

June 16, 1959

B. WEINGART ET AL

2,891,107

PEN LIFTER MECHANISM FOR REMOTE WRITING INSTRUMENT

Filed July 7, 1955

FIG. 4

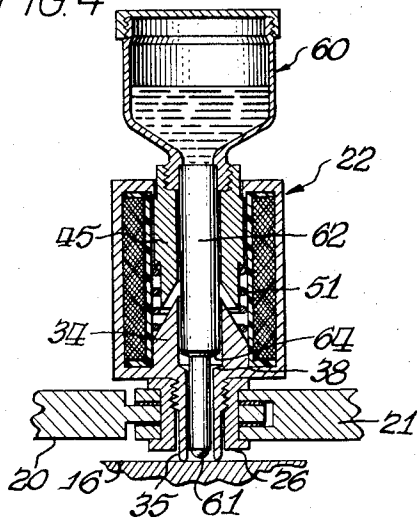


FIG. 3

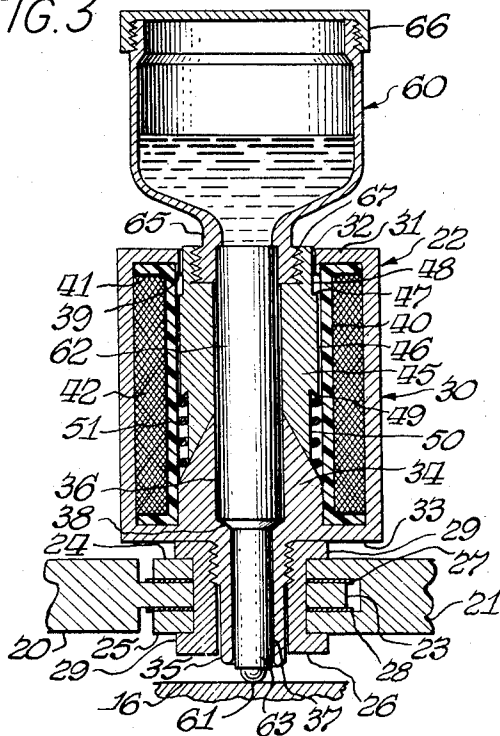


FIG. 6

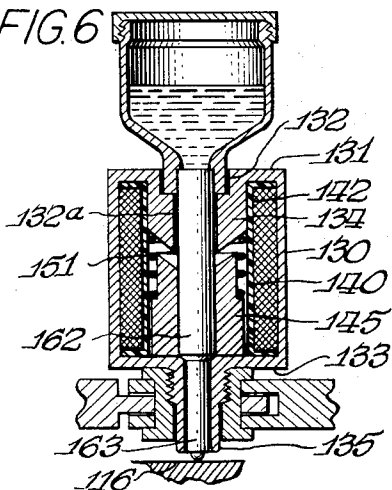


FIG. 2

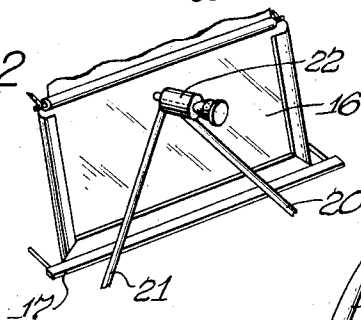


FIG. 1

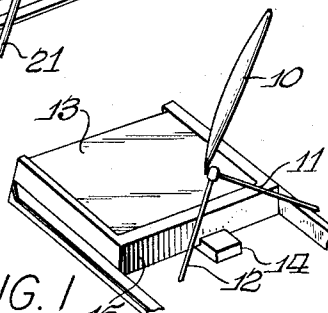
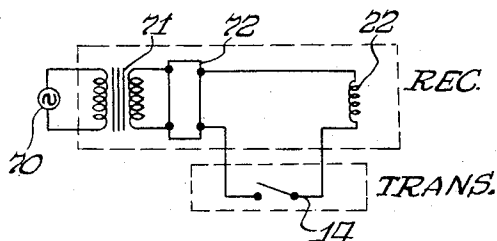


FIG. 5

INVENTORS
BEN WEINGART
ROBERT EMMET POOLE JR.

BY *George E. Frost*
ATTORNEY

1

2,891,107

PEN LIFTER MECHANISM FOR REMOTE WRITING INSTRUMENT

Ben Weingart, Los Angeles, and Robert Emmet Poole, Jr., La Habra, Calif.; said Poole, Jr., assignor to said Weingart

Application July 7, 1955, Serial No. 522,274

5 Claims. (Cl. 178—18)

This invention relates to an improved pen lifter mechanism for a remote writing instrument.

