, since the scraping blade 2 vibrates up and down in use, the case 31 may possibly slip along it in due course. Therefore, as shown in Fig. 10, the side walls 31b, 31c of the case 31 are connected at their lower edges by a narrow connecting member 33 having a protruding portion 34 on its upper surface which engages in a transverse groove in the scraping blade 2, to hold the parts together.

When the case 31 is attached to the scraping blade 2 as described above, the upper surface of the scraping blade extends into the interior of the case so that detritus 14 scraped up by the reciprocating movement of the scraping blade passes into the case.

A front closure 37 is provided in the front opening 36 of the case 31 so as to enable the front opening to be partially opened and closed in stepwise fashion. Thus the front closure 37 is arranged so as, in one position, to open only the lower part of the front opening 36, and in another position to fully open the front opening, so that the opening height of the front opening can be adjusted.

In more detail, the front closure 37 comprises two flaps 39, 40 connected to each other by a hinge 38 and mounted to the front edge of the top wall 31a of the case 31 by a hinge 41. The closure 37 is securable against the front edges of the side walls 31b, 31c of the case 31, to prevent opening of the closure when the case 31 is inclined.

A securing strip 42 is provided on the lower flap 39 and a holding member 43 for the securing strip is provided on the top wall 31a of the case 31. Thus, if the lower flap 39 is opened and the securing strip 42 is connected to the holding member 43, the front of the case 31 will be open to an extent equal to the height Y of the lower flap 39 (see Fig. 9). If the upper flap 40 is opened also, then the front of the case 31 is fully opened.

A rear closure flap 45 is provided for the rear opening 44 of the case 31, to enable the opening 44 to be freely opened and closed. The flap 45 is connected to the rear edge of the top wall 31a of the case 31 by a hinge 46.

The detritus collection box 30 constructed as described above is attached to the scraping blade 2 of the apparatus and is normally used with only the lower flap 39 of the front closure 37 open.

The physical state of the detritus 14 such as chewing gum and the like undergoes changes with

temperature. That is, it will be quite hard at low temperatures during winter, but soft and sticky at high temperatures in summer. Consequently, when the temperature is relatively low, detritus such as chewing gum or the like will curl up on the upper surface of the scraping blade 2 when scraped up. However, the detritus will nevertheless be automatically transferred from the front opening 15 to the interior of the case 31 during such curling, because the distance (see Fig. 9) from the top portion 2a of the scraping blade 2 to the front opening 36 of the case 31, and the opening height Y (i.e. the height Y of the lower flap 39) are chosen so that the detritus 14 is automatically transferred from the front opening 15 to the inside of the case 31 by curling and turning over (see Fig. 11). On the other hand, when the temperature is high, chewing gum or the like is transferred from the front opening 36 to the inside of the case whilst sticking to some extent to the upper surface of the scraping blade 2 (see Fig. 12).

Curled or sticky detritus 14 will not easily escape from the front opening 36 once transferred to the inside of the case 31, since the front opening 36 is open only to the height Y of the lower flap 39.

After the scraping up and collecting of the detritus 14 is completed as described above, the lower flap 39 is closed and the apparatus is carried to an appropriate disposal place such as a trash can where the detritus can be disposed of by fully opening the front closure 37 and the rear flap 45.

Fig. 13 shows another embodiment of the detritus collecting box in which the front opening 36 of the case 31 is openable and closable in stepwise fashion.

In this embodiment, such stepwise opening of the front opening 36 is achieved by providing a front closure 37 which is freely slidable up and down in the front opening. The left and right side walls 31b, 31c of the case 31 extend slightly beyond the top wall 31a at 47b and 47c, and these extensions are formed with vertical grooves 48b, 48c in which the front closure 37 is slidable up and down. When the closure 37 is pushed down until it contacts the upper surface of the scraping blade 2, the front opening 36 of the case 31 is completely closed, and when the closure 37 is pulled up to a desired extent, the front opening of the case is opened to that extent. Thus in this embodiment the degree of opening of the front opening 36 can be adjusted more selectively as compared with the previous embodiment.

Use of the detritus collecting box 30 as described above enables detritus 14 scraped up by the scraping blade 2 to be automatically collected in the case 31, whereby the labor cost for collecting the scraped up detritus can be saved and the operation of scraping up the detritus can be generally improved in efficiency and carried out in an easy working posture by the user.

**Claims**

1. An apparatus for scraping detritus from a surface, comprising an operating shaft of a length suitable for operation by a user while standing, a scraping blade carried at the lower end of the said operating shaft, and means for driving the said scraping blade to reciprocate to and fro in the lengthwise direction of the said operating shaft.

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2. An apparatus as claimed in claim 1, wherein said operating shaft is at least partly hollow and said driving means comprises a cam housed inside said operating shaft and rotatable by a prime mover and having a cam surface, and a scraping blade support member received in said operating shaft and engagable at its upper end with the said cam surface so as to be reciprocable by rotation of the cam.

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3. An apparatus as claimed in claim 1 or 2, further comprising a case for receiving scraped up detritus, grooves being provided on inside walls of said case to slidably receive side edges of the said scraping blade to enable the case to be attached to the blade, the front of said case being open and having an openable and closable closure means.

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4. An apparatus as claimed in any of claims 1 to 3, further including an on/off switch for said drive means comprising a main switch body provided inside a handle of said operating shaft, a switch operating lever having two actuating parts which extend from said handle and an operating part arranged to contact main switch body to operate the switch upon the user pushing either one of said actuating parts, and biasing means urging said switch lever in the direction away from said main switch body.

