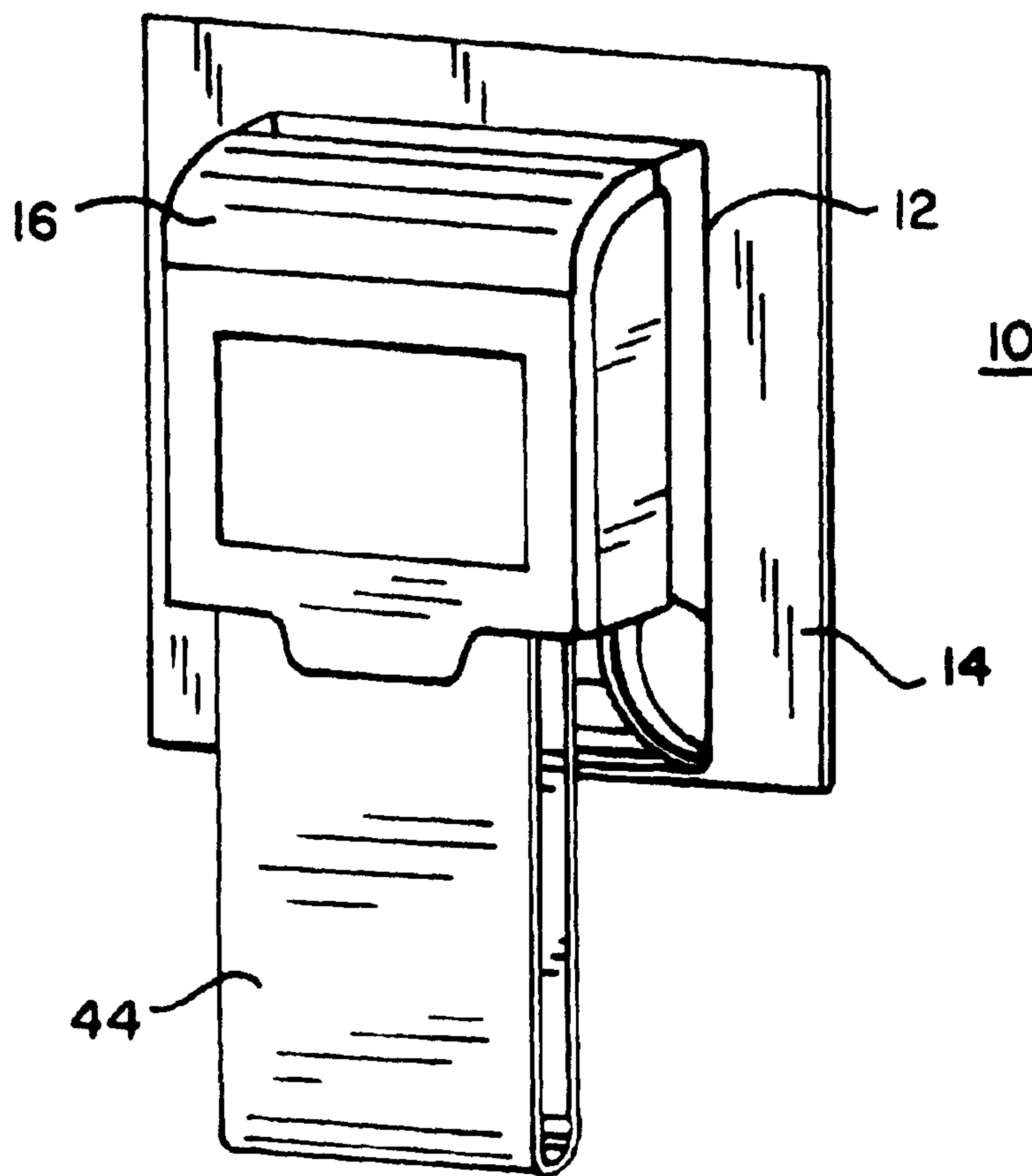




(86) Date de dépôt PCT/PCT Filing Date: 2008/05/16
 (87) Date publication PCT/PCT Publication Date: 2008/12/18
 (45) Date de délivrance/Issue Date: 2011/11/15
 (85) Entrée phase nationale/National Entry: 2009/11/18
 (86) N° demande PCT/PCT Application No.: US 2008/006316
 (87) N° publication PCT/PCT Publication No.: 2008/153671
 (30) Priorité/Priority: 2007/06/08 (US11/811,243)

(51) Cl.Int./Int.Cl. *A47K 10/28* (2006.01),
B65H 18/00 (2006.01), *B65H 20/00* (2006.01)
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(54) Titre : DISTRIBUTEUR DE SERVIETTE EN ROULEAU
 (54) Title: ROLL TOWEL DISPENSER



(57) Abrégé/Abstract:

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
18 December 2008 (18.12.2008)

