(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 504 850 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.02.2005 Bulletin 2005/06

(51) Int Cl.[7]: **B25C 1/06**

(21) Application number: **04016132.5**

(22) Date of filing: **08.07.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: **08.08.2003 US 636537**

(71) Applicants:
- **Modern Pioneer Limited**
  Nantun District, Taichung (TW)
- **Sun, Pei-Chang**
  Taichung (TW)

(72) Inventor: **Sun, Pei-Chang**
Taichung (TW)

(74) Representative: **Viering, Jentschura & Partner**
Steinsdorfstrasse 6
80538 München (DE)

(54) Nailing gun

(57) A nailing gun (100), which uses a motor (20) as power drive to rotate a drive gear wheel (30) and a driven gear wheel (40), causing the drive gear wheel and the driven gear wheel to alternatively move a slider (52) from a nailing position to a standby position, for enabling a nail driving tip (51), which is fastened to the slider, to be moved with the slider from the standby position to the nailing position by a spring member (53), which is compressed to preserve energy when the slider moved from the nailing position to the standby position.

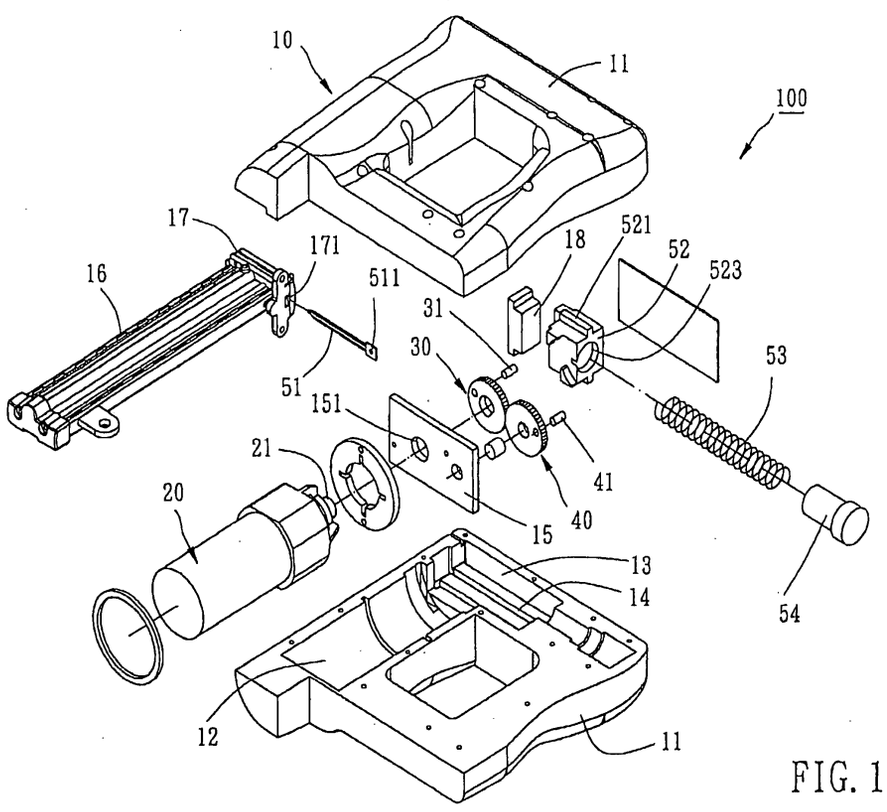

FIG. 1

EP 1 504 850 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to a rechargeable nailing gun and, more particularly, to such a rechargeable nailing gun, which increases the impact stroke without increasing the dimension of the housing.

2. Description of the Related Art

[0002] The nail striking action of a conventional rechargeable nailing gun is achieved by starting a motor, causing the output shaft of the motor to rotate a transmission gear to move a slider. The slider has a protruding block. During rotary motion of the transmission gear, a protruding block of the transmission gear is forced into contact with the protruding block of the slider to push the slider to a position far from the muzzle of the barrel of the nailing gun, and at the same time a spring member is compressed by the slider. When the protruding block of the transmission gear moved over the protruding block of the slider during rotary motion of the transmission gear, an induction switch is triggered to turn off the motor, and the spring member returns to its former shape and to push the slider toward the muzzle of the barrel, causing the driving tip which is fastened to the front side of the slider to drive the nail into the workpiece.

[0003] This design of nailing gun is still not satisfactory in function. Because the maximum stroke of the slider is approximately equal to the arc of a small sector of the transmission gear, the short nail striking stroke of the slider does not provide a satisfactory nailing effect. Increasing the diameter of the transmission gear relatively increases the moving distance of the protruding block of the transmission gear during each nailing cycle, however this arrangement also relatively increases the size of the nailing gun, resulting in an inconvenient use of the nailing gun.