In a remote writing instrument the receiver pen or writing device is actuated by arms on the receiver unit which move in correspondence with the arms, and writing device, on the transmitting unit to duplicate the message written by the operator. For legible duplication, it is necessary that the receiver writing device be lifted from the paper at the same time the operator lifts the transmitting pen from the paper in the act of writing. One method which may be used to so control the receiver writing device is described in the co-pending application entitled "Remote Writing Instrument," Serial Number 496,306, filed March 23, 1955.

In that invention a shiftable bar is positioned adjacent the receiver writing surface. This bar is controlled by switching means sensitive to pressure on the transmitting writing surface. When the transmitting pen is lifted from the writing surface the shiftable bar adjacent the receiver is actuated to bear against the arms carrying the receiver writing instrument. This lifts the receiving pen off the paper. When the transmitting pen is again pressed against the writing surface the shiftable bar adjacent the receiver retracts and a spring bias in the arms carrying the receiving pen urges the pen against the surface.

In the present invention a pen lifter mechanism is provided which may be used in lieu of the shiftable bar type of pen lifting mechanism.

In brief, the present invention consists of a receiver writing device which is raised from the writing surface by the operation of a solenoid. The solenoid seats on a bearing which is axially normal to the writing surface and forms part of the swivel joint of the pen carrying arms of the receiver. A cylindrical protrusion or sleeve on the solenoid extends through and is threadedly engaged with the bore of the bearing, protruding slightly from the end of the bearing adjacent the writing surface. A solenoid slug, with a central bore, is slideably received in the solenoid and moves normal to the writing surface, co-axially with the bearing. Stops limit the movement of the solenoid slug in the solenoid between an off-center position in relation to the solenoid coil and a relatively centered position. The solenoid slug is spring-biased in the off-center position. When the solenoid coil is energized, the solenoid slug shifts to the relatively centered position. A pen, consisting of an ink reservoir, a body, and a writing point is carried in the central bore of the solenoid slug. The writing end of the pen is slideably received in the cylindrical protrusion or sleeve of the solenoid.

Since the pen is non-slideably received in the solenoid slug, the writing point of the pen will move with the slug as the slug moves in relation to the solenoid under the application of energy to the solenoid coil. Hence the writing end of the pen will shift in relation to the end of the cylindrical sleeve of the solenoid. The pen is of such length that when the solenoid slug is in one posi-

2

tion the writing point extends beyond the end of the cylindrical sleeve. When the solenoid slug is in the other position the writing point of the pen is retracted within the cylindrical sleeve.

5 The solenoid is energized through a switch which is sensitive to pressure on the transmitter writing surface. Thus when the pen is applied to the transmitting surface, the solenoid slug of the receiver writing device shifts to a position to extend the writing point beyond the solenoid sleeve, bringing the writing point in contact with the receiving writing surface. When the pen is lifted from the transmitter writing surface, the receiver writing device solenoid slug shifts its position, retracting the writing point into the cylindrical sleeve. The cylindrical sleeve then slides over the writing surface without marking the paper. Bias in the receiver arms keeps the pen writing mechanism in firm contact with the writing surface at all times.

10 In the present invention the only resistance to the movement of the receiver writing device mechanism, when the writing device is in the retracted, non-writing position, is the friction between the small area of the solenoid sleeve and the paper. This resistance is less than is encountered in the shiftable bar type of pen lifting mechanism and the response of the receiver mechanism is therefore quicker and more satisfactory.

15 It is therefore a general object of the present invention to provide a mechanism for lifting the receiver pen of a remote writing instrument from the paper which is sensitive to pressure on the transmitter writing surface.

20 It is therefore another general object of the present invention to provide a pen lifting mechanism for the receiver of a remote writing instrument in which a minimum of resistance to movement is encountered when the pen is in the non-writing position.

25 It is another object to provide for a remote writing instrument a receiver pen carried by the movable receiver arms at their point of pivot and selectively operable means independent of the pen to bear on the writing surface to relieve the pressure of the pen on the writing surface and stop the writing action.

30 It is yet another object of the present invention to provide for a remote writing instrument receiver pen independent means selectively operable to bear on the writing surface to relieve the pen from contact with the paper.

35 It is a further object of the present invention to provide a pen lifting mechanism for a remote writing instrument which lifts the receiver pen from the paper without the need of lifting the pen carrying arms.