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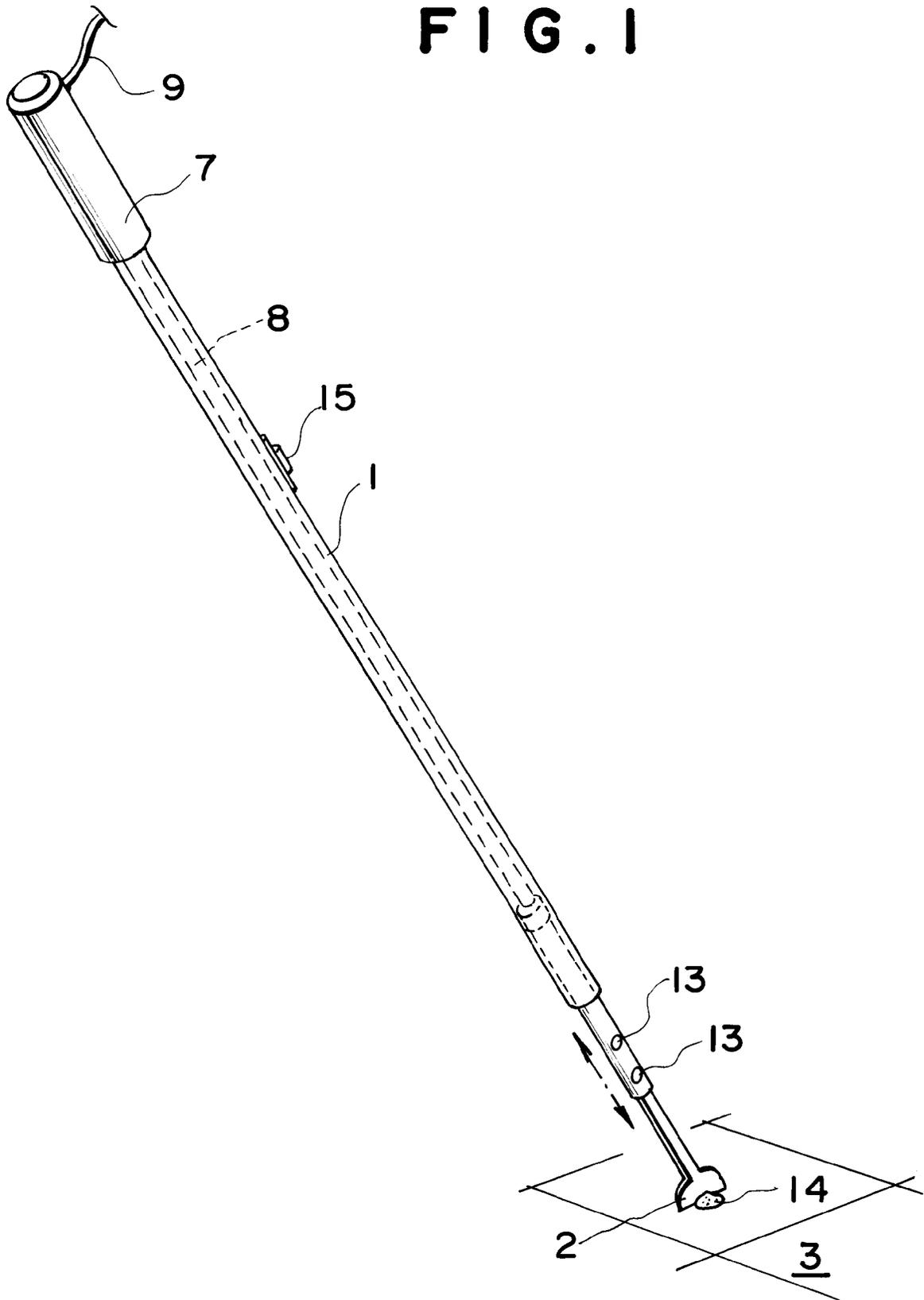
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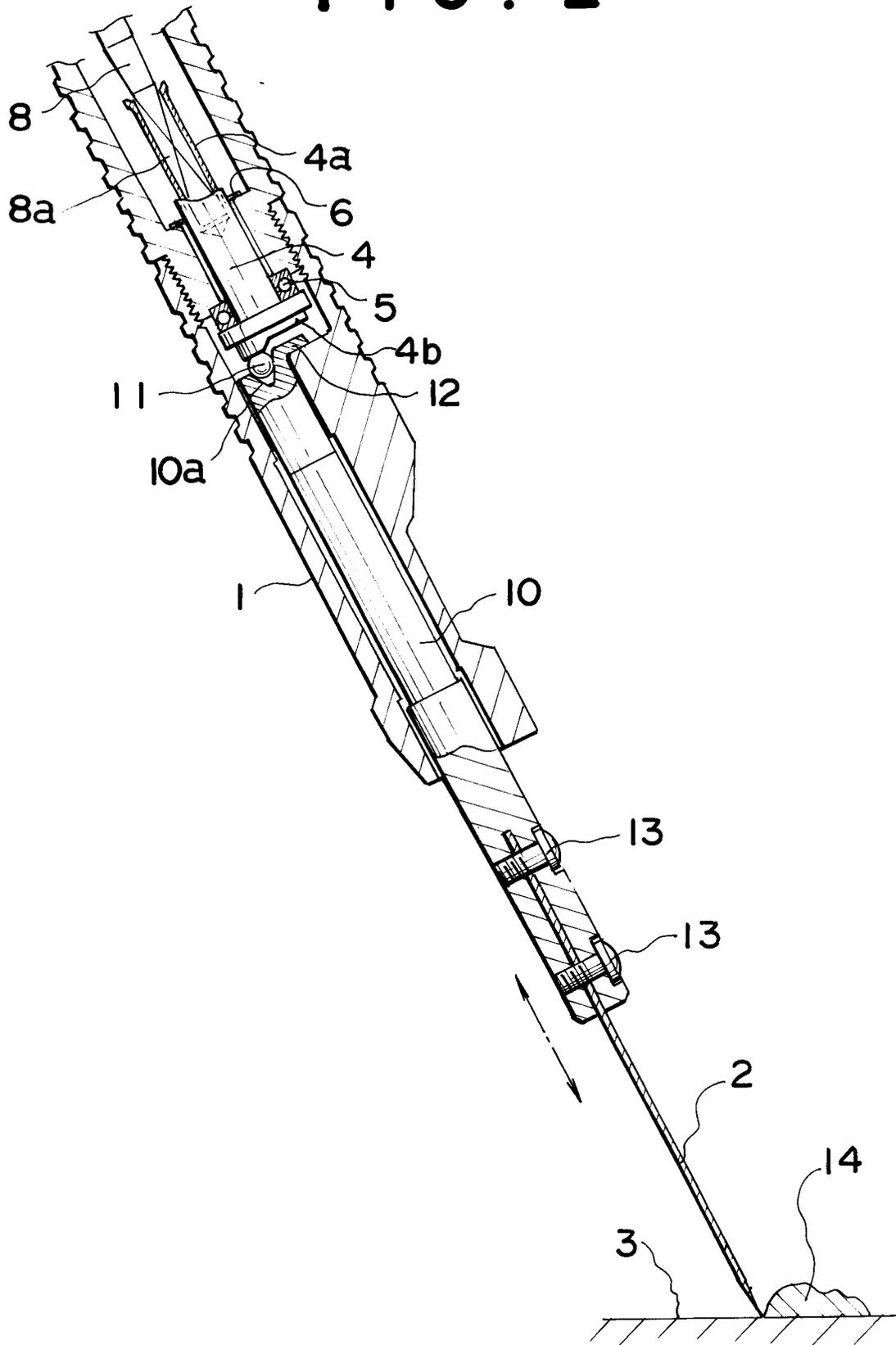
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FIG. 1