[0004] Therefore, it is desirable to provide a nailing gun that eliminates the aforesaid drawback.

SUMMARY OF THE INVENTION

[0005] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a nailing gun, which increases the impact stroke of the nailing mechanism.

[0006] It is another object of the present invention to provide a nailing gun, which has a simple and compact structure.

[0007] To achieve these objects of the present invention, the nailing gun comprises a housing having a receiving chamber and an elongated work chamber; a nail magazine fastened to the housing; a gun barrel fixedly connected to a front end of the nail magazine corresponding to the work chamber; a transmission mechanism mounted in the receiving chamber inside the housing and having an output shaft; a drive gear wheel fixedly mounted on the output shaft for synchronous rotation and having a first driving element; a driven gear wheel rotatably meshed with the drive gear wheel and having a second driving element; and a nail driving unit mounted in the work chamber inside the housing and having a nail driving tip movable between the gun barrel and the work chamber, a slider movable between a first position and a third position through a second position in between the first position and the third position inside the work chamber, the slider having a first stop means for pushing by the first driving element to move the slider from the first position to the second position during rotary motion of the drive gear wheel, a second stop means for pushing by the second driving element to move the slider from the second position to the third position during rotary motion of the driven gear wheel, and a front side fixedly fastened to said nail driving tip, and push means adapted to push the slider from the third position to the first position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is an exploded view of a nailing gun according to a preferred embodiment of the present invention.

FIG. 2 is a schematic assembly view of the present invention, showing the status of the slider in the first position.

FIG. 3 is a schematic view illustrating the relationship between the drive gear wheel and the slider corresponding to the position shown in FIG. 2.

FIG. 4 is similar to FIG. 2 but showing the slider in the second position.

FIG. 5 is a schematic view illustrating the relationship between the drive gear wheel and the slider corresponding to the position shown in FIG. 4.

FIG. 6 is similar to FIG. 2 but showing the slider in the third position.

FIG. 7 is a schematic view illustrating the relationship between the drive gear wheel and the slider corresponding to the position shown in FIG. 6.

FIG. 8 is similar to FIG. 2 but showing the slider to be moved toward the gun barrel.

FIG. 9 is a schematic view illustrating the relationship between the drive gear wheel and the slider corresponding to the position shown in FIG. 8.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Referring to FIGS. 1 and 2, a nailing gun **100** is shown comprised of:

a housing **10** formed of two symmetrical half shells

11, the housing **10** having a receiving chamber **12**, an elongated work chamber **13** in communication with the receiving chamber **12**, two longitudinal sliding grooves **14** arranged in parallel in the work chamber **13**, a locating plate **15** mounted in the work chamber **13**, the locating plate **15** having a through hole **151**;

a nail magazine **16** fastened to the outside wall of the housing **10**;

a gun barrel **17** fixedly connected to the front end of the nail magazine **16** corresponding to the outer end of the work chamber **13**, the gun barrel **17** defining a nail slot **171**;

a buffer block **18** located on one end of the work chamber **13** of the housing **10** near the gun barrel **17**;

a transmission mechanism formed of a motor **20** mounted in the receiving chamber **12** inside the housing **10**, the motor **20** having an output shaft **21** of non-circular cross-section inserted through the through hole **151** of the locating plate **15** into the inside of the work chamber **13**;

a drive gear wheel **30** fixedly mounted on the free end of the output shaft **21** of the motor **20** for synchronous rotation, the drive gear wheel **30** having a rod member **31** fixedly located on the front side near the periphery, which rod member **31** forming a first driving member;

a driven gear wheel **40** fastened rotatably with the locating plate **15** and meshed with the drive gear wheel **30**, the driven gear wheel **40** having a rod member **41** fixedly located on the front side near the periphery, which rod member **41** forming a second driving member; and

a nail driving unit **50**.

[0010] The nail driving unit **50** is comprised of a nail driving tip **51**, a slider **52**, and a biasing member, for example, a spring **53**.

[0011] The nail driving tip **51** is movable between the nail slot **171** of the gun barrel **17** and the work chamber **13**, having a mounting hole **511** in one end. The slider **52** is a block member having two longitudinal rails **521** symmetrically located on the top and bottom sides and respectively coupled to the sliding grooves **14** in the work chamber **13** inside the housing **10** to guide linear movement of the slider **52** along the sliding grooves **14**, a front pin **522** fastened to the mounting hole **511** of the nail driving tip **51** (see also FIG. 3), a recessed hole **523** in the rear side, and first and second stop means, namely, the upper stop block **524** and the lower stop block **525** in an upper part and a lower part of one side facing the locating plate **15**. Further, there is an elevational difference **H** between the upper stop block **524** and the lower stop block **525**.