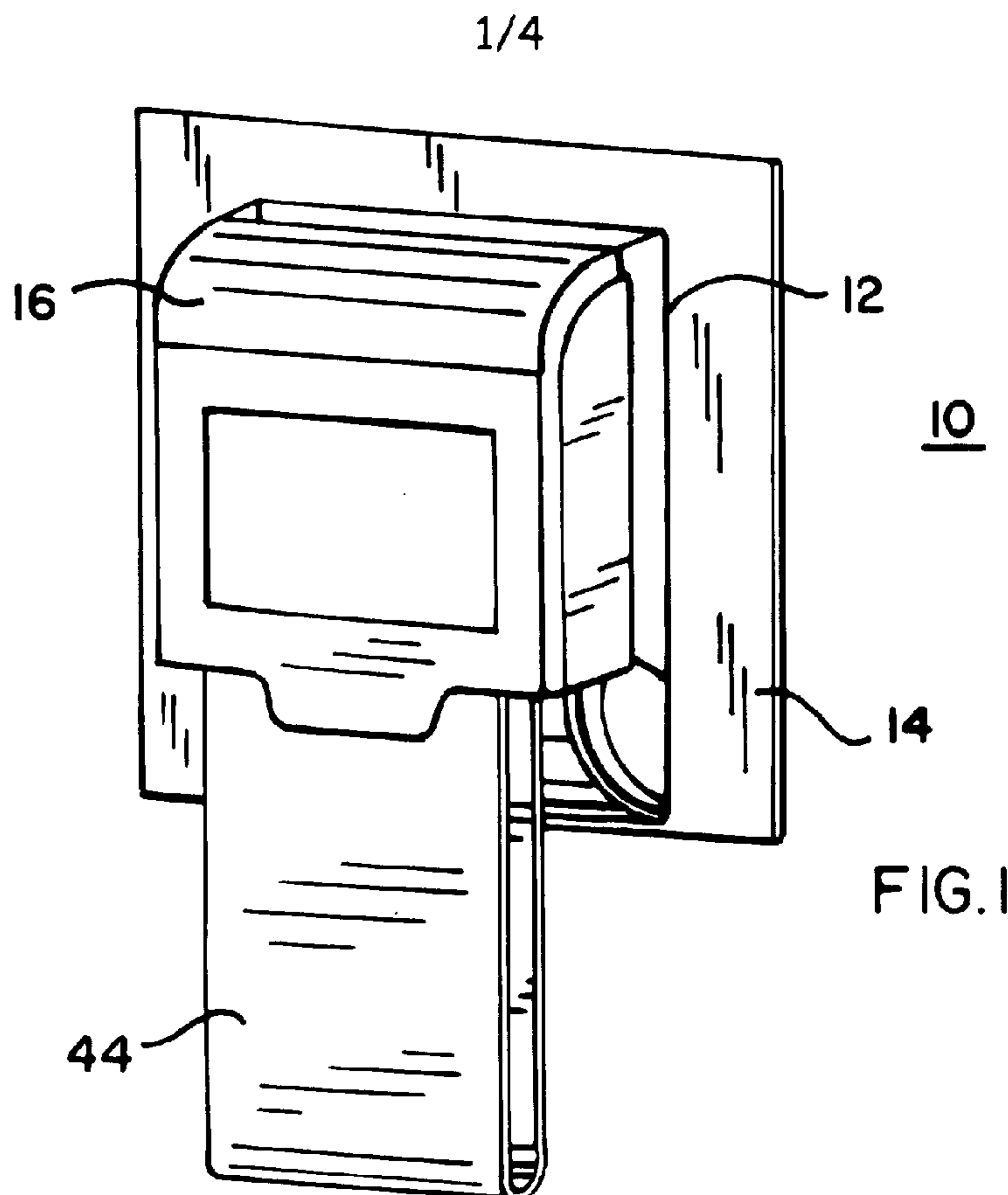
PCT

(10) International Publication Number
WO 2008/153671 A9

- (51) International Patent Classification:
B65H 18/00 (2006.01) *B65H 20/00* (2006.01)
- (21) International Application Number:
PCT/US2008/006316
- (22) International Filing Date: 16 May 2008 (16.05.2008)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
11/811,243 8 June 2007 (08.06.2007) US
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Coast, FL 32137 (US).
- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA,
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE,
EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID,
IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC,
LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN,
MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH,
PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV,
SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN,
ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL,

[Continued on next page]

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WO 2008/153671 A9



NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- *with international search report*
- *with amended claims*

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *of inventorship (Rule 4.17(iv))*

(48) Date of publication of this corrected version:

2 July 2009

(15) Information about Correction:

see Notice of 2 July 2009

ROLL TOWEL DISPENSER

This invention relates to roll towel dispensers and more particularly to environmentally sensitive means for providing recycled toweling for wiping/drying uses having a minimum carbon foot print. With the increasing attention being paid to global warming and the attendant environmental factors believed to be causing the warming it has become increasingly important to reduce to the minimum the creation of pollution and consumption of natural resources. Recycling has thus become important in all aspects of modern life. The toweling/wiping industry is one such activity and the present invention is an attempt to improve significantly the long term environmental impact thereof.

BACKGROUND

Continuous roll towel dispensers have been available for many years. Generally they have involved a loop of cloth towel material fed out of a first slot of a cabinet and taken up through another slot. Various manually operated and power operated devices have been developed and there are literally hundreds of patents covering this art. Recently the towel material has included various paper and synthetic products as well as the traditional cotton and linen products. Machines dispensing individual sheets of paper and sheet portions torn from rolls of paper are also well known in the industry. All of these machines have become increasingly sophisticated and complicated in part to address their impact on the environment, and while the effect of paper in its various forms versus cloth has been and continues to be debated in the industry, the need for an environmentally friendly low carbon footprint wiping/drying solution has become preeminent.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly it is a primary object of the present invention to provide a greatly simplified roll towel dispenser that can be made largely of recycled material and will permit easy reuse of the toweling/wiping material.

It is another object of the present invention to provide a roll towel dispenser device in which the clean toweling is easy to install and the used toweling is easy to remove and reprocess for additional use.

It is another object of the present invention to provide a roll towel dispenser in which the toweling is contained totally within the dispenser cabinet with no exposure to the user except when actually required for a drying/wiping operation.

It is a still further object of the present invention to provide a roll towel dispenser in which the used toweling material is completely retracted into the dispenser cabinet after use so that it can not be accessed

from the outside by vandals or other unauthorized users.

It is yet another object of the present invention to provide a simplified take up reel spindle that may be easily installed in the dispenser and easily removed from a roll of used toweling.

It is a still further object of the present invention to provide a dispenser in which gravity feeds the clean toweling out of the cabinet after unrolling from the supply.

It is another object of the present invention to provide a roll towel dispenser that can dispense a variety of web materials without machine modifications.

