Aug. 1, 1967 H. C. KELSAY 3,333,500

SELF-CLINCHING STAPLE

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FIG. 1.

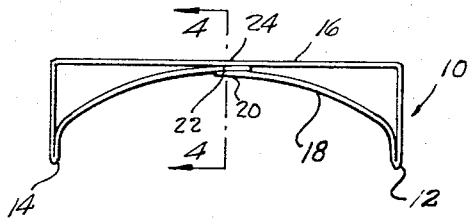


FIG. 3.

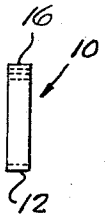
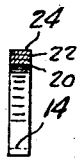


FIG. 4.



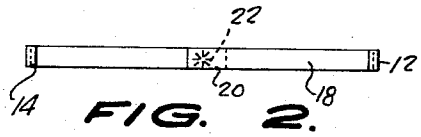


FIG. 2.

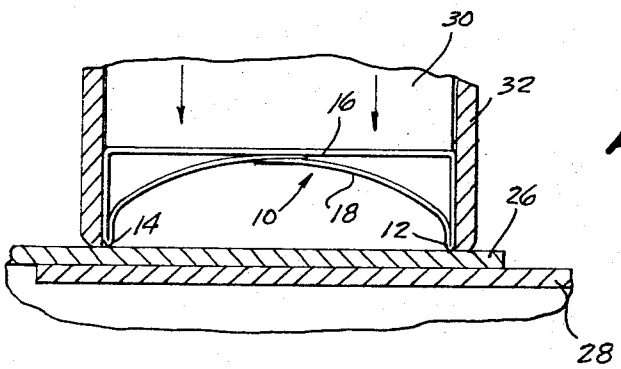


FIG. 5.

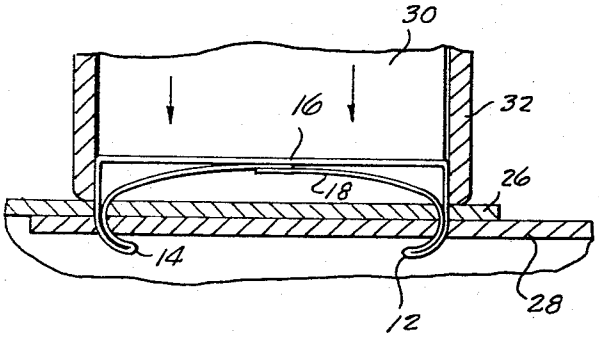
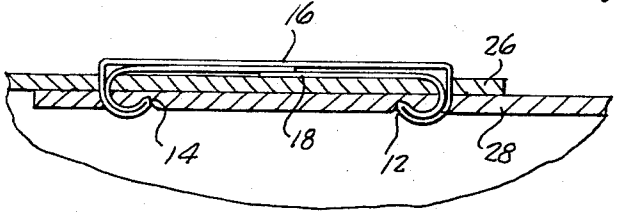


FIG. 6.

FIG. 7.



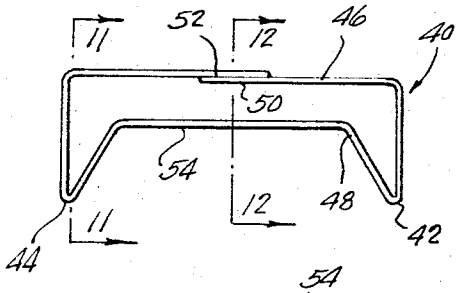
INVENTOR.
HOYT C. KELSAY,
BY
Berman, Davidson & Berman
ATTORNEYS.

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SELF-CLINCHING STAPLE

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FIG. 8.



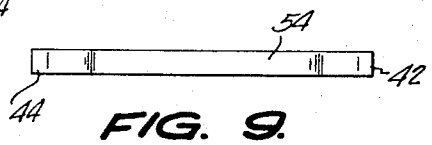


FIG. 9.

FIG. 10.

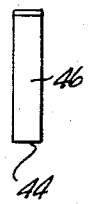


FIG. 11.

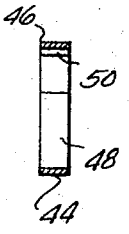


FIG. 12.