[0012] The spring **53** has one end positioned in the recessed hole **523** of the slider **52** and the other end inserted into a fixed cap **54** at the rear side of the work chamber **13**.

[0013] After structural description of the nailing gun **100**, the operation of the nailing gun **100** is outlined hereinafter.

[0014] FIGS. 2 and 3 show the status of the slider **52** in a first position **P1.** At this time, the rod member **31** of the drive gear wheel **30** is stopped at the upper stop block **524** of the slider **52**, and the spring **53** is in the extended status.

[0015] When continuously rotating the motor **20** to move the drive gear wheel **30** and the driven gear wheel **40**, the rod member **31** of the drive gear wheel **30** forces the upper stop block **524** to move the slider **52** from the first position **P1** to a second position **P2** as shown in FIGS. 4 and 5. At the moment the slider **52** reached the second position **P2**, the nail driving tip **51** moved backwards relative to the buffer block **18**, and the rod member **41** of the driven gear wheel **40** touches the lower stop block **525**. Following continuous rotation of the driven gear wheel **40**, the rod member **31** of the drive gear wheel **30** is moved away from the upper stop block **524**, and the rod member **41** of the driven gear wheel **40** pushes the slider **52** from the second position **P2** to a third position **P3**, as shown in FIGS. 6 and 7. At this time, the slider **52** is spaced from the gun barrel **17** at a long distance, i.e., a long impact stroke is produced, and the spring **53** is compressed by the slider **52** to preserve energy. Please refer also to FIGS. 8 and 9, when the slider **52** reached the third position **P3** during continuous rotary motion of the drive gear wheel **30** and the driven gear wheel **40**, the rod member **41** is spaced from the lower stop block **525** at a distance and suspended in the area within the elevational difference **H**, and the spring **53** is released to impart a thrust force to the slider **52**, causing the nail driving tip **51** to move with the slider **52** toward the gun barrel **17** rapidly. When the front side of the slider **52** touched the buffer block **18**, one nailing cycle is done.

[0016] As indicated above, the combined transmission of the drive gear wheel **30** and the driven gear wheel **40** double the impact stroke of the nail driving mechanism, enhancing the nail driving action of the nailing gun without increasing the dimension of the housing **10**.

Claims

1. A nailing gun comprising:

a housing having a receiving chamber and an elongated work chamber;

a nail magazine fastened to said housing;

a gun barrel fixedly connected to a front end of said nail magazine corresponding to said work chamber,

a transmission mechanism mounted in said receiving chamber and having an output shaft;

a drive gear wheel fixedly mounted on said output shaft for synchronous rotation and having a first driving element;
a driven gear wheel rotatably meshed with said drive gear wheel and having a second driving element; and
a nail driving unit mounted in said work chamber and having a nail driving tip movable between said gun barrel and said work chamber, a slider movable between a first position and a third position through a second position in between said first position and said third position inside said work chamber, said slider having a first stop means for pushing by said first driving element to move said slider from said first position to said second position during rotary motion of said drive gear wheel, a second stop means for pushing by said second driving element to move said slider from said second position to said third position during rotary motion of said driven gear wheel, and a front side fixedly fastened to said nail driving tip, and biasing means for thrusting said slider from said third position to said first position.

2. The nailing gun as claimed in claim 1, further comprising a buffer block mounted in said work chamber inside said housing near said gun barrel for buffering said slider when said slider moved from said third position to said first position.

3. The nailing gun as claimed in claim 2, wherein said first driving element and said second driving element are respectively formed of a rod member respectively perpendicularly located on a respective front side of said drive gear wheel and said driven gear wheel; the first stop means and second stop means of said slider are stop blocks respectively formed in a upper part and a lower part of one side of said slider.

4. The nailing gun as claimed in claim 3, wherein said housing comprises two longitudinal sliding grooves arranged in parallel for guiding linear movement of said slider, said slider comprises two longitudinal rails respectively coupled to said longitudinal sliding grooves to guide linear movement of said slider along said longitudinal sliding grooves.

5. The nailing gun as claimed in claim 4, wherein said transmission mechanism comprises a motor mounted in said receiving chamber, said output shaft extends from said motor into said work chamber and connected to said drive gear wheel.

6. The nailing gun as claimed in claim 5, wherein said biasing means is a spring having a first end connected to a rear side of said slider and a second end connected to a part of said housing.