In a further aspect, the present invention provides a device for dispensing predetermined segment lengths of a continuous web of material for a processing operation, comprising in combination: a base member adapted for mounting on a suitable surface; a front housing adapted to be connected to said base member to form an enclosure; a lower compartment formed in said enclosure to receive processed segment lengths of the web of material; an upper compartment formed in said enclosure and extending forward of said lower compartment to receive a supply of said continuous web of material; an unobstructed opening formed in the bottom of said front housing adjacent the front thereof; a web material feeding means positioned in said upper compartment adjacent the front edge thereof to feed said web of material, from the supply thereof in said upper compartment over said front edge to cause said web of material to cascade down past said lower compartment and out through said unobstructed opening formed in the bottom of said front housing, the web of material forming a depending loop of unprocessed web material; web material take-up means, mounted in said lower compartment rearward of the depending loop of web material, for retracting processed web material into said housing through said unobstructed opening formed in the bottom of said front housing adjacent the front thereof; said web material take-up means being positioned in said lower compartment so as to retract said depending loop of web material completely inside said housing and away from said open bottom of said front housing; separate individual feeding motor means and take-up motor means operatively connected to said web material feeding means and said web material take-up means, respectively; sensing means for detecting a requirement for feeding of said web of material out from said housing for dispensing said loop of web material from said housing, and determining when to initiate a take-up operation for retracting said depending loop of web material into said housing; control means for operating said feeding motor means and said take-up motor means in response to

output from said sensing means; and power supply means mounted within said housing for supplying operating electric power to said motor means, said sensing means and said control means; wherein a segment of said continuous web material is dispensed from within said housing, through said unobstructed opening for use, and is thereafter entirely withdrawn into said housing through said unobstructed opening, so that all the web material is removed from exterior of said housing.

These and other and further objects of the invention are achieved in an embodiment in which an enclosure has a pair of spaced apart vertical end plates therein joined by an horizontal shelf forming an upper compartment for a roll of clean toweling; a horizontal feed roll is rotatably mounted between said end plates along the front edge of said plate; a used material take-up spindle is rotatable mounted between said plates below said shelf; a pivotably mounted wall plate is hung below said shelf on the bottom front edge of the shelf extending to adjacent the rear edge of an opening in the bottom of the enclosure; individual gear motors are mounted on said end plates to power said feed roller and take-up spindle; computer control means are used to operate the motors and a battery is used to power the apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front perspective view of the dispenser of the present invention mounted on a wall with the toweling shown in the actuated ready to use position;

Figure 2 is a front elevation of the apparatus with the front housing and door removed;

Figure 3 is a sectional view taken on the center line of Figure 1 looking to the right with the towel in the fully retracted position;

Figure 4 is a view similar to Figure 3 but with the towel in the actuated ready to use position;

Figure 5 is a perspective view of the take-up spindle; and

Figure 6 is a view similar to Figure 4 with another tension sensor.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to Figure 1 the towel dispenser 10 is shown with its base 12 mounted on a wall portion 14 with the front housing 16 which is pivotally mounted at the top of base 14 in the closed position. A loop 44 of toweling is shown in the actuated ready to use position. Inside the housing 16 the very simple structure includes a pair of spaced apart end plates 20 (see Fig. 2) mounted on the base 14.

Mounted between the plates 20 is a shelf 22 which at its front edge has a lip portion 24 (see also Fig. 3 & 4). Journaled in end plates 20 just above shelf 22 is feed roller 26. The surface of roller 26 is preferably formed from a rubber like material to provide good frictional contact with toweling when a roll of toweling 34 is placed on the shelf 22. Also journaled between plates 20 is the take-up spindle 28. Gear motors 30 and 32 are mounted on the outer surface of the right hand plate 20 and drive the roller 26 and spindle 28 respectively. These motors are typically low voltage DC motors and are powered by battery 60 mounted on the upper portion of base member 12. Motion sensor 50 is mounted on the inside of the lower portion of front housing 16 and initiates the feed and retract cycles.

The simplicity of the mechanism can be more fully appreciated by referring to Figures 3 & 4. A roll 34 of toweling material is placed in the upper compartment formed by the shelf 22. The free end of toweling is then withdrawn from the bottom of roll 34, over roll 26 and fed down into the lower compartment and threaded through the spindle 28 after first passing about shaft 36 in the Figs. 3 & 4 embodiment. Shaft 36 is journaled in a hole in the left hand plate 20 and a small vertical slot 38 in the right hand plate 20. This serves as a tension control limit as will be explained in detail herein. A pivotally mounted door 40 is hung from the under side of shelf 22 and extends to just past the lip 42 of an opening 46 in the front housing 16.

Roller 26 powered by motor 30 feeds toweling from the bottom of roll 34 out off the shelf 22 and by gravity causes it to fall down the inside of front housing 16 and out the slot 46 to form the loop 44. Tension in the toweling is released while the toweling is being fed out by roll 26 to form the loop 44 and, door 40, tends by gravity to move from the "fully rewound position" of Figure 3 to contacting lip 42 to close the lower compartment (See Fig. 4) and help direct the fresh toweling down the inside of the front housing and out the slot 46 where it can be grasped by a user. Loop 44 may be easily used to dry hands or wipe other objects as desired. Spindle 28 is fixed during this fresh toweling feed cycle.

After the toweling loop 44 has been used and the sensor 50 no longer senses any motion, a signal is sent to motor 32 to rotate spindle 28 to wind up and retract all the previously exposed toweling loop. This retract cycle is completed when the tension in the toweling causes shaft 36 to be raised and trip a sensor mounted on the right hand end plate to shut off motor 32 resulting in the condition shown in Figure 3. In addition to the tension sensor actuated by shaft 36 to shut off further retracting of the loop 44 a sensor and program in the computer board 52 senses excessive pulling on the toweling material such as might be encountered if an arm or hand were caught in loop

44 and causes motor 30 to immediately

feed toweling material into loop 44 relieving the tension and allowing the safe removal of any obstruction.

