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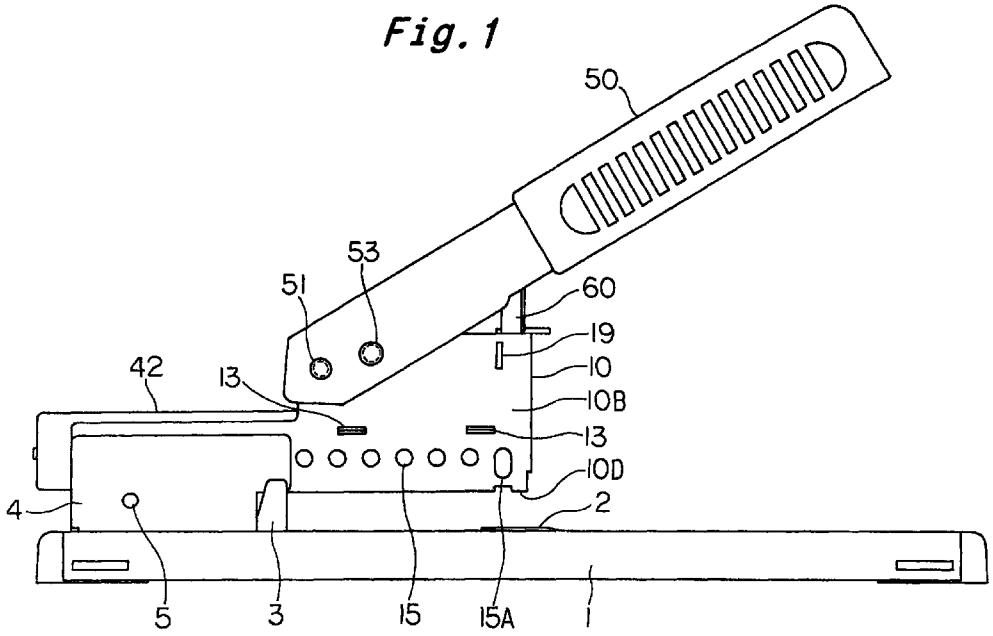
(54) **STAPLER**

(57) A stapler is provided which allows confirmation of the remaining number or leg length of staples stored in a case from the outside. A plurality of through holes 15 is opened along a guide rail 20 in the case 10 in the walls 10B, 10C of the case 10 of the stapler. In this case, confirmation of the position of the staple pushing part 43 is facilitated by the provision of a mark 47 on the staple pushing part 43. The remaining number of staples 30 is determined based on the position of the staple pushing part 43. It is possible to confirm the leg length of the staples 30 from the longitudinal through hole 15 above the staple ejecting mouth 10D.

Fig. 1



EP 1 086 786 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a stapler used when stapling documents for example, and in particular relates to improvements in confirming the remaining number or leg length of staples which are stored in the case of the stapler.

BACKGROUND OF THE INVENTION

[0002] A stapler (paper fastener) functions by pressing out gate shaped staples one by one from a staple ejecting part in order to fasten an object such as documents. Staples are disposed on a guide rail provided in the case of the stapler. The staples are adapted to reach a staple ejecting mouth on the lower tip of the guide rail by being pushed by a staple pushing member. The staples are ejected one by one from the staple at the head of the staples. When staples are used up, new staples are supplied on the guide rail by a manual operation. Staples used in the stapler have a plurality of types differing with respect to leg length. Fastening operations are adapted by changing the staple leg length in response to the thickness of the object to be fastened.

[0003] Thus when a stapler is in use, it is convenient to know the leg length or the remaining number of staples which are stored in the case. However the case of a conventional stapler is formed from non-transparent metal and thus the staples in the case can only be seen to a limited extent from an aperture provided in proximity to the staple ejecting part. As a result, a user of a stapler has not been able to confirm a remaining number of staples until the number of staples has reduced to such an extent as to be visible from the aperture provided near the staple ejecting part. Furthermore when it is desired to confirm the leg length of the staples in the case, it has been necessary to eject a staple for example in an empty operation.

[0004] In order to solve the above problem, small staplers in the prior art (staples operated with one hand) are provided with a case formed from a transparent member, comprised of resin for example, in order to render the interior of the case visible. However such a resin case does not have sufficient strength and can not be used to form the case of large staplers (desktop type staplers) which withstand relatively large loads. That is to say, large staplers require the use of metals of a certain strength as materials to form the case and thus it has not been possible to provide transparency allowing visual confirmation of the state of staples in the case.

[0005] The present invention is proposed to solve the above problem and has the object of providing a stapler which allows confirmation from the outside of the leg length or the remaining number of staples which are stored in the case.

DISCLOSURE OF THE INVENTION

[0006] The present invention relates to a stapler provided with a guide rail on which staples are disposed slidably, a staple pushing member which is disposed to slide on the guide rail and which presses staples from behind toward a staple ejecting part, and a case storing the guide rail and the staple pushing member. The invention is characterized in that an observation port allowing viewing of the staples is formed in the case along the guide rail. Thus, when the stapler is used, as the number of staples disposed on the guide rail decreases, the position of the staple pushing member displaces towards the staple ejecting part. A user of the stapler can view the staples and the staple pushing member through the observation port formed in the case along the guide rail. As a result, the remaining number of the staples can be checked at any time by confirmation of the position of the rear end of the staples or the position of the staple pushing member. This allows early preparation for supply of the staples.