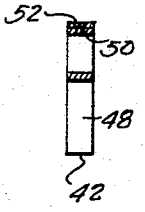


FIG. 15.

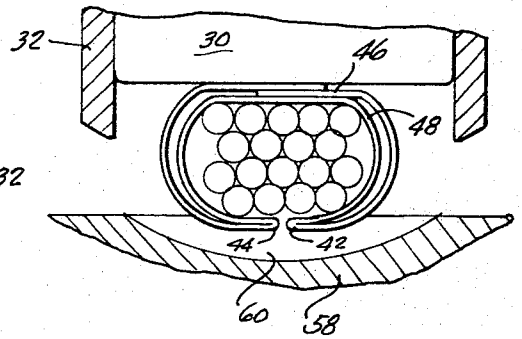


FIG. 13.

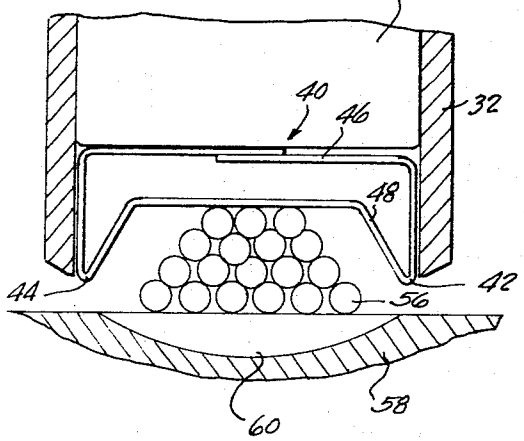
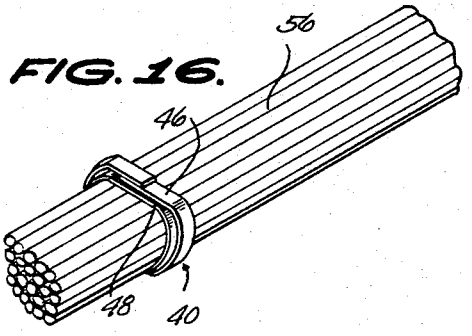


FIG. 16.



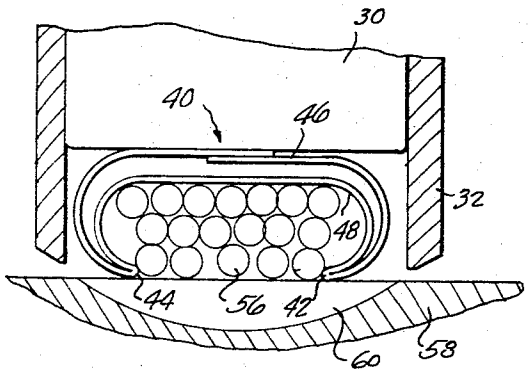


FIG. 14.

INVENTOR.
HOYT C. KELSAY,
BY
Berman, Davidson & Berman
ATTORNEYS.

United States Patent Office

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3,333,500

SELF-CLINCHING STAPLE

Hoyt C. Kelsay, 3129 Julian Drive,
Raleigh, N.C. 27604

Filed Mar. 19, 1965, Ser. No. 441,062
4 Claims. (Cl. 85—49)

This invention relates to a self-clinching staple for securing together sheets of paper, cardboard, etc., and which can also be used for securing together a bundle of loose articles such as rods or wires.

Conventional staples are used in a device which drives the staples against a lower member or anvil, the anvil serving to turn or clinch the staples after they have passed through the material being stapled. With the anvil type of machine, it is virtually impossible to apply conventional staples to a closed or filled box without damaging the box, its contents, or obtaining a loose closure. It is either impossible to get the anvil inside the box to complete the clinching operation or the anvil raises the flaps of the box resulting in a loose, sloppy tie of the flap covers.

Accordingly, it is an object of this invention to provide a staple which can be driven through material from one side only, the staple being designed to clinch after passing through the material. By employing the staple of the present invention, it is possible to staple together the flaps or the covering body of boxes by means of a device which will operate entirely from the exterior of the box. Since the staple is self-clinching, the fastening operation can be accomplished without positioning an anvil or other instrumentality in the interior of the box.