The amount of fresh toweling fed out to relieve the obstruction is generally limited to one or two cycles. This feature will also limit damage from deliberate attempts to damage the dispenser since the gear motors

30 and 32 can not be forced into reverse rotation by excessive pulling on the toweling material. As may be

seen in Figure 3 when the dispenser is in the "fully rewound" state it is virtually impossible to gain access to the interior of the housing or even exert enough tension on the toweling to trigger this safety feature. Alternatively torque or other tension sensors than the foregoing may be used to stop retraction and provide the safety features.

Figure 6 shows an alternative way to sense toweling tension to shut off the rewind motor 32. In this embodiment the computer senses the motor current and when it senses the increased "stall" current condition it turns off power to motor 32 resulting in the condition shown in Figure 6. Door 40 will function in the same manner to close the take-up compartment as in Figures 3 & 4.

Referring now to Figure 5 the spindle 28 is formed by a flat sided elongated U shaped two tine fork with the open end adapted to fit into a bushing fixed on the shaft of motor 32. The closed end of fork 28 has a hole 29 adapted to engage a stub shaft 56 formed on spring arm 58 secured to the outside of the left hand end plate 20 (see Fig. 2). This also allows the easy removal of the completely retracted roll 35 of toweling from the machine by simply flexing arm 58 to the left in Figure 2 to withdraw the stub shaft from the hole 29 in the closed end of the U shaped spindle 28. Spindle 28 may also be collapsed and easily pulled out of the wound up used toweling.

The computer board 52 is mounted on the right side end plate and is programmed to perform at least the following steps namely: power up; check for cover open; check for towel fully rewound; check for movement pulses; turn on towel feed; check for movement pulses; turn off towel feed; turn on towel rewind; check for towel fully rewound; disable movement and turn on "call attendant" upon preselected conditions occurring. Other operations may be added as required.

While there are given above certain specific examples of the invention and its application in practical use, it should be understood that they are not intended to be exhaustive or to be limiting of the invention. On the contrary, they are given in order to acquaint others skilled in the art with this invention and the principles thereof and a suitable manner of its application in practical use.

Claims:

1. A device for dispensing predetermined segment lengths of a continuous web of material for a processing operation, comprising in combination:
 - a base member adapted for mounting on a suitable surface;
 - a front housing adapted to be connected to said base member to form an enclosure;
 - a lower compartment formed in said enclosure to receive processed segment lengths of the web of material;
 - an upper compartment formed in said enclosure and extending forward of said lower compartment to receive a supply of said continuous web of material;
 - an unobstructed opening formed in the bottom of said front housing adjacent a front thereof;
 - a web material feeding means positioned in said upper compartment adjacent a front edge thereof to feed said web of material, from the supply thereof in said upper compartment over said front edge to cause said web of material to cascade down past said lower compartment and out through said unobstructed opening formed in the bottom of said front housing, the web of material forming a depending loop of unprocessed web material;
 - web material take-up means, mounted in said lower compartment rearward of the depending loop of web material, for retracting processed web material into said housing through said unobstructed opening formed in the bottom of said front housing adjacent the front thereof;
 - said web material take-up means being positioned in said lower compartment so as to retract said depending loop of web material completely inside said housing and away from said open bottom of said front housing;
 - separate individual feeding motor means and take-up motor means operatively connected to said web material feeding means and said web material take-up means, respectively;

sensing means for detecting a requirement for feeding of said web of material out from said housing for dispensing said loop of web material from said housing, and determining when to initiate a take-up operation for retracting said depending loop of web material into said housing;

control means for operating said feeding motor means and said take-up motor means in response to output from said sensing means; and

power supply means mounted within said housing for supplying operating electric power to said motor means, said sensing means and said control means;

wherein a segment of said continuous web material is dispensed from within said housing, through said unobstructed opening for use, and is thereafter entirely withdrawn into said housing through said unobstructed opening, so that all the web material is removed from exterior of said housing.

2. The device of Claim 1 wherein said continuous web of material includes a continuous roll of toweling material positioned in said upper compartment, with one end of said toweling material being rolled up in said take-up means.
3. The device of Claim 1 wherein said upper and lower compartments are formed of a pair of spaced apart vertical end plates mounted on said base member; and a horizontal shelf mounted between said end plates substantially at a vertical midpoint thereof; wherein said web material feeding means comprises a feeding roller mounted across a forward edge of said shelf member; and wherein said web material take-up means comprises an elongated, flat-sided U-shaped spindle member rotatably mounted in said lower compartment.
4. The device of Claim 3 wherein said feeding motor means and said take-up motor means each comprise an individual DC gear motor mounted at a side of the respective one of said upper and lower compartments, and driving said feeding roller and said

take-up spindle, respectively; and said power means includes a battery mounted within said enclosure.

5. The device of Claim 4 wherein said DC gear motors include means to prevent being turned reversely from pulling on said web material; and sensing means includes means to detect tension on said loop of material and to delay operating said take-up means when such tension is detected.

6. The device of Claim 1 wherein said feeding motor means and said take-up motor means each include a low-voltage DC gear motor; and said power means includes an AC to DC converter.

7. The device of Claim 1 wherein said sensing means includes web material tension sensing means for sensing a pulling of the web material of said depending loop; said control means includes means responsive to said tension sensing means to interrupt operation of said take-up motor means, and to actuate said feeding motor means to automatically feed additional web material to said depending loop; whereby injury to users of said dispensing device is prevented.

8. The device of Claim 1 wherein said sensing means includes a motion-detecting sensor mounted in said enclosure adjacent the front bottom of said housing.

9. The device of Claim 1 wherein said web material take-up means includes an elongated, U-shaped take-up spindle having a pair of flat-sided tines, and being removably mounted within said lower compartment; and means for removably coupling the take-up spindle to said take-up motor means; whereby the end of the continuous web of material can be inserted between the tines of said spindle for starting a take-up roll of the web of material, and when the web of material is entirely wound around the spindle as a roll of used material, such roll can be removed from the

device for reprocessing by removing the spindle from the cabinet and withdrawing the spindle from the roll of used material.