[0007] According to an aspect of the invention, at least a section of the observation port has a length in a longitudinal direction which allows viewing of the lower end of staples disposed on the rail irrespective of the leg length of staples in the stapler. Since it is possible to check the leg length of staples disposed on the guide rail from the observation port, it is not necessary to open the case or eject a staple without stapling (hereafter perform an empty operation) in order to confirm the leg length of staples stored in the case.

[0008] According to another aspect of the invention, the observation port is formed by a plurality of through holes aligned in a lateral direction of the guide rail. The area of the observation port opened in the case is reduced to a minimum which maintains sufficient strength in the case. The holes in the case are formed at the same time as the formation of the case. This reduces manufacturing costs.

[0009] According to yet another aspect of the invention, at least one of the through holes has a predetermined length in a vertical direction which allows viewing of the lower end of staples disposed on the rail irrespective of the leg length of staples in the stapler. Since the leg length of staples disposed on the guide rail can be confirmed from the observation port, it is not necessary to open the case or perform an empty operation in order to confirm the leg length of staples in the case.

[0010] According to yet another aspect of the invention, a mark is provided on the staple pushing member which can be observed from the observation port. The position of the staple pushing member can be easily and accurately confirmed by the mark which can be seen from the observation port. Therefore the remaining number of staples can be determined.

[0011] According to yet another aspect of the invention, the mark is colored in a color which is different from the color of the staples or the staple pushing member.

The position of the staple pushing member can be easily and accurately confirmed by the mark which can be seen from the observation port. Therefore the remaining number of staples can be determined.

[0012] According to yet another aspect of the invention, the guide rail is colored in a color which is different from the color of the staple pushing member. A user of the stapler can easily and accurately confirm sections in which the staples and the staple pushing part are not disposed on the guide rail. Therefore the remaining number of staples can be determined.

[0013] According to yet another aspect of the invention, the staples are colored in a color which is different from the color of the staple pushing member. In such a way, a user of the stapler can easily and accurately perform direct confirmation of the trailing end of the staples. Therefore the remaining number of staples can be determined on this basis.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a lateral view of a stapler according to the present invention.
Fig. 2 is a cross sectional view of the stapler.
Fig. 3 is a cross sectional view of a case of the stapler.
Fig. 4 is a plan view of the case.
Fig. 5 is a rear view of the case.
Fig. 6 is a lateral view of a staple pushing unit of the stapler.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0015] In order to describe the present invention in greater detail, the present invention will be described with reference to the accompanying drawings.

[0016] Fig. 1 and Fig. 2 are respectively a lateral view and a cross sectional view of a stapler according to the present embodiment.

[0017] As shown in the figures, the stapler is provided with a base 1. A staple deforming anvil 2 is provided at approximately a central position in a longitudinal direction of the base 1. Objects such as documents are fastened by staples 30 ejected from a staple ejecting mouth 10D being deformed by bending against the staple deforming anvil 2. A guide 3 allowing displacement in a longitudinal direction is provided on the rear (left side of the figure) of the staple deforming anvil 2. A fastening position can be set to a suitable position by adjusting the end of the object such as a document along the guide 3.

[0018] A case supporting plate 4 is fixed by screws to the proximity of the rear end section (the left end section in the figure) of the base 1. The proximity of the rear end (the left end section in the figure) of a case 10 is mounted on the case supporting plate 4 to rotate freely through a shaft 5. A spring 6 is provided between a bottom 10A of the case 10 and the base 1. The case 10 is biased to rotate in an anti-clockwise direction in the figure by the spring 6. Furthermore the rotation of the case 10 is limited by abutment of the case 10 with a stopper 4B which forms a section of the supporting plate 4 and thus the case 10 is maintained in approximately a horizontal state.

[0019] The main components of the stapler are contained in the case 10. As shown in Fig. 3 to Fig. 5, the case 10 is a member which forms three sides of a quadrilateral in cross section and which comprises the bottom 10A and walls on both sides 10B, 10C. The case 10 for example may be formed from material having a certain rigidity such as steel. The front end of the walls 10B, 10C of the case 10 is bent inwardly to form a case front end 10E. The height of the walls 10B, 10C decreases towards the rear end of the case 10 (the left side of Fig. 1 to Fig. 4) and increases at the front end of the case 10 (the right side of Fig. 1 to Fig. 4). As described below, a handle 50 is mounted to rotate freely on a section of the front end section which has a greater height. A shaft hole 11 is formed to allow penetration of the aforesaid shaft 5 near the rear end of the walls 10B, 10C.

[0020] As clearly shown in Fig.4 and Fig. 5, a guide rail 20 forming three sides of a quadrilateral in cross section which comprises a bottom and both sides is stored in the case 10. Apertures 20A, 20B, 20C are formed from the rear end (left side of Fig. 4 and Fig. 5) of the guide rail 20 in the bottom of the guide rail 20. A stopper 9A, a spring mounting 9B and a stopper 9C are formed by a pressing process with respect to the apertures 20A, 20B, 20C in the bottom 10A of the case. The stopper 9A, spring mounting 9B and stopper 9C are respectively engaged with the apertures 20A, 20B, 20C.

[0021] A spring mounting section 20D is provided between the apertures 20A and 20B of the guide rail 20. A spring 21 is provided between the spring mounting section 9B and the spring mounting section 20D. The guide rail 20 is biased towards the front end of the case 10 by the spring 21 and fixed to a predetermined position on the case 10 with the stoppers 9A, 9C engaged with the apertures 20A, 20C.