# FIG. 2



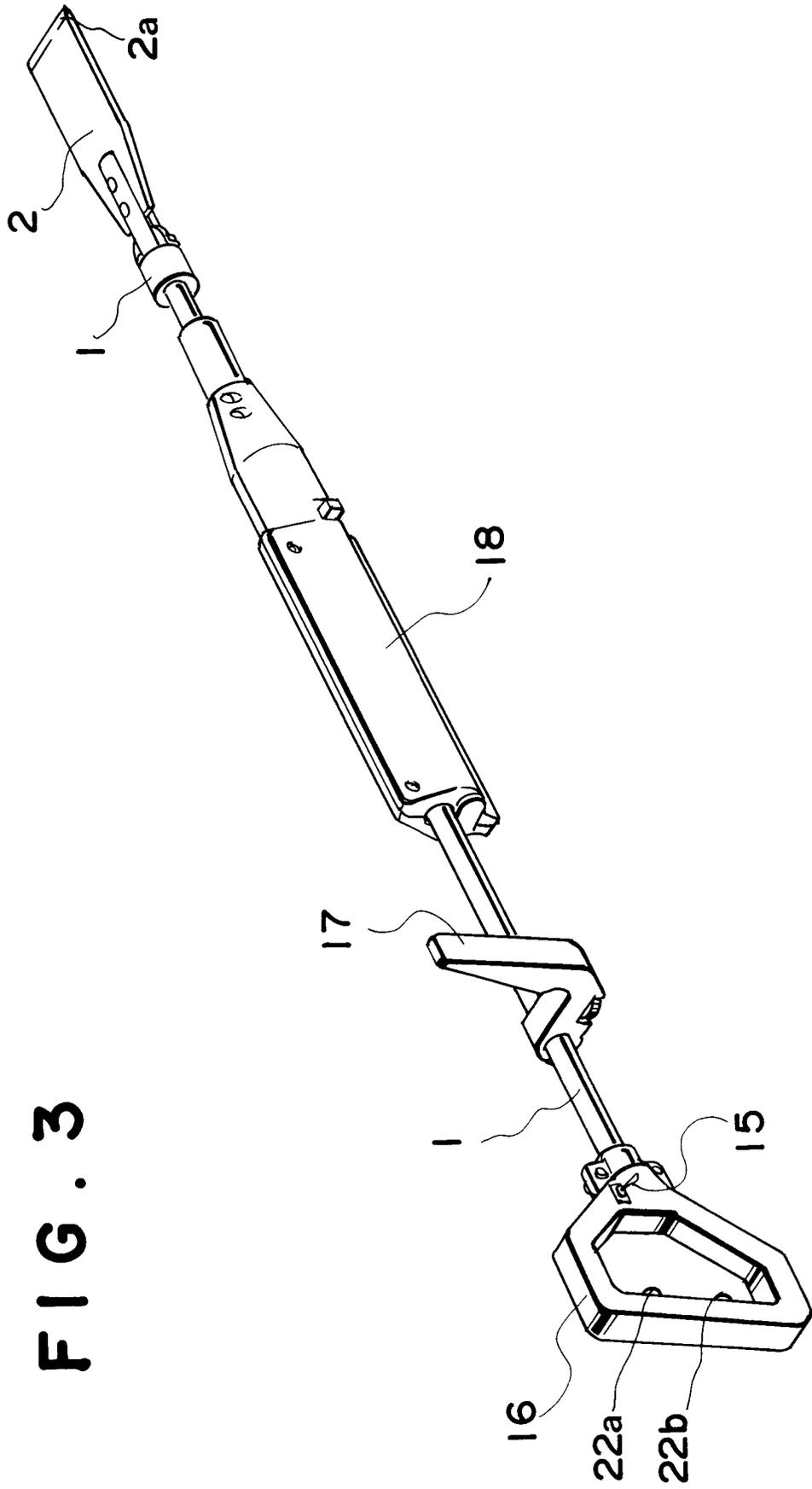


FIG. 3