10. The device of Claim 1 wherein said control means includes a computer processor element programmed with software instructions for performing at least the following steps:

upon power-up, checking to detect if the cabinet is open; checking whether the supply of web material is fully rewound; checking for request to dispense the web material; turning off the feeding means; turning on a towel rewind function of said take-up means; disabling said take-up and feeding motor means upon pre-selected error conditions; and providing a call-attendant signal upon predetermined error conditions.

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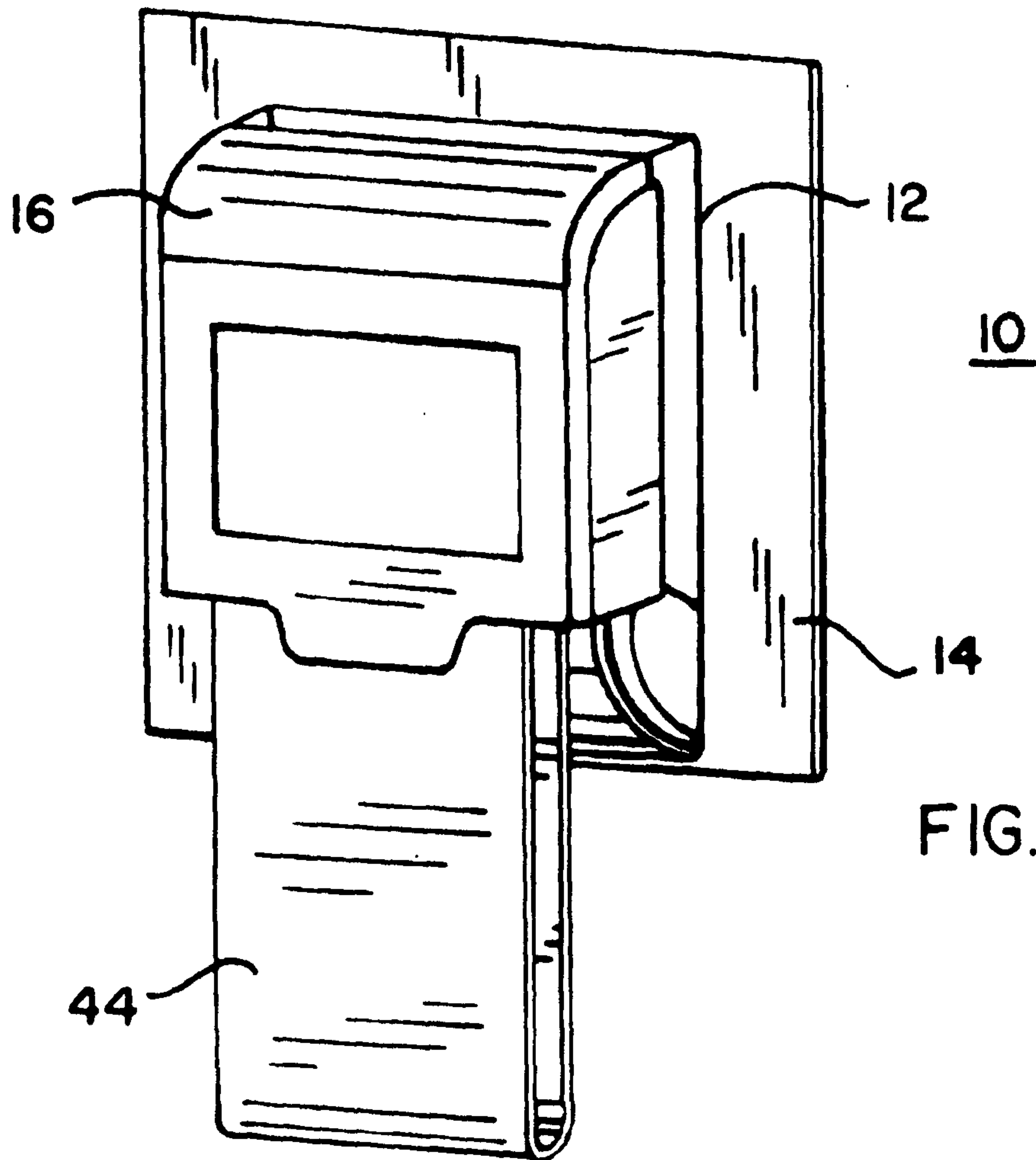