Another object of this invention is to provide a self-clinching staple designed for wrapping around a loose bunch of wires, rods, or the like to bind these items into a tight bundle. The staple can be driven around the material from one side only after the articles have been assembled upon a supporting surface.

A further object of this invention is to provide a staple of the character indicated, which is simple in construction, capable of being mass-produced, but yet highly efficient for its intended operation.

Further objects and advantages of this invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a front view in elevation of one form of the staple which comprises the subject matter of the present invention.

FIGURE 2 is a bottom plan view of the staple illustrated in FIGURE 1.

FIGURE 3 is an end view in elevation of the staple illustrated in FIGURE 1 as seen from the right hand side of FIGURE 1.

FIGURE 4 is a cross sectional view taken substantially along the plane indicated by the line 4—4 of FIGURE 1.

FIGURE 5 illustrates the manner in which the staple shown in FIGURE 1 is applied in stapling together two overlapping flaps of a container.

FIGURE 6 is a view similar to FIGURE 5, but illustrating the staple partly inserted through the flaps of the container.

FIGURE 7 is a view similar to FIGURES 5 and 6, but illustrating the final position of the staple after it has been driven to staple together the flaps of the container.

FIGURE 8 is a front view in elevation of a second form of the staple of the present invention, and more particularly, a staple specifically designed for holding together a loose bunch of articles, such as wires and rods.

FIGURE 9 is a bottom plan view of the staple illustrated in FIGURE 8.

FIGURE 10 is a side view in elevation of the staple illustrated in FIGURE 8 as seen from the right hand side of FIGURE 8.

FIGURE 11 is a cross sectional view taken substantially along the plane indicated by the line 11—11 of FIGURE 8.

FIGURE 12 is a cross sectional view taken substantially along the plane indicated by the line 12—12 of FIGURE 8.

FIGURE 13 illustrates the manner in which the staple of FIGURE 8 is about to be wrapped about a loose bundle of wires or rods.

FIGURE 14 is a view similar to FIGURE 13 but illustrating the staple partly wrapped around a bundle of loose wires or rods.

FIGURE 15 is a view similar to FIGURES 13 and 14 but illustrating the staple in its final position circumscribing the loose bundle of rods or wires and holding them tightly together in a neat package.

FIGURE 16 is a perspective view of the staple of FIGURE 8 wrapped around a bundle of wires or rods.

Referring now to the drawings in detail, and in particular the form of the invention illustrated in FIGURES 1–7, one form of a staple comprising the subject matter of the present invention is generally designated by the numeral **10**.

The staple **10** is illustrated as being made from a single, continuous strip of sheet material, but it should be understood that wire or other comparable materials may be employed. A plurality of individual staples may be held together by any conventional means now employed for holding staples together, such as by applying a coating of enamel or similar material which will hold the staples together at their edges with sufficient tenacity to enable the staples to be handled as a strip until they are driven.

Each staple **10** includes a pair of spaced points **12** and **14** for piercing the material to be stapled. The points **12** and **14** are formed by doubling back spaced portions of the strip material forming the staple. A substantially U-shaped bridge **16** extends between and joins one end of each of the points **12** and **14**. An arch-like member **18**, substantially curved throughout its length, joins the other end of each of the points **12** and **14**.

The arch-like member **18** is coplanar with the bridge **16**. The arch-like member **18** includes the ends **20** and **22** of the strip material. The ends **20** and **22** are overlapped and joined, by a spot weld, or other comparable means, to the central portion **24** of the bridge **16**.