[0022] The guide rail 20 has a narrow width part 20E near the rear end and a large width part 20F near the tip.

[0023] As clearly shown in Fig. 5, supply of staples 30 to the stapler is performed by insertion of staples 30 from an upper aperture near the rear end of the case 10. As shown by the two-dot chain line in Fig. 5, staples 30 are disposed across the narrow width part 20E to slide along the guide rail 20. Here, the gate shaped staples 30 are piled up orthogonally with respect to the paper surface as shown in Fig. 5.

[0024] The staples 30 are set on the narrow width part 20E and are guided to the large width part 20F which has a greater width by being pushed from behind

by a staple pushing member which will be described below. The tip of the staples 30 reaches on the staple ejecting mouth 10 formed on a front end of the case bottom 10A. A protrusion 12 which protrudes inwardly is formed on a lateral section of the guide rail narrow width part 20E of the case walls 10B, 10C. Staples 30 on the narrow width part 20E are pushed from both sides by the protrusions 12 and are guided without rattling. The staples 30 can be widened when guided into the large width part 20F and regulated to an appropriate shape by pressing.

[0025] The top of the large width part 20F of the guide rail 20 is covered by a guide rail cover 14 fixed to an engagement hole 13 of the case 10.

[0026] As shown in Fig. 6, a staple pushing unit 40 which biases staples 30 on the guide rail 20 is provided with a staple pressing shaft 41, a rear cover 42 fixed to the base of the staple pushing shalt 41 and a staple pushing part 43 which comprises the staple pushing member.

[0027] The staple pushing part 43 forms three sides of a quadrilateral in cross section comprised by an upper face and both walls, and the staple pushing part 43 is fitted slidably with respect to the staple pushing shaft 41 at the pair of shaft through parts 43A, 43B extending from the upper face. A spring 44 is provided between the staple pushing part 43 and the rear cover 42. The staple pushing part 43 is biased towards the tip of the staple pushing shaft 41. A stopper 45 is provided on the tip of the staple pushing shaft 41. The staple pushing part 43 is prevented from detachment from the staple pushing shaft 41 by abutment of the stopper 45 with the aforesaid shaft through part 43B.

[0028] The staple pushing unit 40 is inserted from the top aperture of the rear end of the case 10 (refer to Fig. 2). The staple pushing part 43 is disposed behind the staples 30 to be placed on the guide rail 20 and slide with respect to the guide rail 20. A hook-shaped engagement section 42A formed on the rear cover 42 is engaged with the stopper 4B formed on the case supporting plate 4.

[0029] In such a way, the rear cover 42 of the staple pushing unit 40 comprises a cover which covers an upper aperture of the rear end of the case 10. The staple pushing part 43 which is in contact with the rear end of the staples 30 is biased by the spring 44 and the staples 30 are transferred forward until the staple 30 at the tip of the group reaches the front end 10E of the case 10. The spring 44 biases the rear cover 42 so that the engagement section 42A engages with the engagement section 4B and the staple pushing unit 40 is maintained in a stable manner in the case 10.

[0030] Insertion of staples 30 into the case 10 is performed while the staple pushing unit 40 is removed. The engagement of the engagement section 42A and the engagement section 4B is released and it is possible to remove the staple pushing unit 40 ii the rear cover 42 is pushed forward against the biasing force of the spring 44.

[0031] A tongue-shaped section 46 is provided on the rear end of the rear cover 42. The tongue-shaped section 46 functions as a remover for removing staples which have already been deformed. When removing staples, the staple pushing unit 40 is removed from the case 10, and the tongue-shaped section 46 catches on the staples. The front end of the rear cover 42 is operated about the engagement section 42A. This allows a large force to be applied to the staples 30 in a simple manner by leverage. This allows simplification of removal operations for long staples which are generally difficult to remove.

[0032] The present invention is further characterized by the provision of a mark 47 formed for example by colored tape on a predetermined position (for example near a tip section) of the staple pushing part 43. The function of the mark 47 will be described in detail hereafter.

[0033] As shown in Fig. 1 and Fig. 3, the present invention is characterized in that a plurality of through holes 15 are formed in a series along both sides of the guide rail 20 on both walls 10B, 10C of the case 10. These through holes 15 allow observation of the interior of the case 10. One of the through holes 15 is a longitudinal through hole 15A having a predetermined length in a vertical direction.

[0034] To further elaborate on this point, the through holes 15 are formed in a line continuously from the top of the staple ejecting mouth 10D towards the rear end of the case 10. The length of the sequence of holes at least covers a region where the staples initially disposed on the guide rail 20. That is to say, the line of through holes 15 is provided to cover the entire region covered by the displacement of the staple pushing part 43 when the stapler is in use. When staples 30 are sequentially pressed out, the rear end of the staple unit 30 or the staple pushing part 43 which follows the rear end of the staple 30 can be observed.

[0035] The longitudinal through hole 15A has a predetermined length in a vertical direction sufficient to check the lower end of staples 30 placed on the guide rail 20 irrespective of the leg length of the staples. That is to say, the lower end of staples 30 which are placed on the guide rail 20 arrives below the top end of the longitudinal hole 15 even if the shortest staples 30 for the stapler are used. On the other hand, when the longest staples 30 for the stapler are used, the lower end of the staples 30 arrives at a position above the lower end of the longitudinal hole 15. The furthest forward through hole 15 above the staple ejecting mouth 10D is the longitudinal through hole 15A in the present embodiment.