FIG. 1

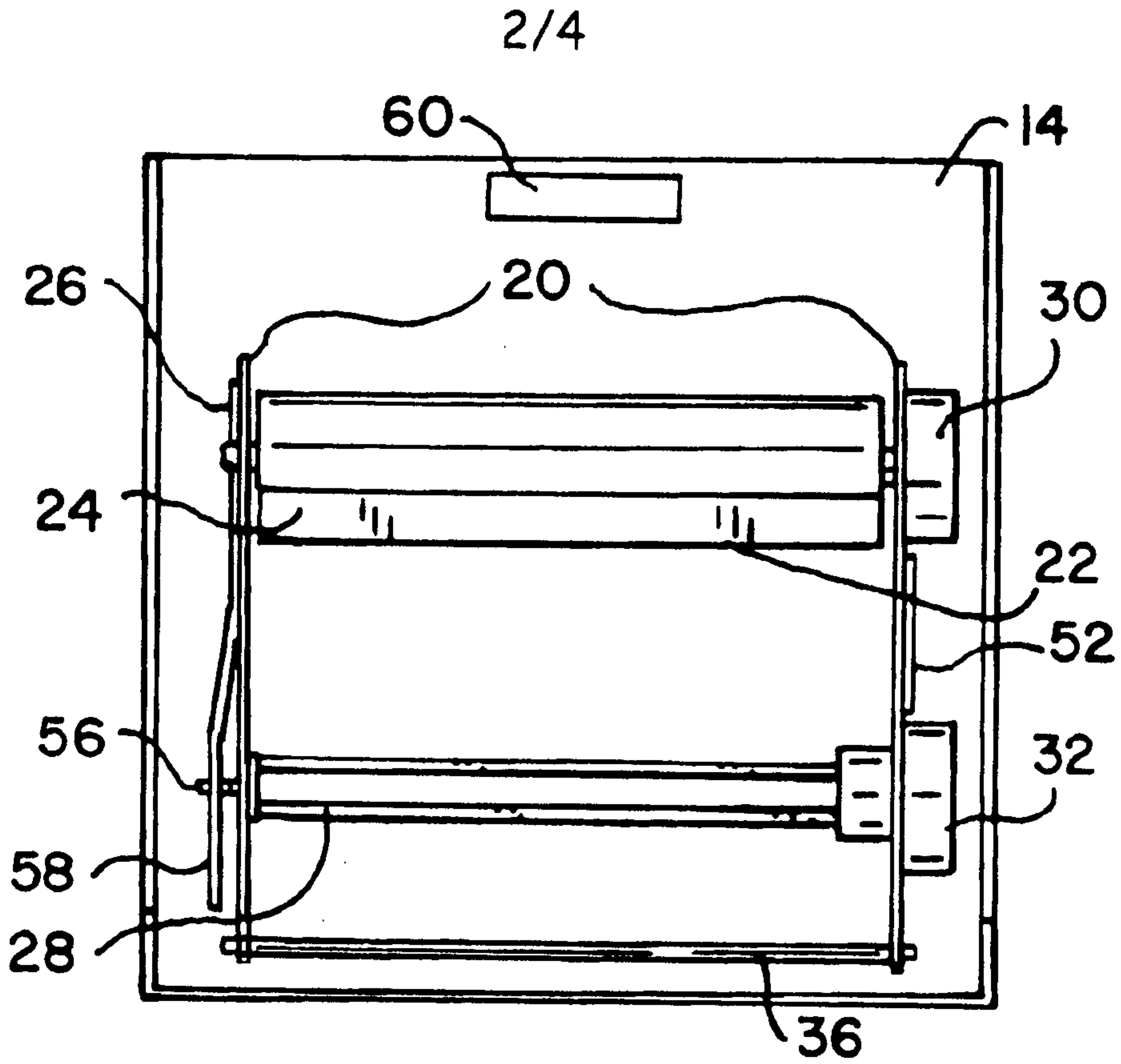


FIG. 2

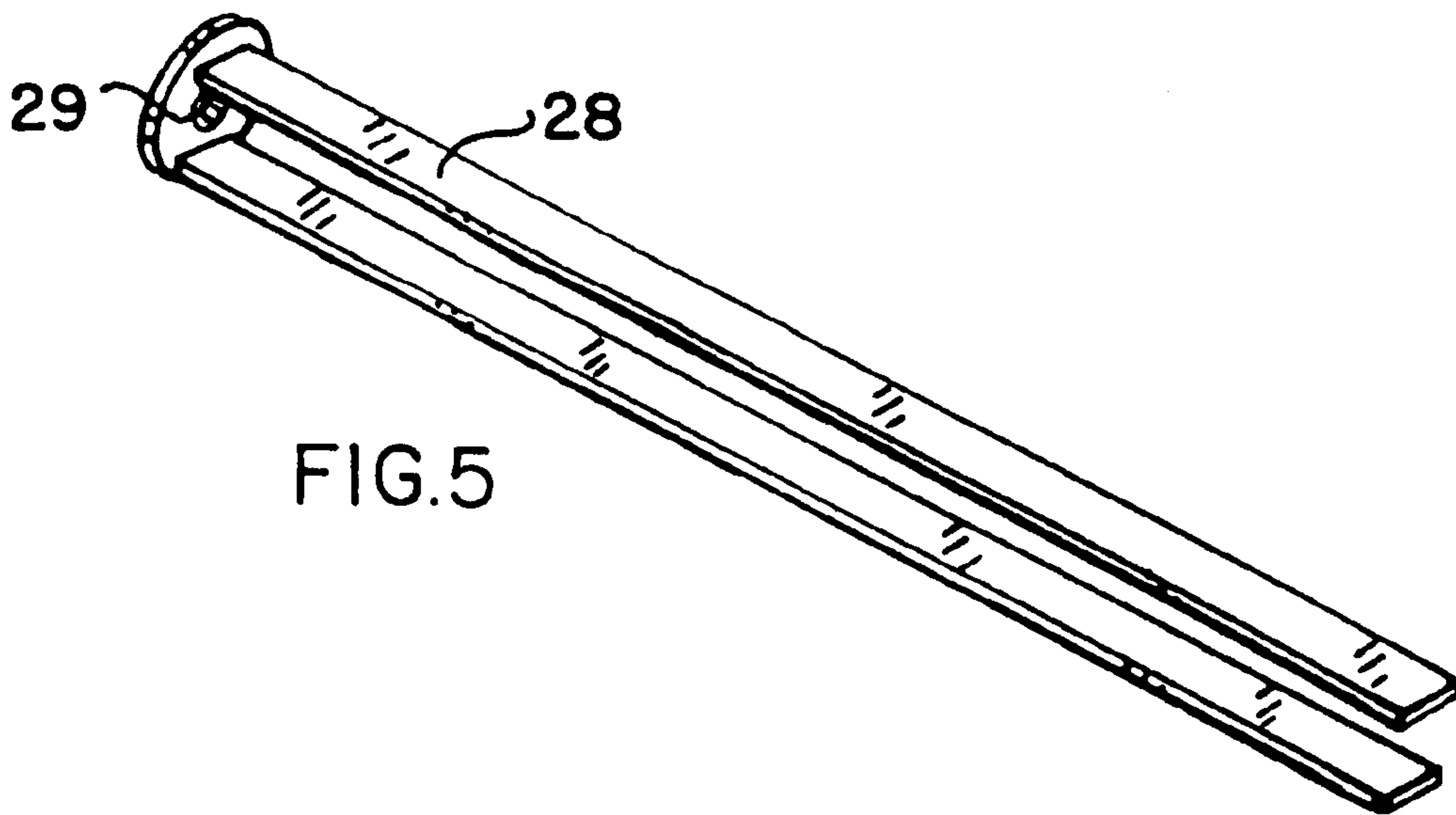