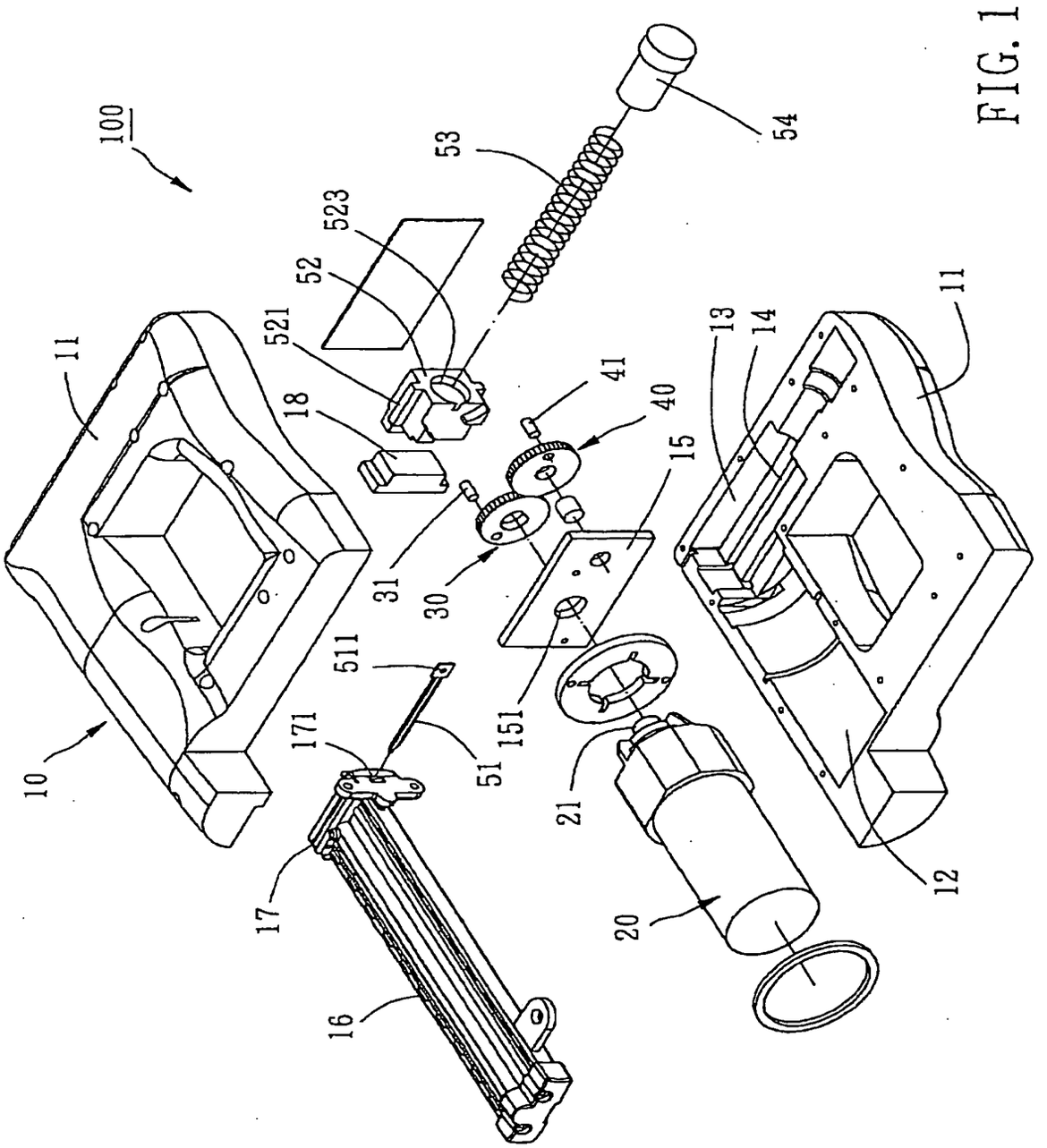
100
10
11
11
12
13
14
15
16
17
171
18
20
21
30
31
40
41
511
51
52
521
523
53
54
151