[0036] As discussed above, the mark 47 is provided on the staple pushing part 43 by adhesion of colored tape in the proximity of the tip for example.

[0037] A user of the stapler can simply and accurately confirm the position of the staple pushing part 43, that is to say, the remaining number of staples 30 by

confirmation of the position of the mark 47 which is visible through the through hole 15. The position of the staple pushing part 43 or the rear end of the staples 30 may be directly confirmed.

[0038] A user of the stapler can check the leg length of staples 30 at a glance by confirmation of the position lower end of the staples 30 visible through the longitudinal through hole 15A. It is possible to simply determine the type of staples 30 by provision of a scale, corresponding to the leg length of the staples 30, on a wall of the longitudinal through hole 15A.

[0039] As shown in Fig. 1 and Fig. 2, the handle 50 is mounted to rotate on the case 10 via a handle shaft 51 in proximity to the base of the handle 50. A shaft hole 17 allowing passage of the handle shaft 51 is formed in both walls 10B, 10C of the case 10 (refer to Fig. 3).

[0040] A spring 52 is provided between handle 50 and the guide rail cover 14. The handle 50 is biased to rotate in an anti-clockwise direction in the figure due to the spring 52. The rotation of the handle 50 in an anti-clockwise direction is limited by a lock nut 53 which passes through the handle 50 from a lock hole 18 formed in the case walls 10B, 10C. The lock hole 18 is a longitudinal hole and thus the handle 50 can rotate in a range according to the width of the lock hole 18.

[0041] An upper end of a pressing blade unit 60 is mounted on a longitudinal hole 54A of a bracket 54 provided on the handle 50. The pressing blade unit 60 is stored to slide vertically in the space between the front end 10E of the case 10 and a pressing blade guide 55 fixed on a mounting hole 19 of the case 10.

[0042] In this way, when the handle 50 operates in a clockwise direction in the figure against the resistance of the spring 52, the pressing blade unit 60 is pressed out downwardly along the pressing blade guide 55. Thus a staple 30 is pressed out from the staple ejecting mouth 10D by the pressing blade (not shown) provided on the lower end of the pressing blade unit 60. Since the case 10 itself rotates in a clockwise direction about the shalt 5 at this time, the object to be fastened (for example documents) which is disposed on the staple deforming anvil 2 is gripped between the staple ejecting mouth 10D and the staple deforming anvil 2 and fastened by the ejected staple 30.

[0043] The operation of the stapler will be described below.

[0044] The staples 30 which are disposed on the guide rail 20 in the case 10 in the stapler is sequentially pressed out in order from a leading staple 30. The staples 30 is pushed forward along the guide rail 20 by the staple pushing part 43 by a distance corresponding to the leg length of the ejected staple 30. In such a way, the leading staple 30 approaches the front end 10E of the case 10. The staple pushing part 43 which pushes the staples 30 displaces along the guide rail 20 towards the tip of the case 10 (towards the staple ejecting mouth 10D) as the remaining number of staples 30 decreases.

[0045] A line of a plurality of through holes 15 which form observation port is opened laterally on the guide rail 20 in the case 10 of the stapler. The through hole 15A which is furthest towards the tip of the case 10 (the hole above the staple ejecting mouth 10D) comprises the longitudinal through hole 15A. The mark 47, which is a colored tape for example, is provided on the staple pushing part 43.

[0046] Thus a user of the stapler can confirm variations in the position of the mark 47 which is visible through the through holes 15 as the position of the rear end of the staples 30 varies as discussed above or as the position of the staple pushing part 43 varies with use of the staples 30. When the position of the mark 47 is far from the tip (from the staple ejecting mouth 10D) of the case 10, it is possible to determine that there is a large amount of remaining staples 30. It is possible to check these positions by observing the staple pushing part 43 or the rear end of the staples 30 directly, but by observing the mark 47, the check of the position can be more easily and accurately performed at a glance.

[0047] The leg length of staples 30 in the case 10 can be confirmed at a glance by confirmation of the position of the lower end of the staple 30 which is visible from the longitudinal through hole 15A. In particular, since the longitudinal through hole 15A of the present embodiment is disposed above the staple ejecting mouth 10D, even when the amount of remaining staples 30 is low, a certain amount of remaining staples 30 is visible from the longitudinal through hole 15A and thus the leg length of staples 30 can be confirmed.

[0048] Since the observation port is comprised by a plurality of through holes 15 in the present embodiment, the area of the observation ports opened in the case 10 can be reduced to a minimum and thus it is possible to maintain a sufficient strength in the case 10. The holes in the case 10 can be formed at low cost at the same time that the case 10 is formed.

[0049] Thus according to the present invention, the leg length of staples 30 and the remaining number of staples 30 stored in the case 10 can be easily confirmed through the longitudinal through hole 15A and through holes 15 and thus it is possible to supply the staples 30 in response to the remaining number of staples 30. In order to check the leg length of staples 30, it is not necessary to open the case 10 or to perform an empty operation.

[0050] Although the observation port formed in the case 10 is comprised by a plurality of through holes 15 in the above embodiment, the present invention is not limited to such an arrangement. The observation port may be formed in any manner as long as it is provided along a lateral direction of the guide rail 20.