40 It is a more particular object of the present invention to provide a receiver pen for a remote writing instrument which is lifted from and brought into contact with the paper by operation of a solenoid.

45 It is still another object of the present invention to provide a receiver pen for a remote writing instrument which is carried by a solenoid slug responsive to pressure on the transmitter writing surface.

50 The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its organization and method of operation, together with further objects and advantages, will best be understood by reference to the following description taken in connection with the accompanying drawings in which:

55 Figure 1 is a perspective view of a portion of the transmitter unit of a remote writing instrument;

60 Figure 2 is a perspective view of a portion of the receiver unit;

65 Figure 3 is a cross sectional side elevation of the pen lifter mechanism in the writing position;

70 Figure 4 is a view similar to Figure 3 but with the pen in the non-writing position;

Figure 5 is a wiring diagram of the electrical circuit of the present invention; and

Figure 6 is a side elevational view in cross section of another embodiment of the present invention.

A part of the transmitter unit of a remote writing instrument is shown in Figure 1. A writing pen 10 is carried by movable arms 11 and 12. These arms move in response to the motion of the pen as a message is written on the writing surface 13 by the operator. A switch 14 extending beneath the supporting frame 15 of the writing surface is responsive to the pressure of the pen 10 on the writing surface 13.

A portion of the receiver unit of a remote writing instrument is shown in Figure 2. The arms 20 and 21 of the receiving unit move in response to the position of the transmitting arms 11 and 12. At the point where arms 20 and 21 meet they carry a writing instrument 22 which transcribes on the writing surface 16 the same message written by the operator with transmitting pen 10. In the structures prior to this invention, a shiftable bar 17 is positioned adjacent the receiver writing surface and is controlled by switch 14 on the transmitter to operate in response to pressure on the transmitter writing surface. As pressure on the transmitting writing surface is relieved bar 17 shifts and bears against arms 20 and 21 to relieve the pressure of the receiver pen on the receiver writing surface, thereby arresting the writing action of the pen.

In the apparatus of the present invention the shiftable bar 17 is unnecessary, or, if present, is left in an unenergized state where it does not bear against arms 20 and 21. As described hereafter, the apparatus of the present invention provides writing action control elements integral with the pen 22 and the joint between arms 20 and 21.

As shown in Figure 3, arms 20 and 21 are swingably linked together and, at the joint, carry the receiver writing device mechanism, shown generally at 22. Arm 20 has a tongue 23 which is received between clevis arms 24 and 25 extending from the end of arm 21. Aligned openings in tongue 23 and clevis arms 24 and 25 receive a flanged bearing 26. Two annular washers 27 and 28 encircle the bearing 26 and reduce friction between tongue 23 and clevis arms 24 and 25. The bearing 26 has flanges 29 at either end to retain tongue 23 and clevis arms 24 and 25.

The solenoid case or carriage 30 is cylindrically shaped and has a top portion 31 with a central circular opening 32. The top 31 has a downturned rim portion 39 circling the opening. The base portion 33 of the carriage 30 has an internal upstanding cylindrical center portion 34 and an external central protrusion or sleeve 35. The upstanding portion 34 has a top of generally conical shape. A central bore extends through the internal and external portions 34 and 35 of carriage 30. That part of the bore 36 in the internal portion 34 of the base has a larger diameter than the section of the bore 37 in the external protrusion 35 and a shoulder 38 is formed where the two sections 36 and 37 of the bore join.

A nylon cylindrical sheath 40, with outturned flanges 41 at both ends, is received in the solenoid carriage 30 and fits snugly over the internal upstanding central portion of the base 34. The solenoid coil 42 is disposed in the annular space between the carriage 30 and the sheath 40.

A cylindrical solenoid slug 45 is slideably received within the sheath 40. The central portion 46 of the slug 45 is constructed with a larger diameter than either end of the slug, forming shoulder 47 where the central portion joins the upper portion 48 of the slug and forming shoulder 49 where the central portion joins the lower portion 50 of the slug. The upper portion 48 of the slug is slideably received in the opening 32 in the top of the solenoid carriage 30 but shoulder 47 engages the lip 39 of the opening to arrest further upward axial movement. The base of the solenoid slug 45 is of inverse conical

shape to seat on the conical shaped portion of the base 34 of the solenoid carriage 30.