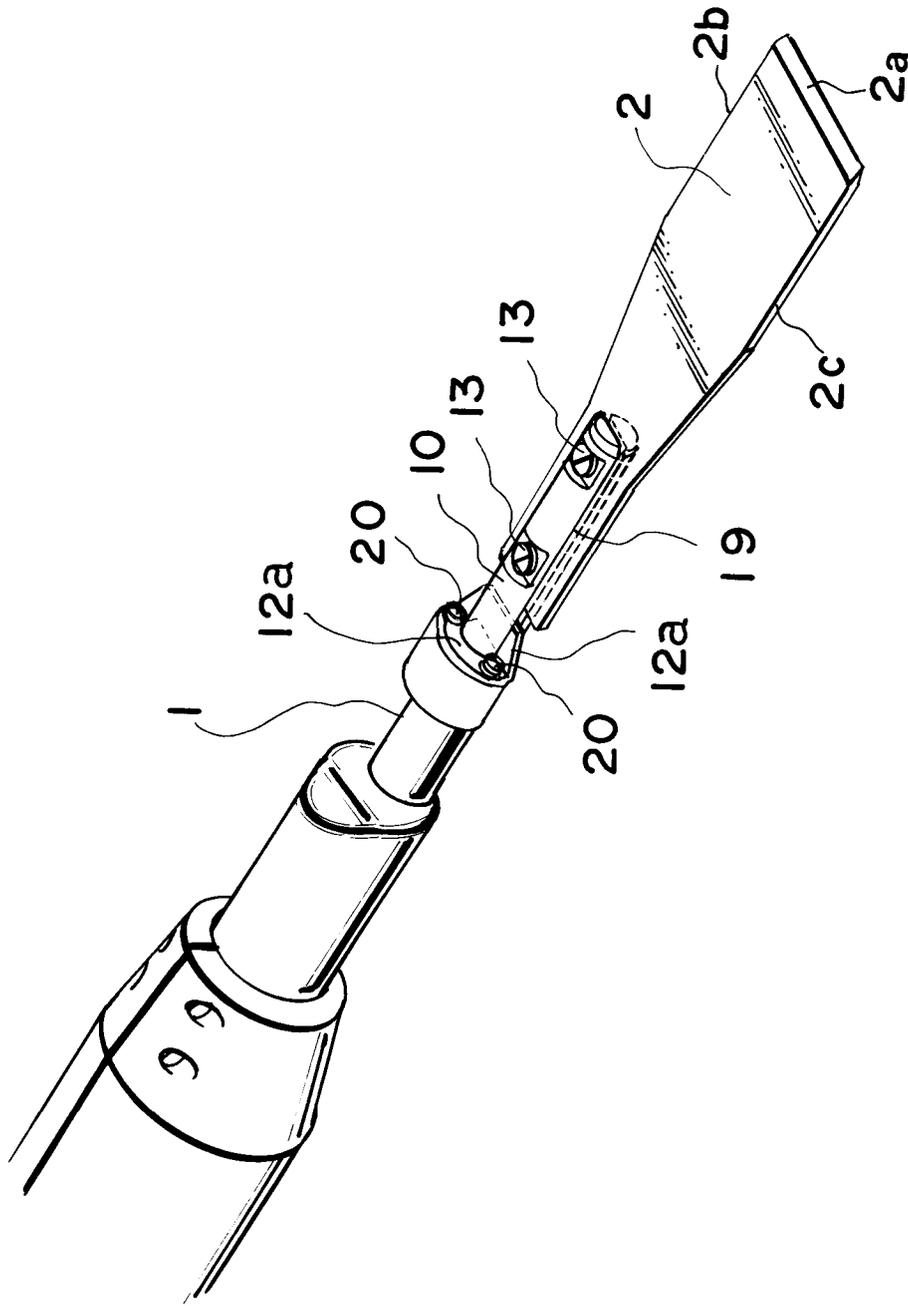
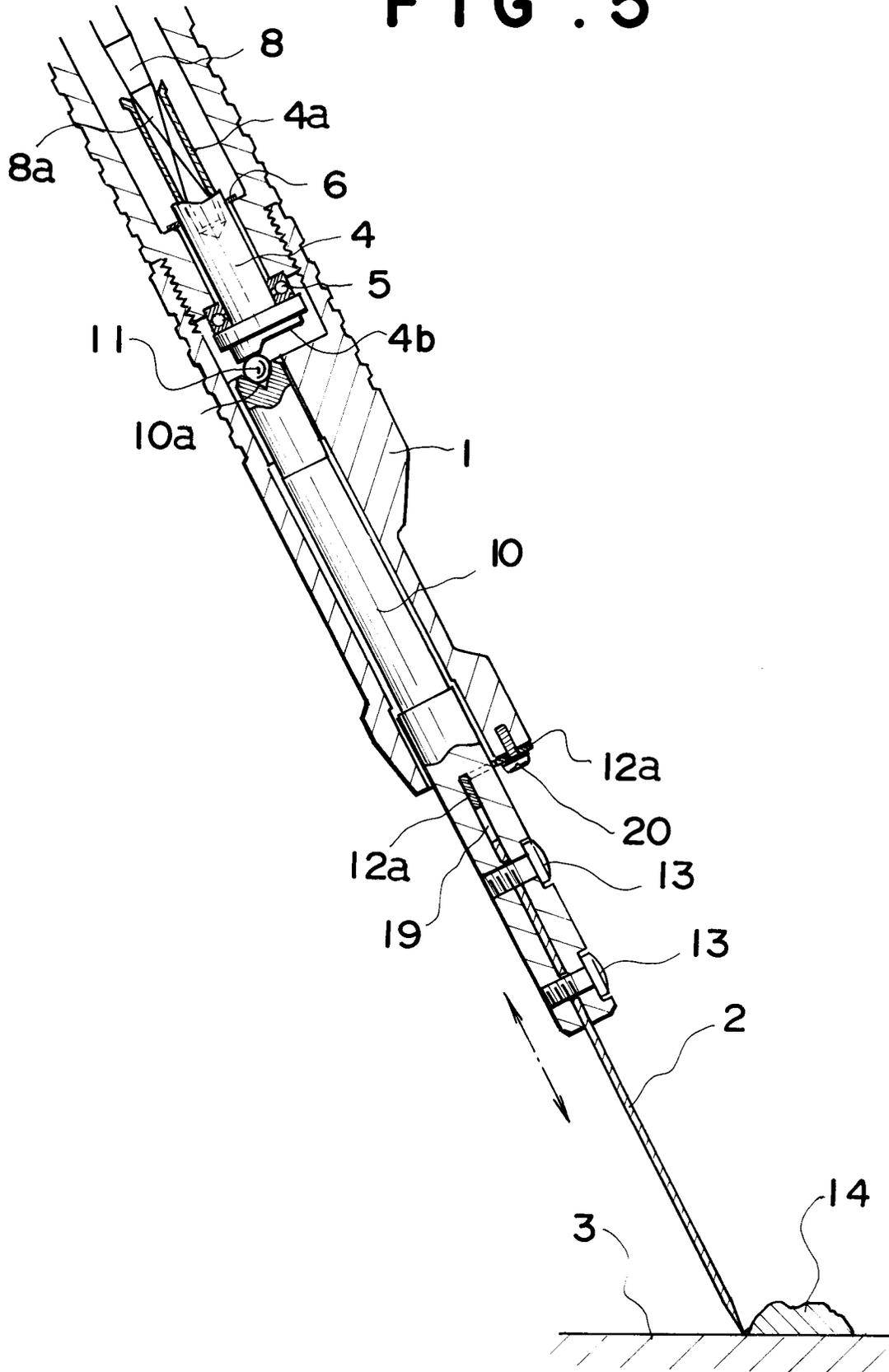