[0051] For example a hole in the shape of a simple slit which extends along the lateral direction of the guide rail 20 may be provided as an observation port. In this case, at least a section of the slit-shaped hole may be widened in a vertical direction in order to confirm the leg length of staples 30.

[0052] It is not necessary for the through holes 15 to have a circular shape and may be formed in any arbitrary shape. The longitudinal through hole 15A may be of any shape as long as its length in a vertical direction allows for confirmation of staple leg length. The number of longitudinal through holes 15A is not limited to one and a plurality of longitudinal through holes 15A may be provided.

[0053] A series of through holes 15 is not required to be in a line and for example may be provided in a plurality of lines. The series of through holes 15 is not required to be disposed in a straight line and may be disposed in a zigzag pattern for example as long as this pattern follows a lateral direction of the guide rail 20.

[0054] Although through holes 15 are provided in both wails 10B, 10C of the case 10 in the present embodiment, it is not always necessary to provide through holes 15 in both walls 10B, 10C and may only be provided in one wall 10B, 10C.

[0055] The mark 47 provided on the staple pushing part 43 is formed by colored tape which is adhered to the staple pushing part 43 in the present embodiment. However the present invention is not limited in this respect and the mark may be formed in any way useful for observation through the through hole. For example, the entirety of the staple pushing part 43 may be marked with a color or the mark may comprise a luminous material instead of tape.

[0056] The guide rail 20 may be a colored in a color which is different from the color of the staple pushing part 43 in another embodiment of the present invention.

[0057] When the guide rail 20 is colored, those sections in the guide rail 20 in which staples 30 and the staple pushing part 43 are not disposed can be viewed at a glance from the observation port. Thus when the guide rail 20 is colored in this manner, the position of the staple pushing part 43 can be confirmed from the length of the visible section of the guide rail 20. Even if the mark 47 is not provided on the staple pushing part 43, it is possible to obtain the same effect as the provision of a mark on the staple pushing part 43.

[0058] The guide rail 20 may be colored partly as long as the action of the staple pushing part 43 can be checked. For example, only the section of the guide rail 20 visible from the through hole 15 may be colored.

[0059] It is possible to color the staples in a color which is different from the color of the staple pushing part 43 in another embodiment of the present invention.

[0060] If the staples 30 are colored in this way, the remaining number of the staples 30 can be directly seen at a glance. It is not necessary to color all of the staples 30 if the rear end of the staples can be confirmed. For example, color may only be applied to some staples in the rear of the staples.

INDUSTRIAL FIELD OF APPLICATION

[0061] As shown above, a stapler according to the present invention allows confirmation of the remaining number or leg length of staples stored in the case of a stapler.

Claims

1. A stapler comprising:

a guide rail on which staples are disposed slidably;
a staple pushing member which pushes the staples from behind toward a staple ejecting part, the staple pushing member disposed to slide on the guide rail, and
a case storing the guide rail and the staple pushing member **characterized in that** an observation port allowing viewing of the staples is formed in the case along the guide rail.

2. A stapler as defined in Claim 1 **characterized in that** at least a part of the observation port has a predetermined length in a vertical direction which allows viewing of a lower end of staples disposed on the guide rail irrespective of a leg length of staple used in the stapler.

3. A stapler as defined in Claim 1 **characterized in that** the observation port comprises a plurality of through holes aligned in a lateral direction of the guide rail.

4. A stapler as defined in Claim 3 **characterized in that** at least one of the through holes has a predetermined length in a vertical direction which allows viewing of a lower end of staples disposed on the rail irrespective of a leg length of staple used in the stapler.

5. A stapler as defined in any one of Claim 1 to Claim 4 **characterized in that** a mark is provided on the staple pushing member which is visible from the observation port.

6. A stapler as defined in Claim 5 **characterized in that** the mark is colored in a color which is different from the color of the staples or the staple pushing member.

7. A stapler as defined in any one of Claim 1 to Claim 6 **characterized in that** the guide rail is colored in a color which is different from the color of the staple pushing member.

8. A stapler as defined in any one of Claim 1 to Claim 7 **characterized in that** the staples are colored in a color which is different from the color of the staple pushing member.