The relative dimensions of the solenoid carriage 30, base portion 34, and slug 45 should be such that the solenoid slug has freedom of axial motion between the position where it seats on the base portion 34, as shown in Figure 3, and the position where shoulder 47 contacts rim 39 of top 31 to arrest upward axial motion, as shown in Figure 4. In addition, the relative dimensions should be such that the solenoid slug 45 is in an off-centered position in relation to the axial length of coil 42 when it is engaged with rim 39 and in a relatively centered position when it is engaged with base portion 34.

A spring 51 encircles the lower portion 50 of slug 45. The spring 51, at one end, seats on the base portion 34 of the carriage and, at the other end, on shoulder 49 of the solenoid slug 45. This urges the slug 45 toward the up position into contact with rim 39 of the top 31 of the solenoid carriage, as shown in Figure 4.

A writing device, or pen, comprising an ink reservoir 60, a body portion, and a ball point writing point 61 is carried by the solenoid unit. The body portion of the writing device is cylindrical and has an upper part 62 which is slideably received in the bore 36 of base portion 34 of the solenoid carriage. The lower part of the pen body 63 is of smaller diameter and is slidably received in the bore 37 of the external protrusion 35 of the solenoid base. The shoulder 64 is formed where the two parts of the pen body 62 and 63 join as shown in Figure 4. The lower part of the pen body has a writing point 61 affixed at the end opposite shoulder 64. At the end of the upper part of the pen body 62 opposite shoulder 64 an ink reservoir 60 is fixedly attached. The ink reservoir is a cylindrical container having a neck 65 with an opening which snugly receives the pen body. A cap 66 covers the opening opposite the neck and is removable to permit filling the ink reservoir with ink. The pen body has a bore (not shown) extending its entire length to permit ink to flow from the ink reservoir 60 to the writing point 61.

The neck 65 of the ink reservoir has external threads 67 which engage the upper portion 48 of solenoid slug 45. Since the other portions of the writing device are slideably received in the solenoid unit, the writing device is free to move with the solenoid slug 45 as it shifts between its up position as shown in Figure 4 and its down position as shown in Figure 3. In the latter position shoulder 64 on the writing device seats on shoulder 38 of the base portion 34 of the solenoid carriage.

The lower part of the pen body 63 is of such length that when the solenoid slug, and hence the pen, is in the down position of Figure 3 the writing point 61 extends beyond the protrusion or sleeve 35 and engages the writing surface 16. The spring bias in arms 20 and 21 cause the pen to exert a firm pressure on the paper. However, when the solenoid slug and pen are in the up position of Figure 4 the writing point 61 is retracted within the sleeve 35. Because of the bias in the pen carrying arms 20 and 21 the sleeve 35 bears on the writing surface.

The end of sleeve 35 adjacent the writing surface is rounded to prevent damage to the paper as the pen unit slides over the surface in the non-writing position. It should be noted that cuts can be made in the end of the sleeve 35 to define feet.

The energizing circuit for the pen lifter mechanism is shown in Figure 5. Power is supplied through transformer 71 from a source of alternating current 70. Transformer 71 is connected to rectifier 72 which creates the unidirectional voltage required for the operation of solenoid 22. The solenoid 22 is connected to rectifier 72 through the transmitter switch 14 which closes when pressure is applied to the transmitter writing surface 13 (see Figure 1). Thus when transmitter pen 10 is pressed against surface 13 solenoid 22 is energized and the solenoid slug 45 is pulled toward its central position (see Figure 3) carrying the receiver pen into its writing posi-

5

tion. When transmitter pen 10 is lifted from the surface, switch 14 opens, deenergizing solenoid 22, and slug 45 is moved to the up position, as shown in Figure 4, by spring 51. This carries the writing point 61 into sleeve 35 out of contact with the writing surface.

Another embodiment of the present invention is shown in Figure 6. In this design the base 133 of the solenoid case or carriage 130 has a central external cylindrical protrusion or sleeve 135. The top 131 of the solenoid carriage has a central cylindrical internal portion 134. A bore extending from the top of the carriage through portion 134 has a section adjacent the top 132 with a larger diameter than the section 132a extending through the remainder of the top portion 134. The surface of section 134 inside the case is conically shaped.

The solenoid slug 145 is slideably received inside the nylon sheath 142 and is free to move axially between the base 133 of the solenoid carriage and the internal portion 134 of the carriage. Solenoid slug 145 has a central bore which snugly engages the upper portion 162 of the pen. The lower portion 163 of the pen is slideably received in cylindrical sleeve 135. A spring 151 between the top portion 134 and the solenoid slug 145 urges the solenoid slug to the down position as shown in Figure 6. Since the pen is carried by the solenoid slug it is also in the down position with the writing point 161 in contact with the receiver writing surface 116.