FIG. 1

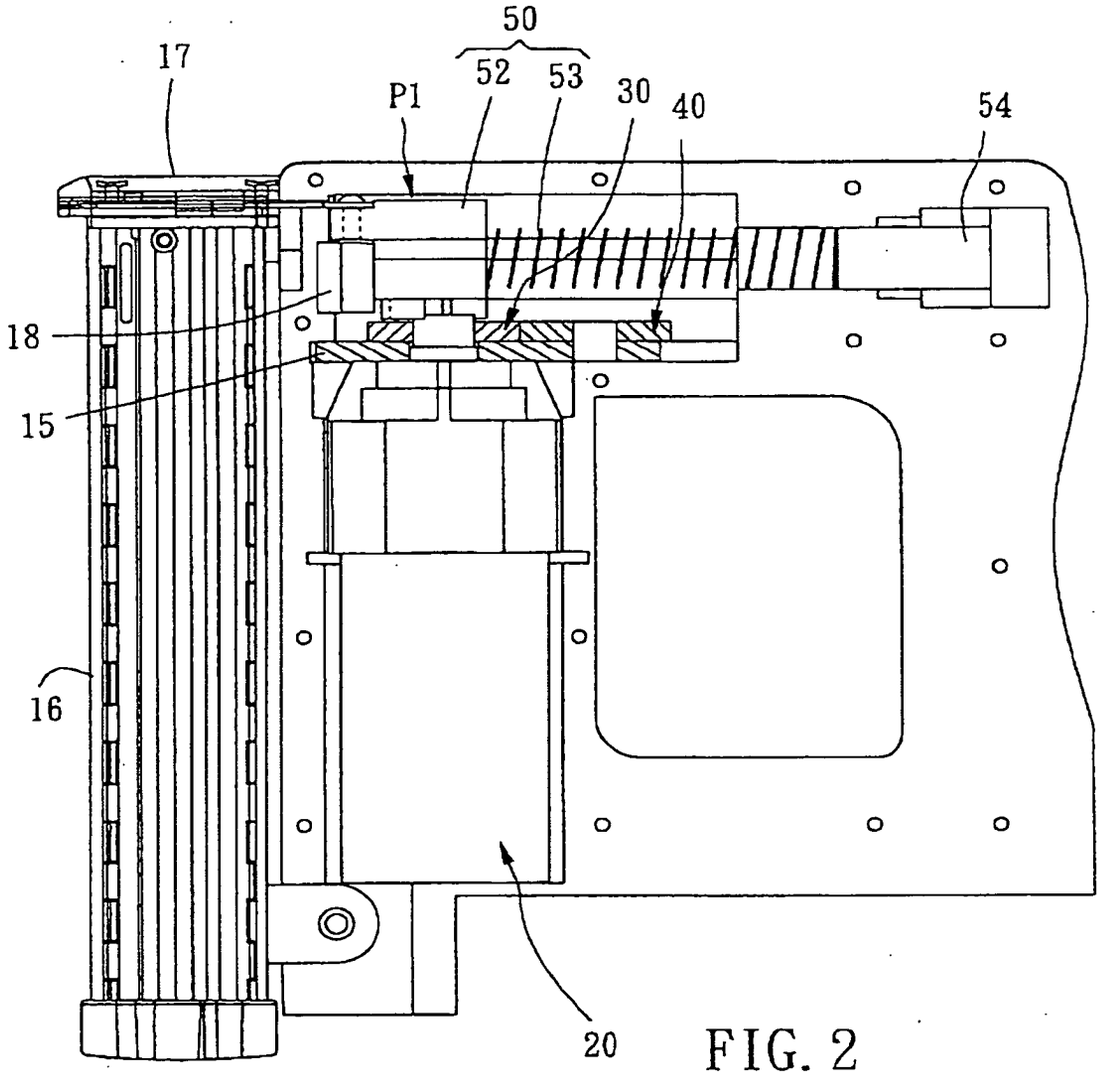
50
17
52
53
P1
30
40
54
18
15
16
20

FIG. 2

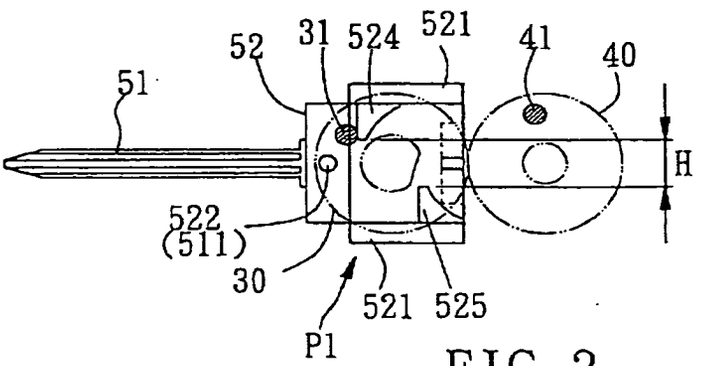
52
31
524
521
41
40
51
H
522
(511)
30
521
525
P1