FIG. 4

# FIG. 5



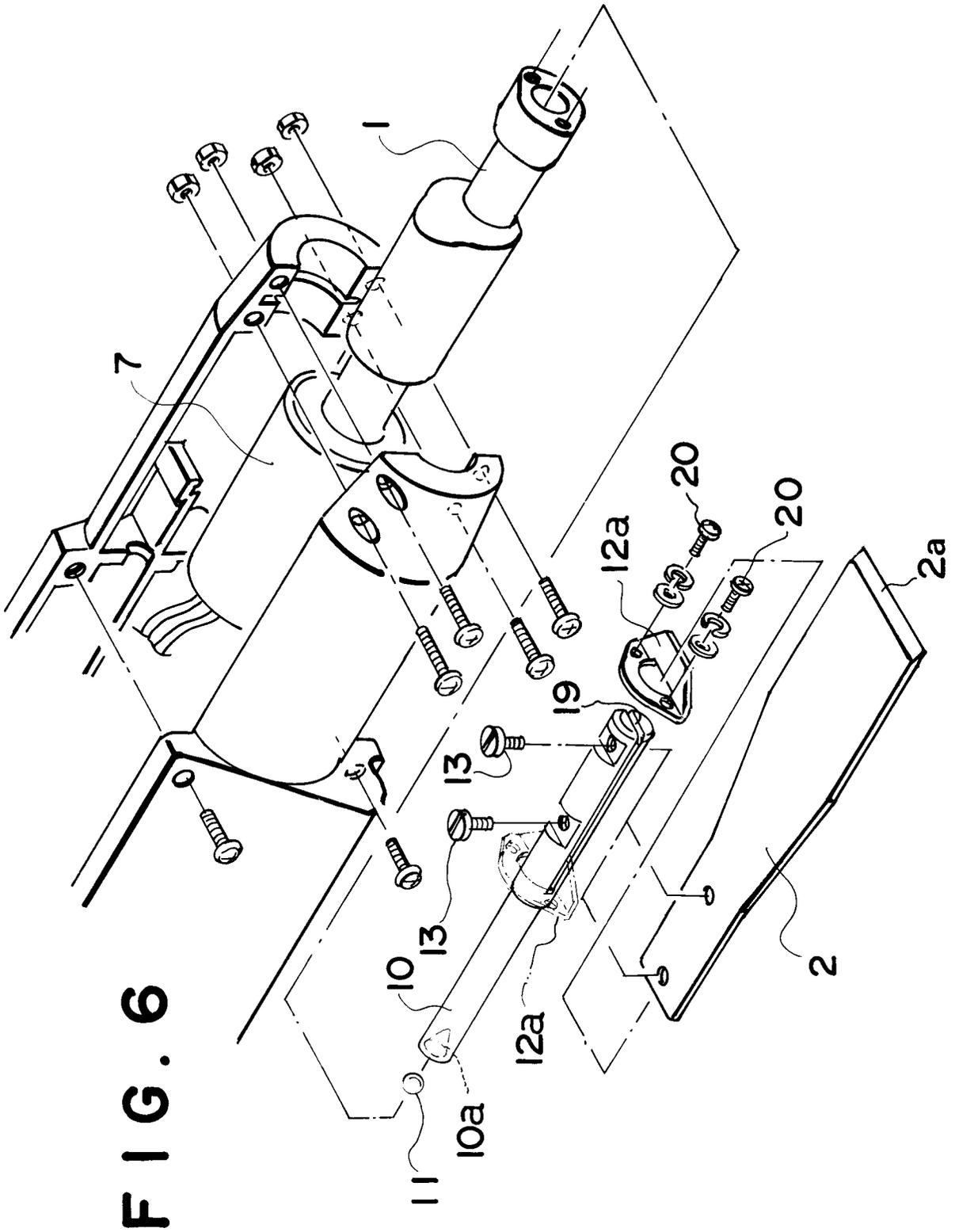


FIG. 6

FIG. 7

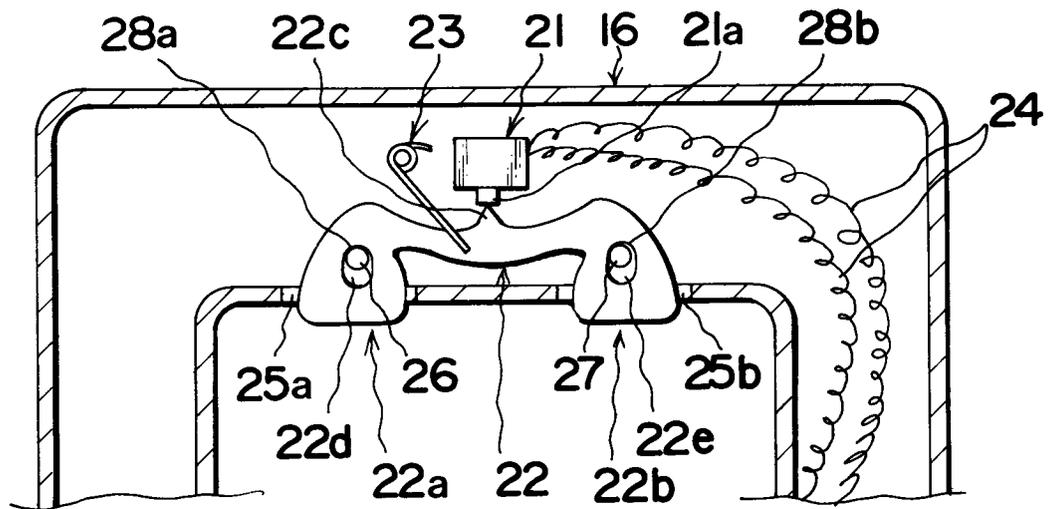


FIG. 8

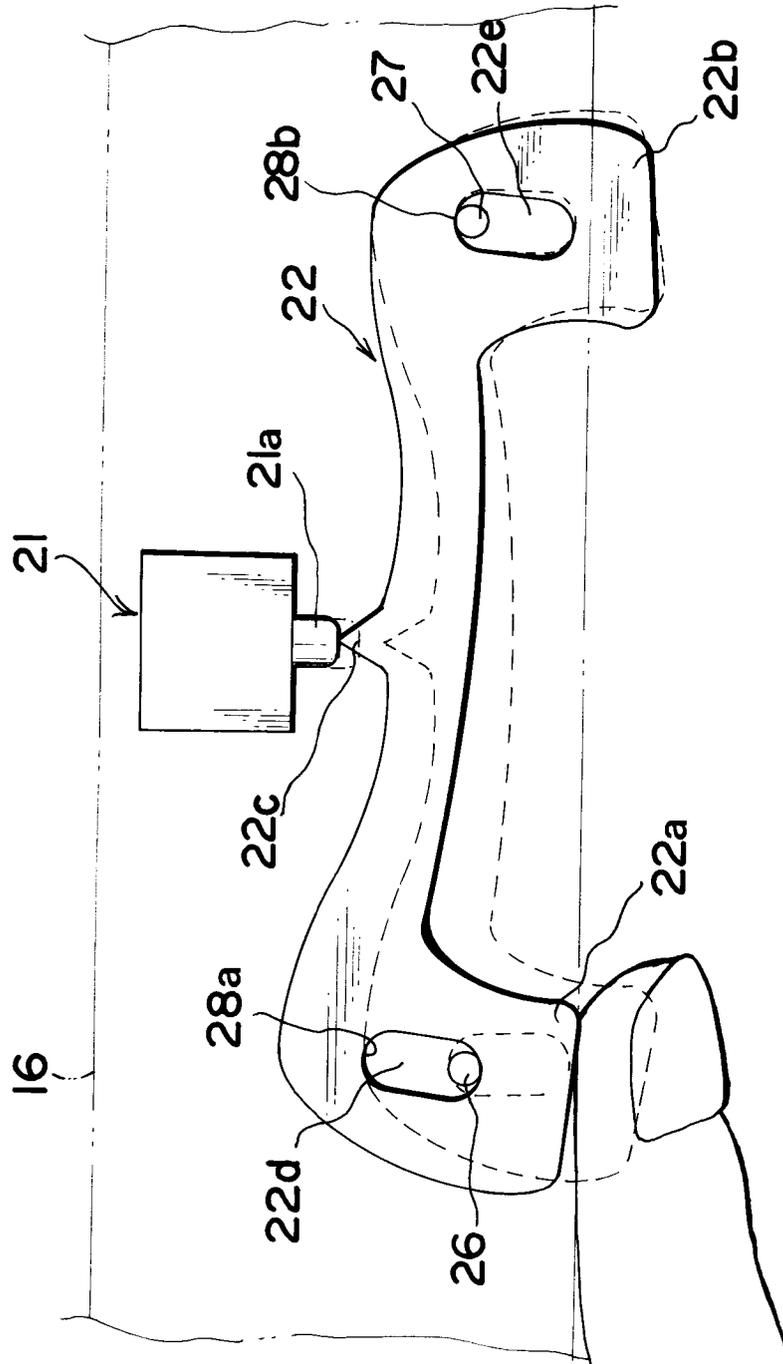


FIG. 9

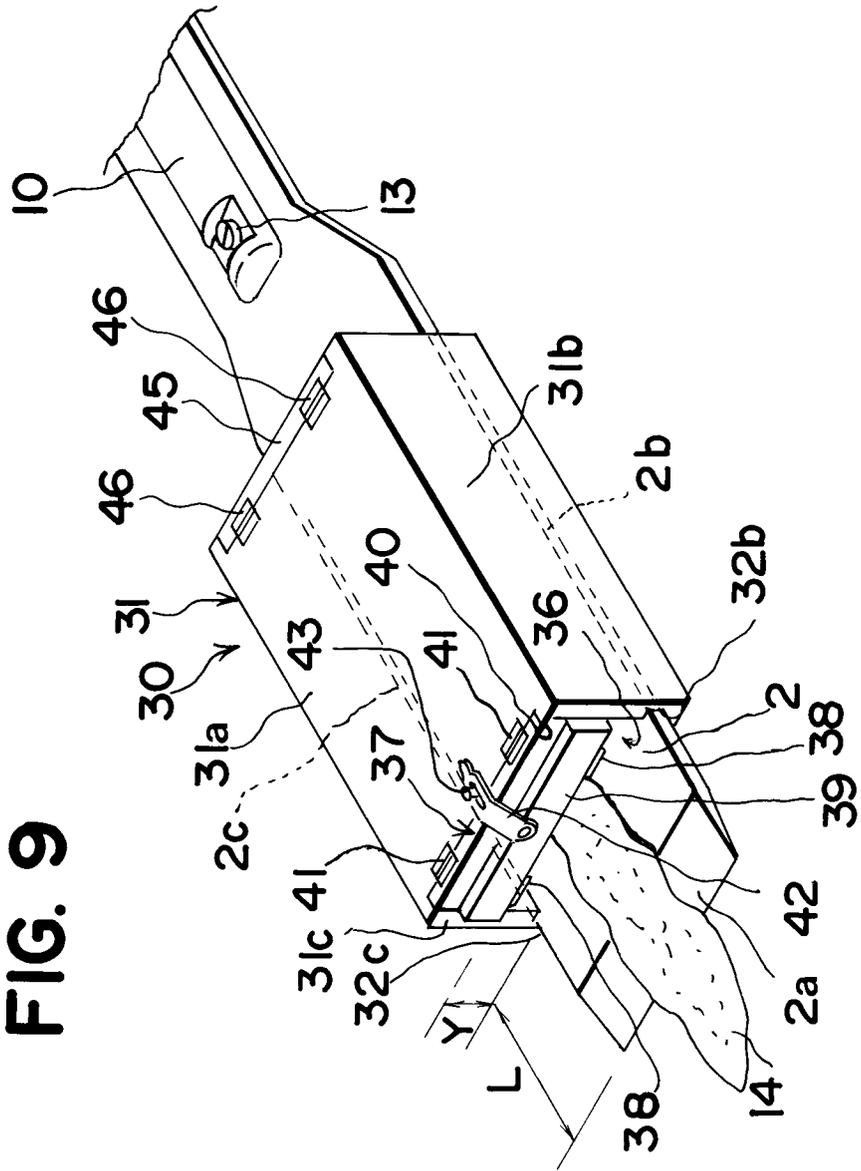


FIG. 10

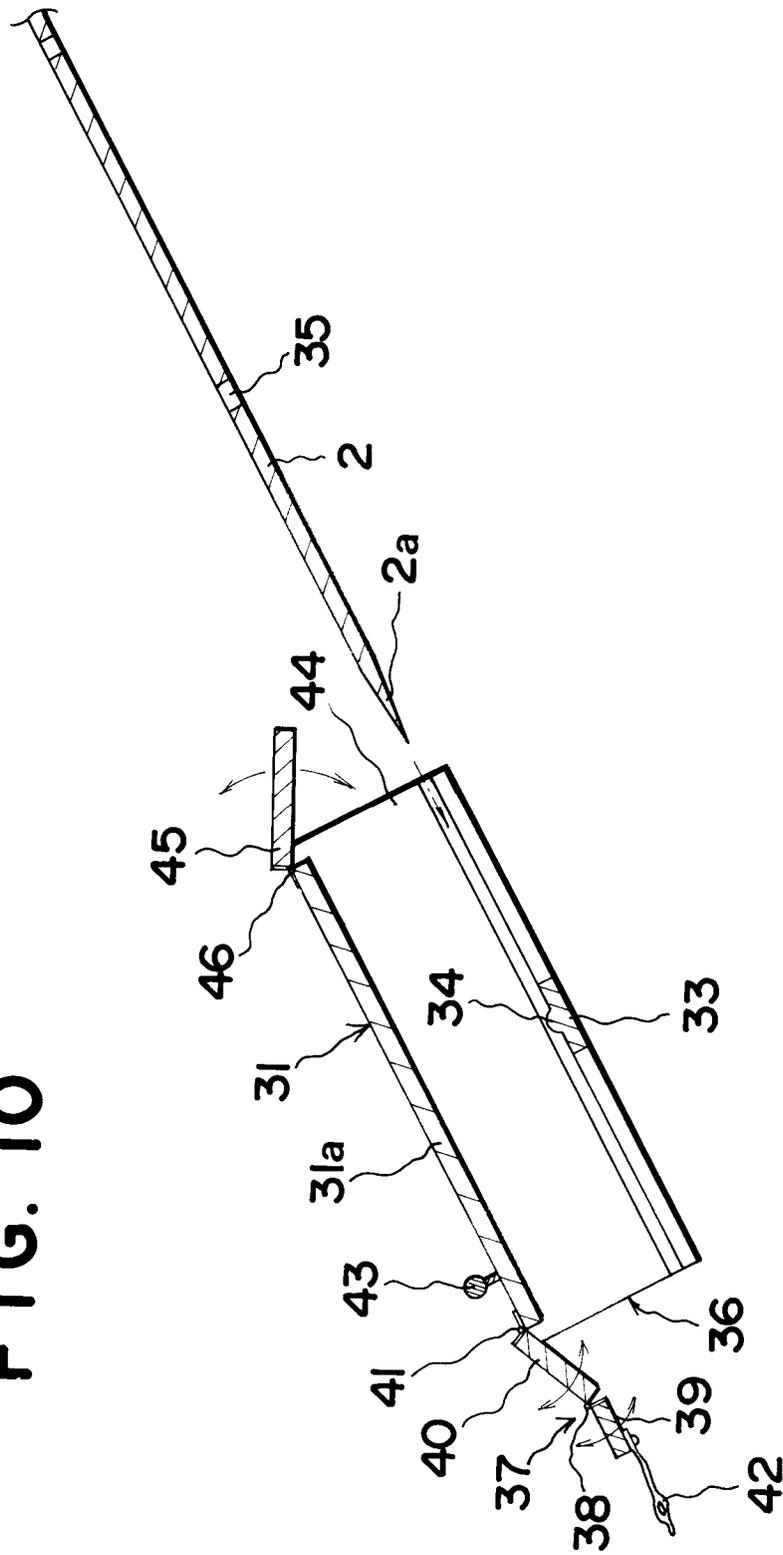


FIG. 11

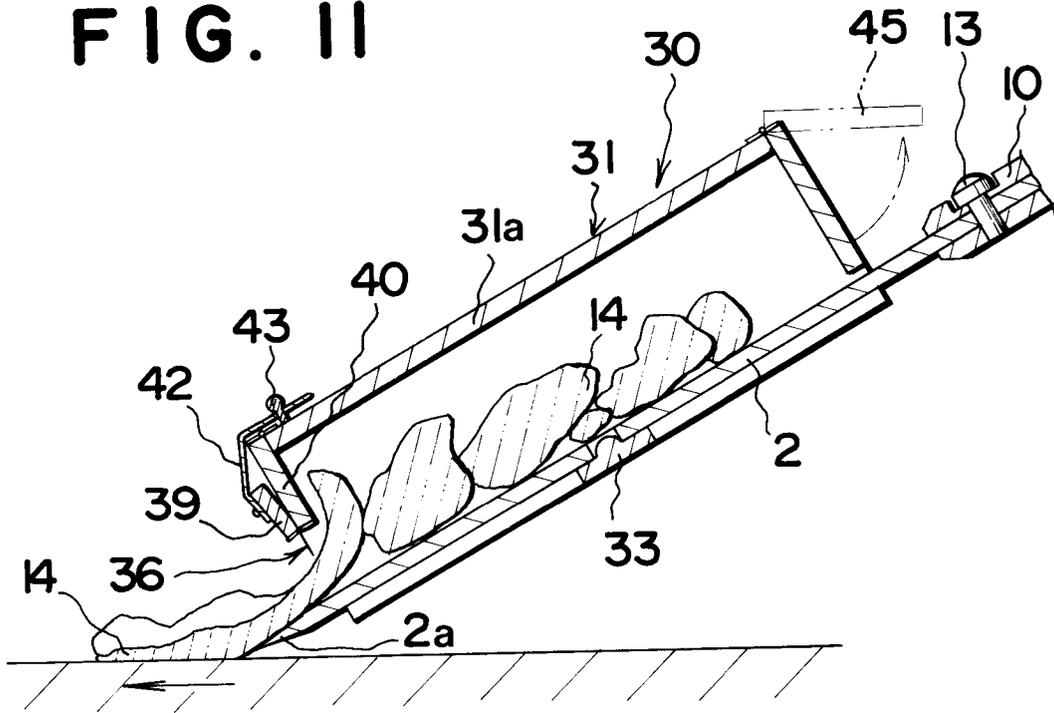