When the solenoid is energized, the solenoid 145 is drawn upward, against the force of spring 151, into contact with top portion 134. The pen unit is also drawn upward and the writing point 161 retracts into the sleeve 135 out of writing contact with the surface 116.

With this embodiment it is evident that switch 14 on the transmitting unit will be connected so as to close the solenoid circuit when no pressure is applied to writing surface 13 and to open the circuit when pressure is applied.

It should be noted that the solenoid case or carriage 30 and the bearing 26 may be made in two parts which can be fastened together, by any suitable means, after assembly.

Although a ball point pen is shown in the embodiments herein described, it should be understood that the writing device may be any type of writing instrument.

While we have shown and described specific embodiments of the present invention it will, of course, be understood that alternative forms may be provided without departing from the true spirit and scope thereof. Specifically the protrusion which bears on the writing surface when the pen is out of contact with the paper need not be a part of the solenoid carriage. It may, for example, extend from the bearing or the pen carrying arms. Also, it should be noted that the protrusion may be carried by the solenoid slug while the pen is retained in a fixed position in relation to the solenoid carriage. Similarly, the unit can be constructed so that the solenoid slug remains in fixed position in relation to the pen bearing arms and the solenoid carriage and coil, carrying either the pen or the protrusion, shift to bring the pen in, and out of, contact with the writing surface. We therefore intend by the appended claims to cover all such modifications and alternative constructions falling within their true spirit and scope.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A receiving apparatus for a remote writing mechanism to write on a sheet of paper or the like, said apparatus comprising: means to hold said sheet in a plane at a predetermined location; a movable arm member mounted adjacent said location; and a carriage member attached to said arm member and positioned over said sheet at said location; said members being constructed and arranged to urge said carriage member against said sheet; said carriage member including a protrusion unit with an end adjacent said sheet, said protrusion unit

6

having a bore extending therethrough generally normal to said plane, a writing instrument unit extending through said bore with the writing end of the instrument unit adjacent said sheet, one of said units being fixed to said carriage member and the other of said units being movable with respect thereto toward and away from said sheet, an armature attached end of said other unit, a pair of stop means associated with said carriage member and said other unit to limit the movement of said other unit toward and away from said sheet, respectively, resilient means associated with said other unit to resiliently urge said other unit against one of said stop means and away from the other of the stop means, and an electromagnet mounted on said carriage member and positioned with respect to said armature to move said other unit towards said other of the stop means when said magnet is energized, a first of said stop means being positioned so that when effective to limit the movement of said movable unit said end of protrusion unit extends toward said sheet beyond said end of said instrument unit, the second of said stop means being positioned so that when effective to limit the movement of said movable unit said end of said instrument unit extends toward said sheet beyond said end of said protrusion unit; whereby the energization or deenergization of said magnet will bring said writing end into or out of contact with said sheet and when said end is not in contact with said sheet said protrusion unit will bear against said sheet to support said carriage member.

2. A receiving apparatus for a remote writing mechanism to write on a sheet of paper or the like, said apparatus comprising: means to hold said sheet in a plane at a predetermined location; a movable arm member mounted adjacent said location; and a carriage member attached to said arm member and positioned over said sheet at said location; said members being constructed and arranged to urge said carriage member against said sheet; said carriage member including a protrusion affixed to said carriage member and with an end positioned adjacent said sheet, said protrusion having a bore extending therethrough generally normal to said plane, a writing instrument extending through said bore with the writing end of the instrument adjacent said sheet, said instrument being movable with respect to said protrusion toward and away from said sheet, an armature attached to said instrument, a pair of stop means associated with said carriage member and said instrument to limit the movement of said instrument toward and away from said sheet, resilient means associated with said instrument to resiliently urge said instrument toward one of said stop means and away from the other of the stop means, and an electromagnet mounted on said carriage member and positioned with respect to said armature to move said instrument toward said other of the stop means when said magnet is energized, a first of said stop means being positioned so that when effective to limit the movement of the instrument said end of said protrusion extends toward said sheet beyond said end of said instrument, the second of the stop means being positioned so that when effective to limit the movement of the instrument said end of said instrument extends toward said sheet beyond said end of said protrusion whereby the energization or deenergization of said magnet will bring said writing end into or out of contact with said sheet and when said end is not in contact with said sheet said protrusion will bear against said sheet to support said carriage member.