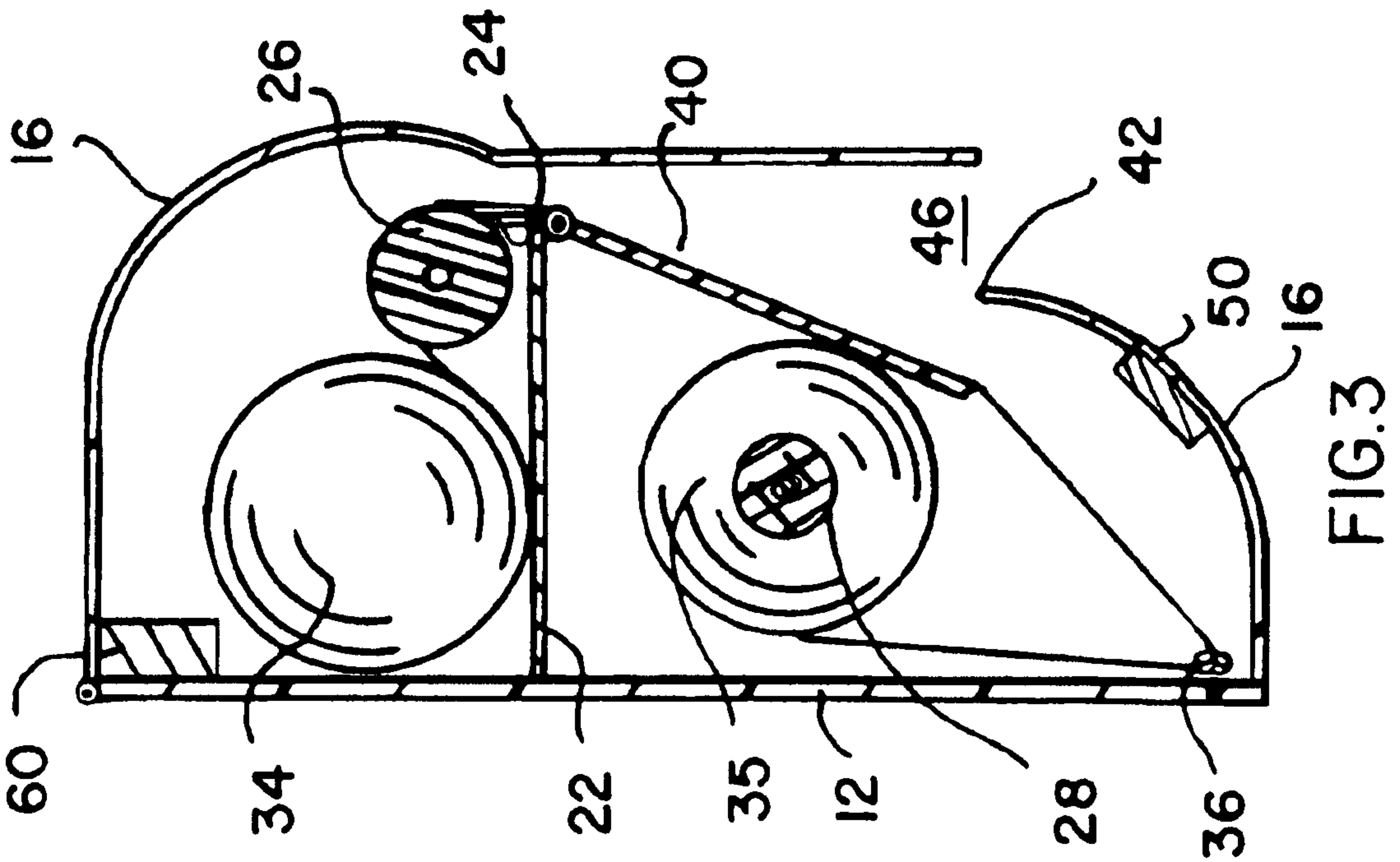
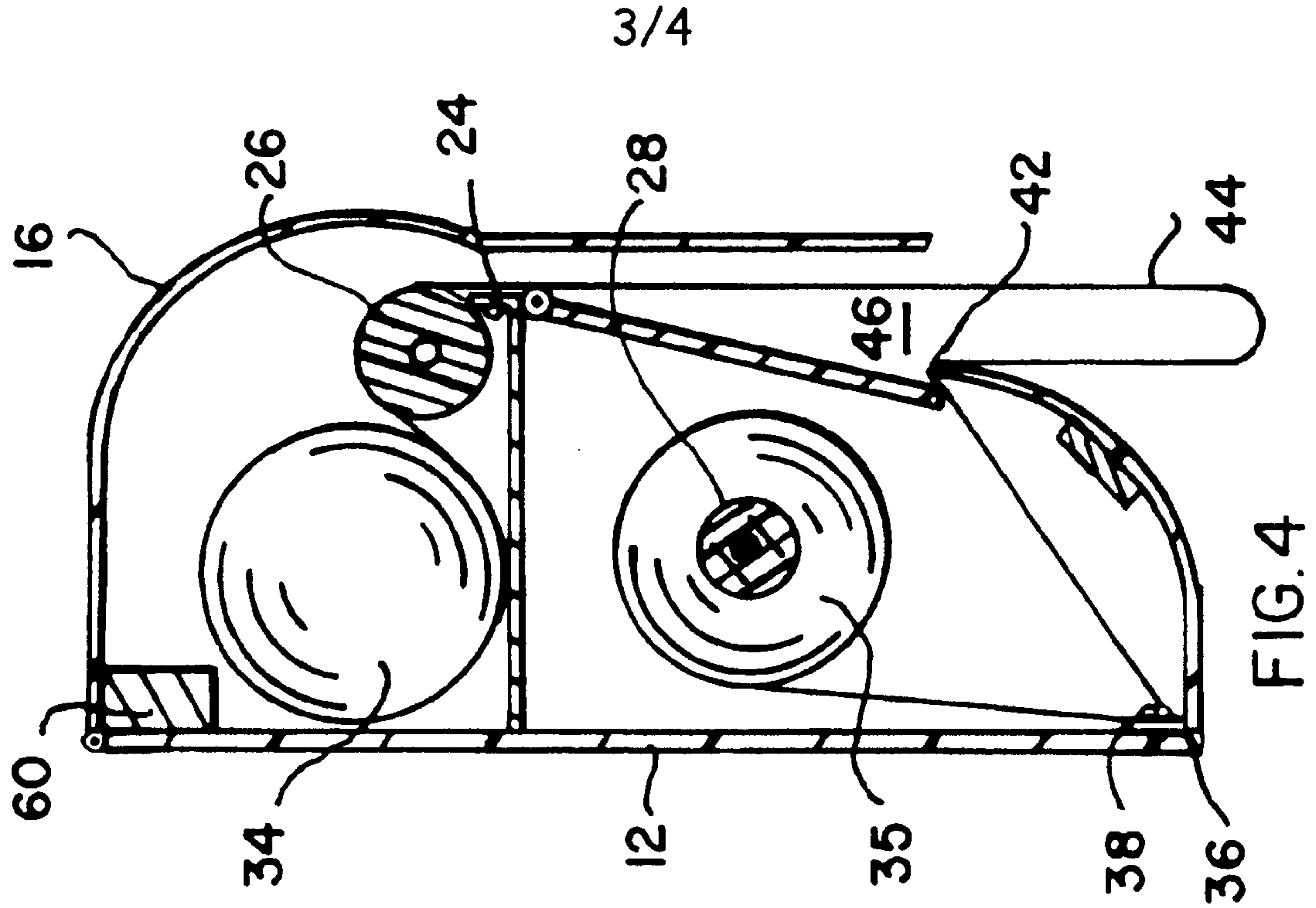