FIG. 3

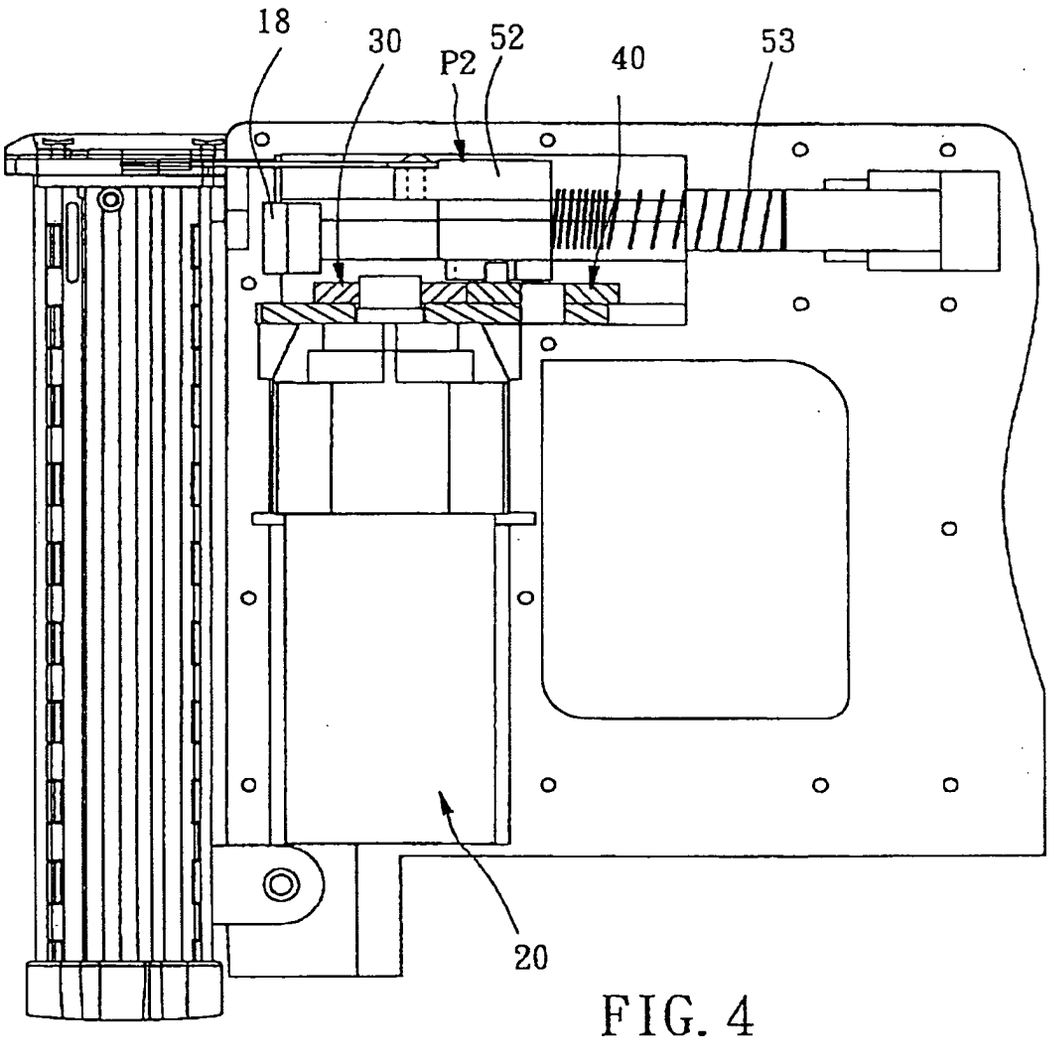

FIG. 4

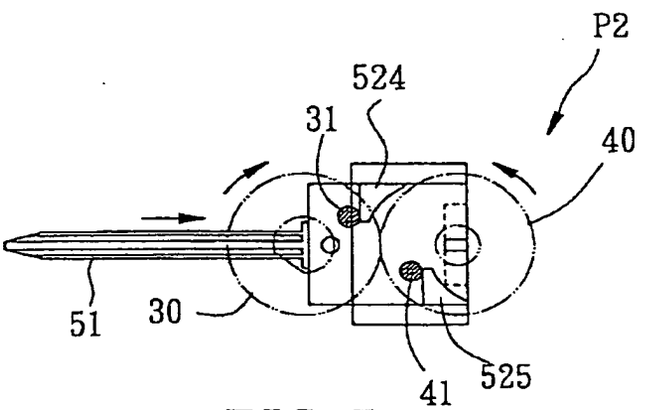