3. A receiving apparatus for a remote writing mechanism to write on a sheet of paper or the like said apparatus comprising: means to hold said sheet in a plane at a predetermined location; a movable arm member mounted adjacent said location; and a carriage member attached to said arm member and positioned over said sheet at said location; said members being constructed and arranged to urge said carriage member against said sheet; said carriage member including a protrusion affixed to said

7

carriage member and with an end positioned adjacent said sheet, said protrusion having a bore extending there-through generally normal to said plane, a writing instrument extending through said bore with the writing end of the instrument adjacent said sheet, said instrument being movable with respect to said protrusion toward and away from said sheet, an armature attached to said instrument, a pair of stop means associated with said carriage member and said instrument to limit the movement of said instrument toward and away from said sheet, resilient means associated with said instrument to resiliently urge said instrument away from said sheet and toward the respective stop means, and an electromagnet mounted on said carriage member and positioned with respect to said armature to move said instrument toward said sheet when said magnet is energized, a first of said stop means being positioned so that when effective to limit the movement of the instrument said end of said protrusion extends toward said sheet beyond said end of said instrument, the second of the stop means being positioned so that when effective to limit the movement of the instrument said end of said instrument extends toward said sheet beyond said end of said protrusion; whereby the energization of the magnet will cause the writing end to bear against said sheet and the deenergization of the magnet will permit said resilient means to withdraw said writing end with said carriage member being supported on said protrusion.

4. A receiving apparatus for a remote writing mechanism to write on a sheet of paper or the like, said apparatus comprising: means to hold said sheet in a plane at a predetermined location; a movable arm member mounted adjacent said location; and a carriage member attached to said arm member and positioned over said sheet at said location; said members being constructed and arranged to urge said carriage member against said sheet; said carriage member including a protrusion affixed to said carriage member and with an end positioned adjacent said sheet, said protrusion having a bore extending therethrough generally normal to said plane, a writing instrument extending through said bore with the writing end of the instrument adjacent said sheet, said instrument being movable with respect to said protrusion toward and away from said sheet, an armature attached to said instrument, a pair of stop means associated with said carriage member and said instrument to limit the movement of said instrument toward and away from said sheet, resilient means associated with said instrument to resiliently urge said instrument toward said sheet and toward the respective stop means, and an electromagnet mounted on said carriage member and positioned with respect to said armature to move said instrument away from said sheet when said magnet is energized, a first of said stop means being positioned so that when effective to limit the movement of the instrument said end of

8

said protrusion extends toward said sheet beyond said end of said instrument, the second of the stop means being positioned so that when effective to limit the movement of the instrument said end of said instrument extends toward said sheet beyond said end of said protrusion; whereby the deenergization of the magnet will cause the writing end to bear against said sheet by the urging of said resilient means and the energization of the magnet will withdraw said writing end with said carriage member being supported on said protrusion.

5. A writing apparatus for a remote writing mechanism having a writing surface positioned in a plane, and an arm means with a portion movable over said surface to guide said writing apparatus and to urge said apparatus towards said surface, said apparatus comprising: a carriage member mounted on said portion of said arm means to be urged by said means towards said surface; said carriage member including a protrusion unit with an end adjacent said sheet, said protrusion unit having a bore extending therethrough generally normal to said plane, a writing instrument unit extending through said bore with the writing end of the instrument unit adjacent said sheet, one of said units being fixed to said carriage member and the other of said units being movable with respect thereto toward and away from said sheet, an armature attached to said carriage member and said other unit to limit the movement of said other unit toward and away from said sheet, respectively, resilient means associated with said other unit, a pair of stop means associated with said carriage member and said other unit to limit the movement of said other unit toward and away from said sheet, respectively, resilient means associated with said other unit to resiliently urge said other unit against one of said stop means and away from the other of the stop means, and an electromagnet mounted on said carriage member and positioned with respect to said armature to move said other unit towards said other of the stop means when said magnet is energized, whereby the energization or deenergization of said magnet will bring said writing end into or out of contact with said sheet and when said end is not in contact with said sheet said protrusion unit will bear against said sheet to support said carriage member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,415,499	Tuttle	May 9, 1922
2,332,523	Norden et al.	Oct. 26, 1943
2,582,043	Krahulec	Jan. 8, 1952
2,583,720	Adler	Jan. 29, 1952
2,590,294	Both	Mar. 25, 1952
2,676,869	Ress	Apr. 27, 1954
2,692,301	Ress	Oct. 19, 1954