Fig. 1

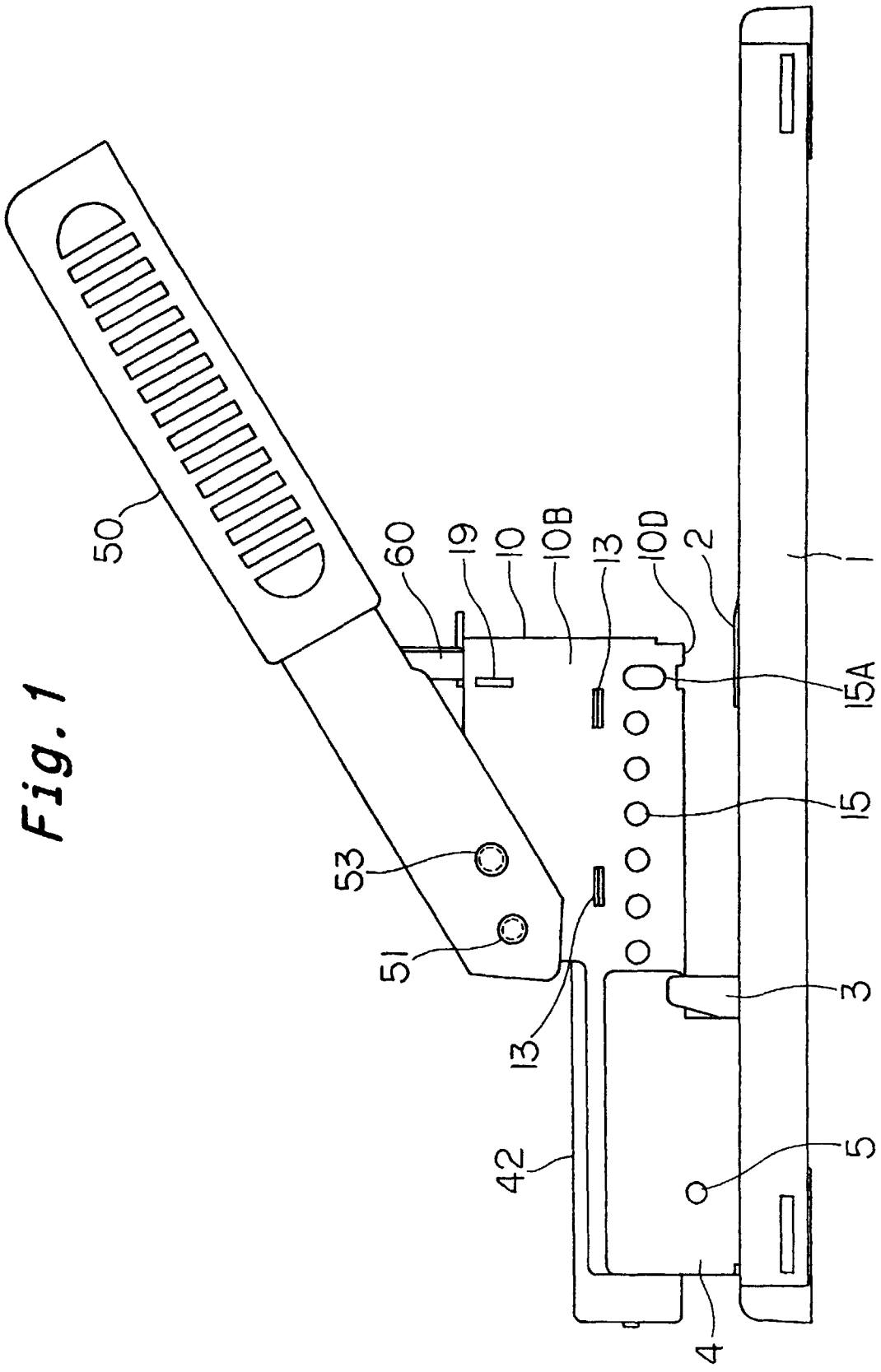


Fig.2

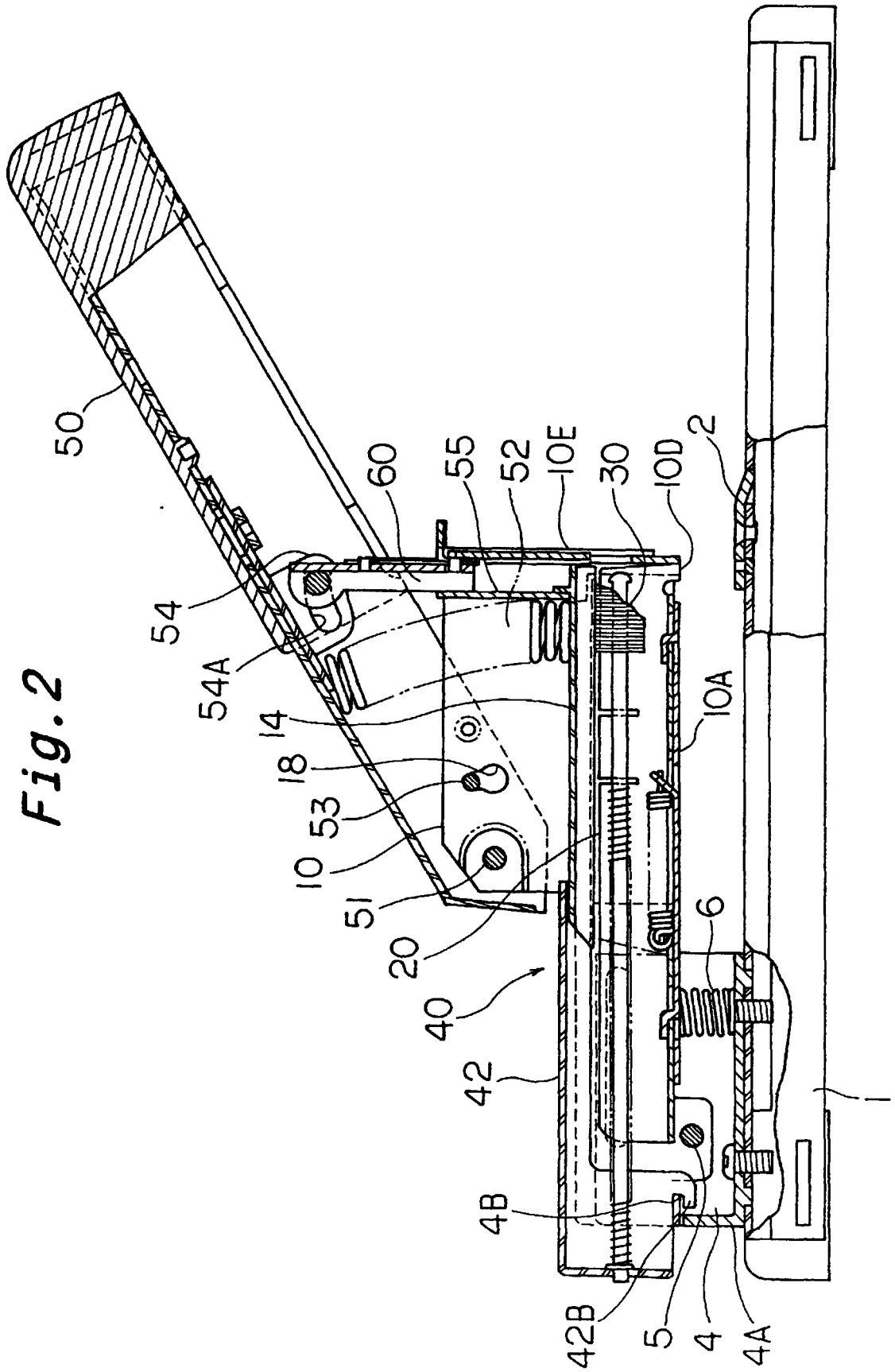

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Fig.3

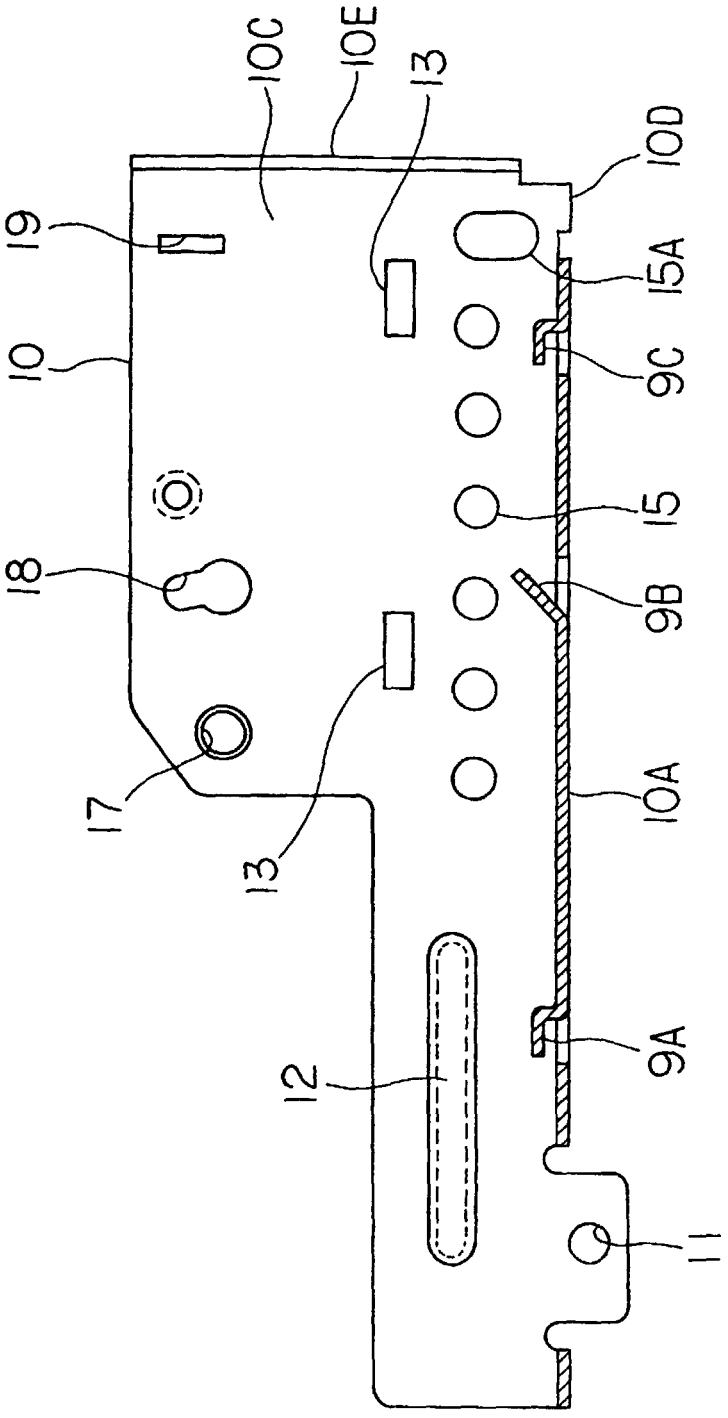


Fig. 4

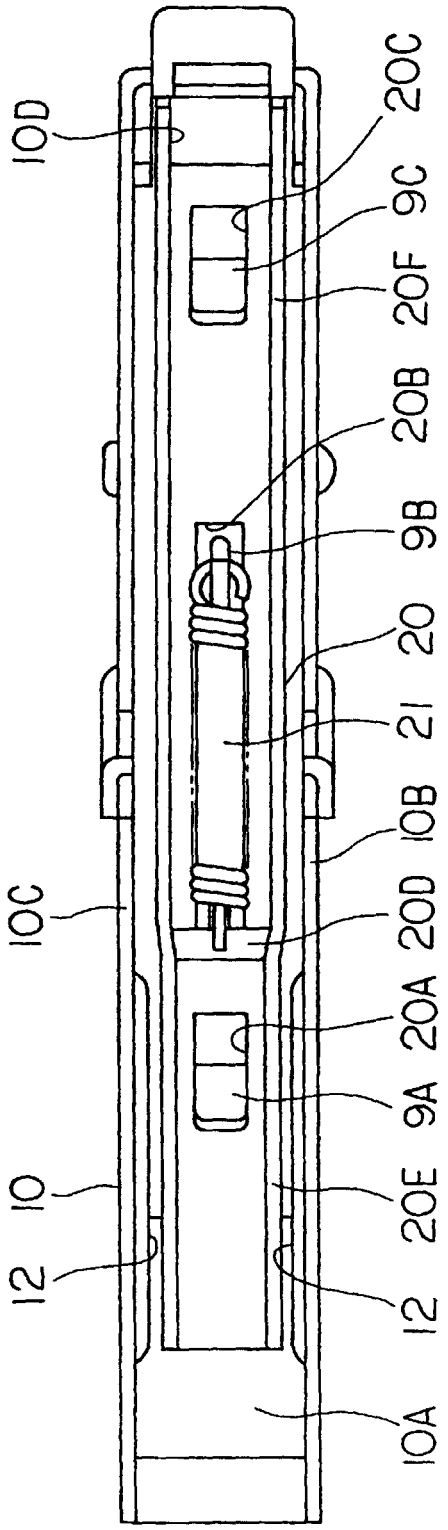


Fig.5

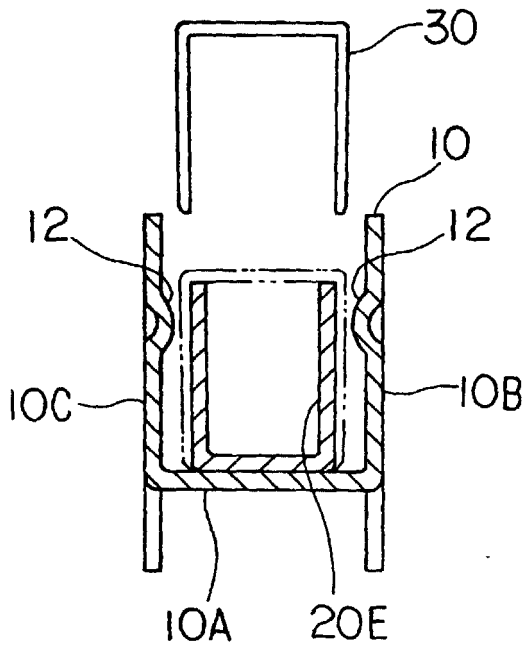
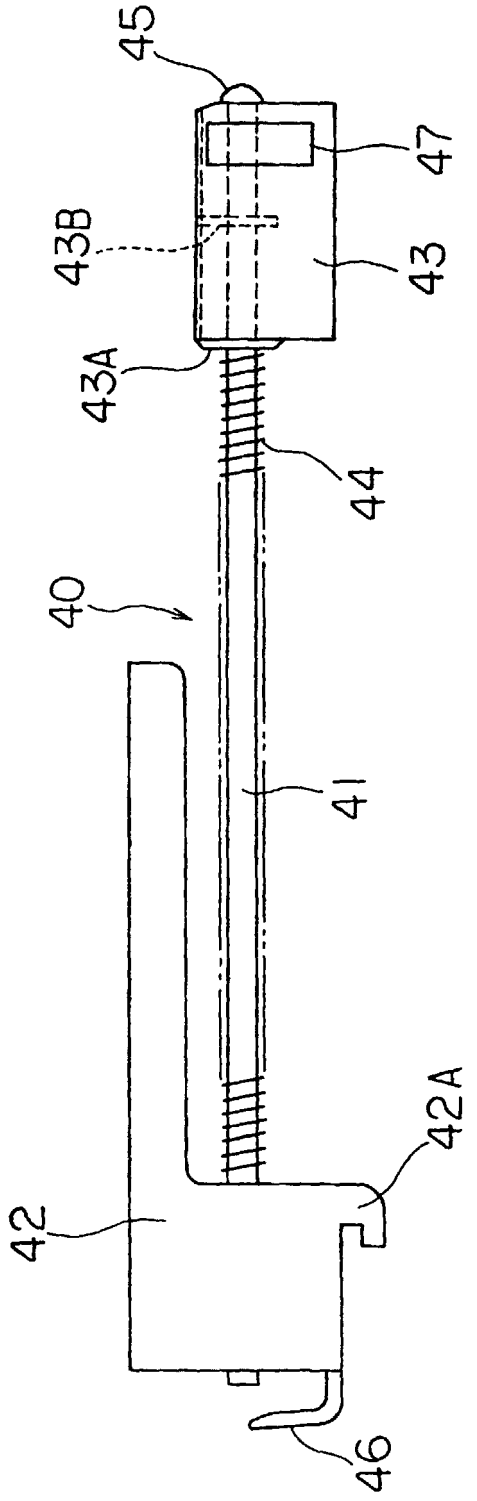


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP98/01162

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[6] B25C5/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[6] B25C5/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1998
Kokai Jitsuyo Shinan Koho 1971-1998

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP, 37-29009, Y (Hidetaro Miyamoto), October 27, 1962 (27. 10. 62) (Family: none)	1-4 5-8
Y	JP, 63-57082, U (NEC Corp.), April 16, 1988 (16. 04. 88) (Family: none)	5-7
Y	JP, 62-172573, U (NEC Corp.), November 2, 1987 (02. 11. 87) (Family: none)	8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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