FIG. 5

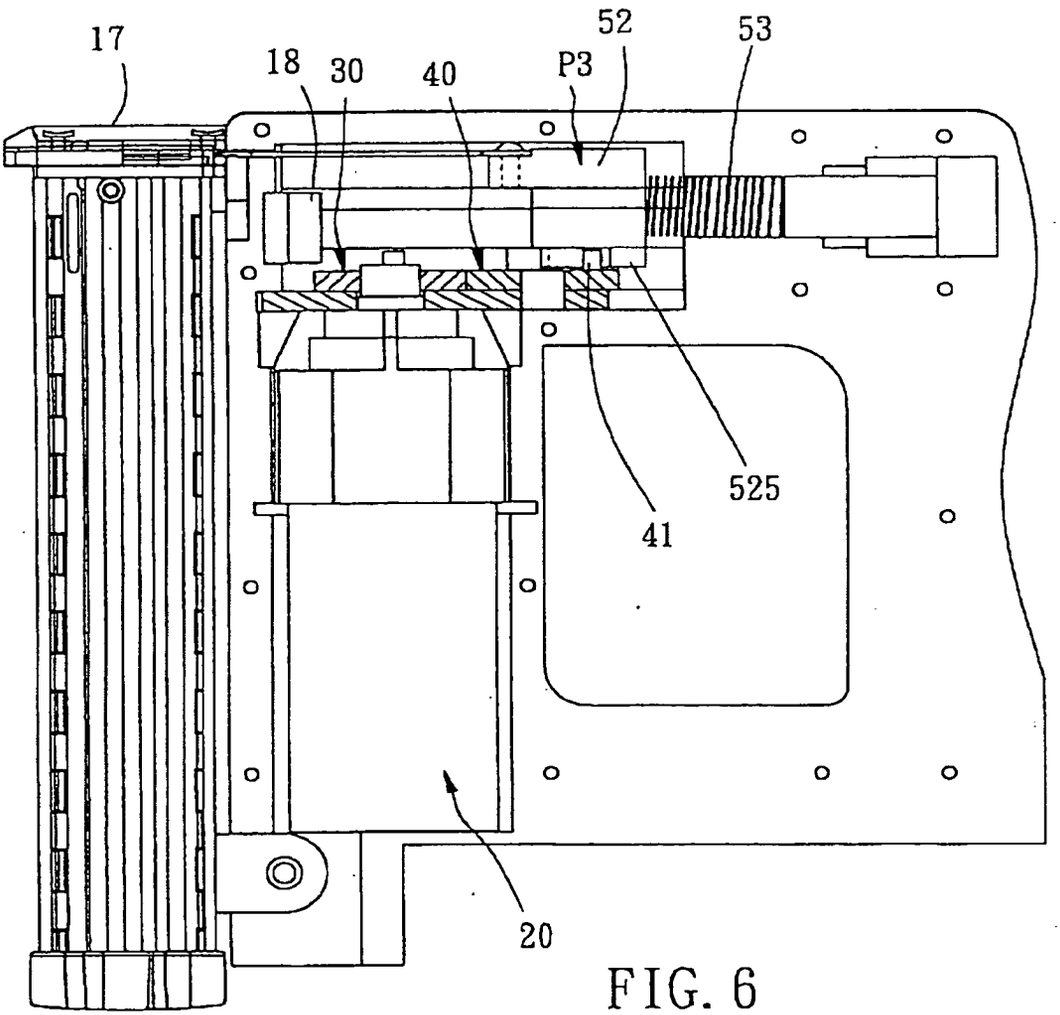

FIG. 6

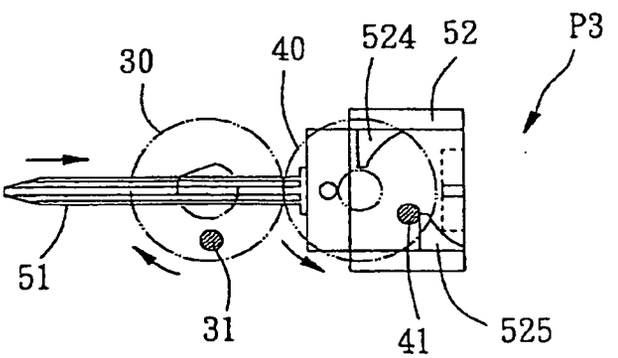