FIG. 5



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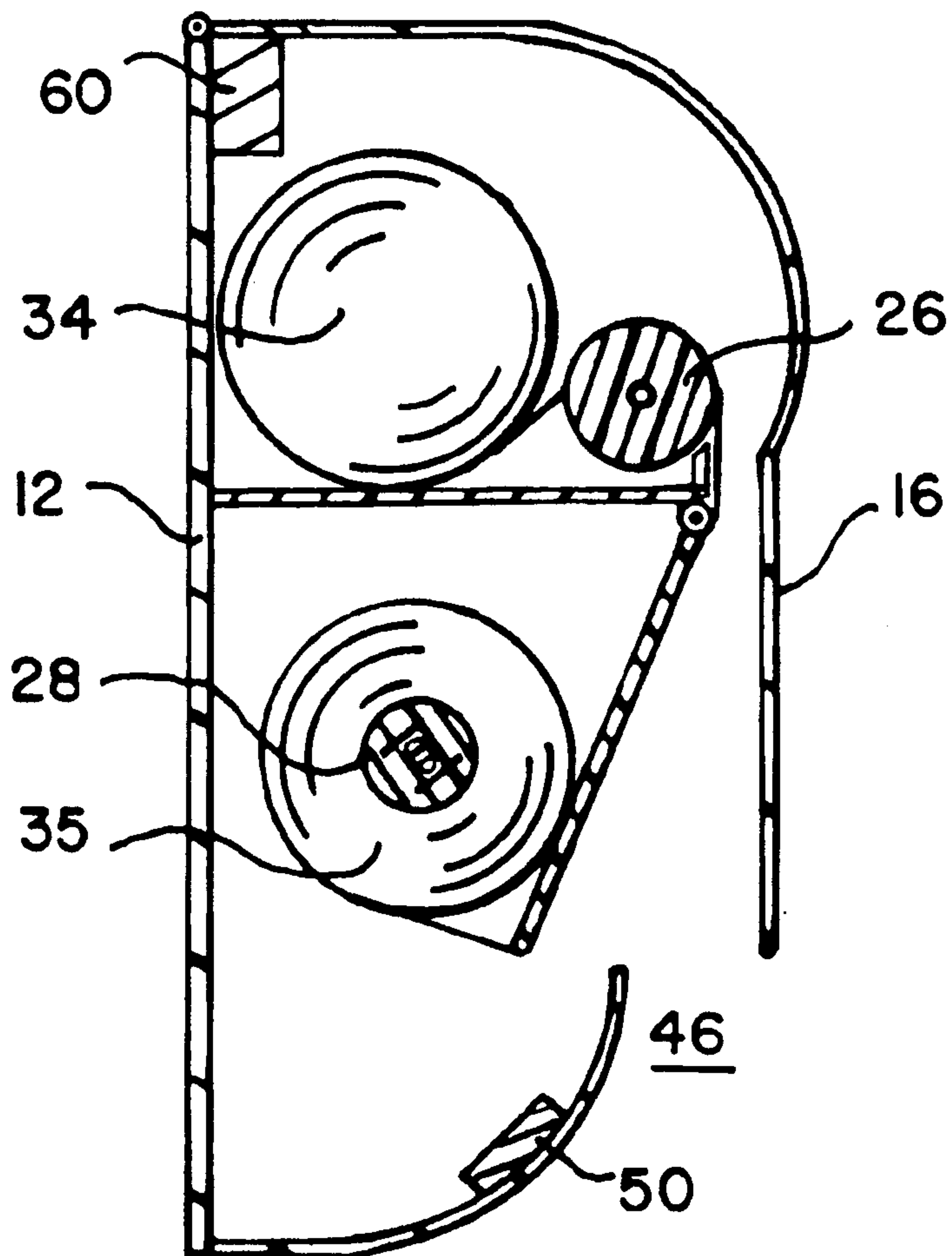


FIG. 6