FIG. 12

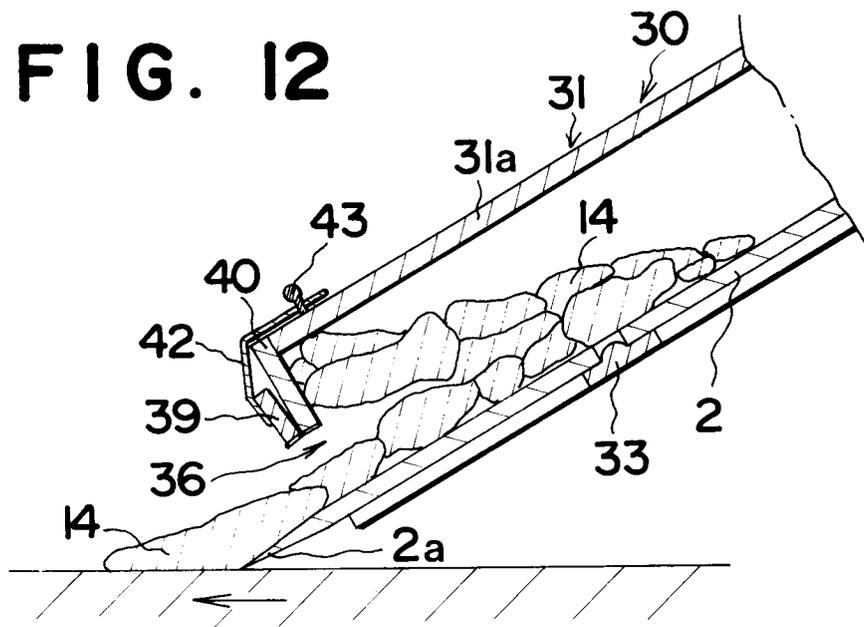
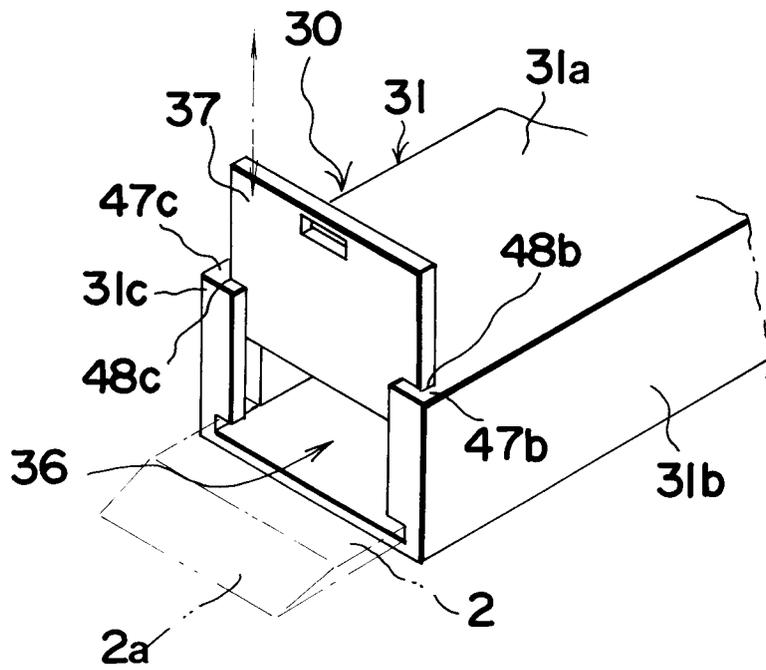


FIG. 13





European Patent  
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EUROPEAN SEARCH REPORT

Application Number  
EP 93 30 6686

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	GB-A-2 039 812 (T. CALDWELL LITLER-JONES) * the whole document * ---	1,2,4	A47L13/08
X	US-A-3 733 637 (A.F. BECKER) * the whole document * ---	1,4	
A	GB-A-2 093 751 (G.D. ACHILLE) * abstract; figures * ---	1,2	
A	DE-A-26 45 737 (R. ERKENS) * the whole document * ---	1,2	
A	US-A-2 649 604 (A. MCD. HESS) * the whole document * ---	3	
A	US-A-4 888 846 (T. NATALE) * abstract; figures * ---	1	
A	US-A-2 443 602 (R.G. CLARK) * figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			A47L
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		22 December 1993	Vanmol, M
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