FIG. 7

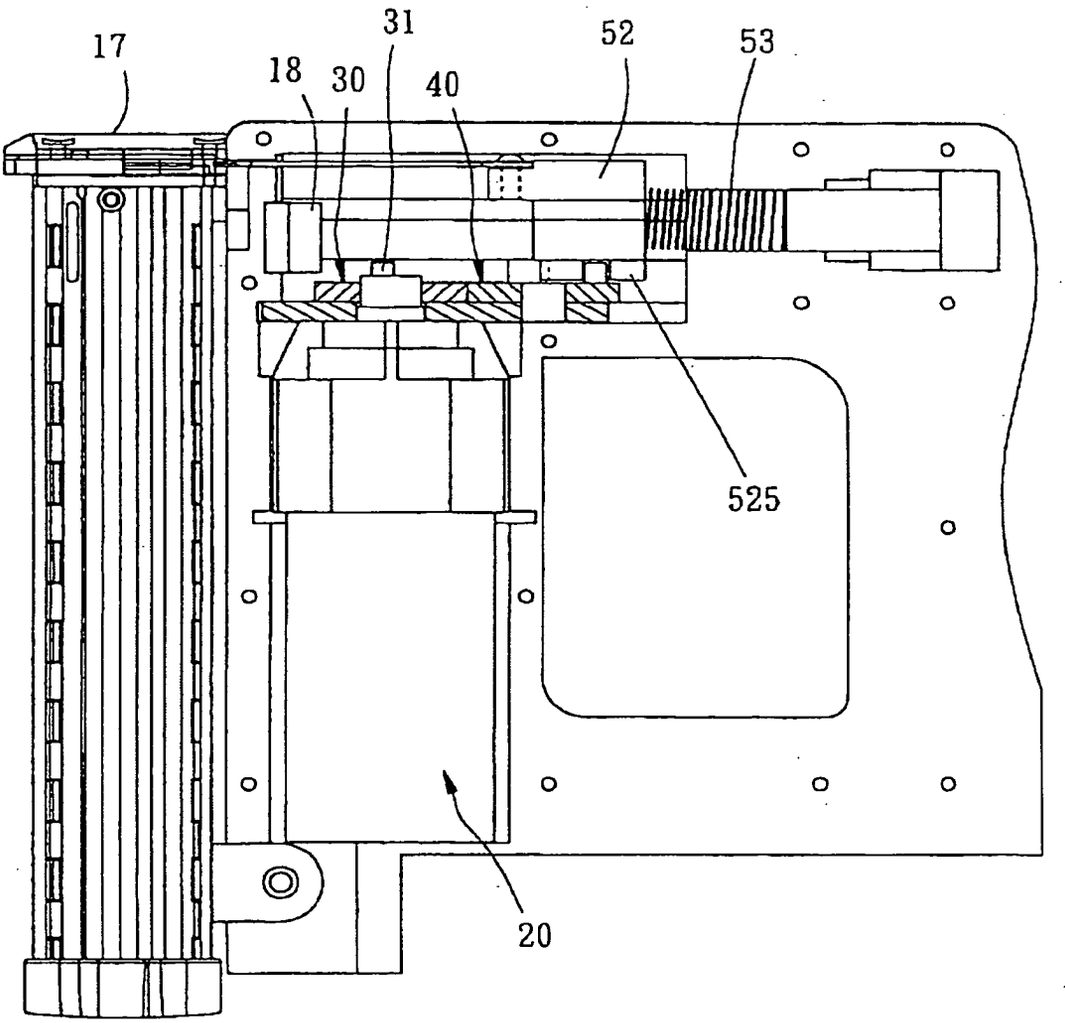

FIG. 8

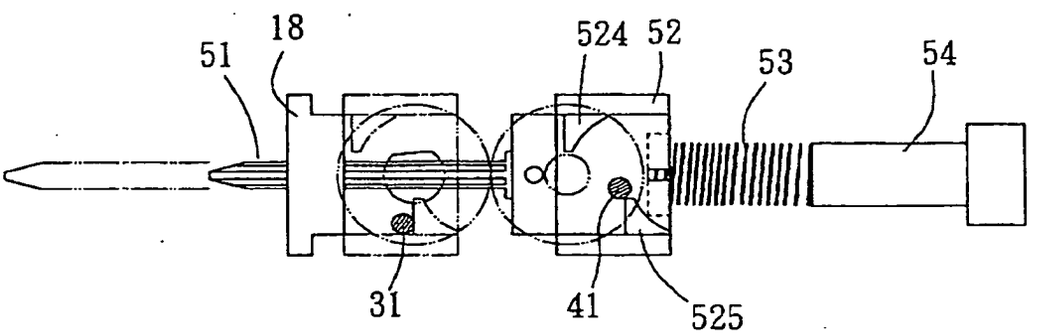

FIG. 9