With specific reference now to FIGURES 5–7, the manner in which the staple **10** is driven into the overlapped ends of a pair of cardboard flaps **26** and **28** of a box to staple them together, is fully illustrated. The driving means consists of a vertical plunger **30** confined within a sleeve **32**, which also confines the staple **10**. Upon downward movement of the plunger **30**, a vertical force is applied to the staple **10**. The staple will initially move downwardly and the points **12** and **14** will pierce the cardboard flaps **26** and **28**. After the points **12** and **14** have pierced the cardboard flaps **26** and **28**, continued downward movement of the staple **10** by the plunger **30** will cause the bridge **16** of the staple to move relative to the arch-like member **18**. The ends of the arch-like member **18** will come into contact with the cardboard flap **26** and will be compressed towards the downwardly moving bridge **16**. As the arch-like member **18** is compressed towards the bridge **16**, the ends of the points **12** and **14** to which the arch-like member **18** is connected, will move downwardly slower than the ends of the points connected to the continuously downwardly moving bridge **16**. This will cause the points **12** and **14** to curve inwardly after passing through the overlapped flaps **26** and **28**.

Continued movement of the plunger **30** will cause the arch-like member **18** to completely flatten against the top of the flap **26** and will cause the points **12** and **14** to curve to such an extent as to bite into the inner surface of the flap **28**, as clearly shown in FIGURE 7.

Once the arch-like member **18** is completely flattened, the stapling operation is completed and the plunger **30** is withdrawn. The operations of driving the staple **10** through the cardboard flaps **26** and **28** and of turning or clinching the points **12** and **14** are performed entirely on one surface of the material which is being stapled. Thus, the flaps of a box may be joined after the box has been filled with its contents. The construction of the staple causes the staple to clinch without the use of an anvil.

Referring now particularly to FIGURES 8–16, there is shown a slightly modified form of a staple which can be used to bind together a bundle of loose wires, rods or other items having rod-like portions. The operation of the staple illustrated in FIGURE 8 and generally designated by numeral **40** is substantially identical to the operation of the staple **10**, as will be fully explained hereinafter.

The staple **40** is also formed from a continuous, single length of strip sheet material. The staple **40** includes a pair of spaced points **42** and **44** formed by doubling back spaced portions of the sheet material. A substantially U-shaped bridge **46** joins one end of each of the points. Since the bridge **46** is formed from the ends of the sheet material, the ends of the material **50** and **52** are overlapped and secured together by welding or other comparable means.

An arch-like member **48** joins the other end of each of the points **42** and **44**. The arch-like member **48** includes a central portion **54** which is substantially parallel to the bight portion of the U-shaped bridge **46** and spaced therefrom. The arch-like member **48** is coplanar with the bridge **46**.

With specific reference to FIGURES 13–16, it will be seen that the staple **40** is used to bind together a plurality of loose wires or rods into a bundle **56**. The loosely packed wires or rods are placed upon a supporting surface **58**, having a groove **60** cut therein.

The staples **40** can be driven by a vertically reciprocable plunger **30** disposed within a confining sleeve **32**. As the plunger **30** moves downwardly, it will cause the staple **40** to move downwardly. The central portion **54** of the arch-like member **48** will make initial contact with the top of the bundle of wires or rods. Continued downward movement of the plunger **30** will cause the bridge **46** to move downwardly relative to the arch **48**, since the arch-like member **48** is in contact with the bundle of wires or rods which resists its downward movement.

Accordingly, the arch-like member **48** is compressed toward the bridge **46**. The ends of the points **42** and **44** connected to the arch-like member **48** will move downwardly slower than the ends of the points **42** and **44** connected to the bridge **46**. This will cause the points **42** and **44** to curve inwardly about the loosely stacked bundle of wires or rods as the bridge **46** moves relative to the arch-like member **48**. As shown in FIGURE 15, the bridge **46** will continue its downward movement under the urging of the plunger **30** until it contacts the arch-like member **48**.

When the bridge **46** has contacted the arch-like member **48**, the points **42** and **44** will have completely encompassed the bundle of loose wires and rods shown in FIGURE 15 and be positioned adjacent to each other. Because of the groove **60** in the supporting surface **58**, the points **42** and **44** can move beneath the plane of the supporting surface so as to completely encircle the bundle of loose wires and rods.

Hence, the staple **40** is self-clinching and does not need an anvil member to effect its clinching action.

While specific embodiments of this invention have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

I claim:

1. As an article of manufacture, a self-clinching staple comprising a pair of spaced points, each point being defined by two spaced end portions connected at their forward ends, a substantially U-shaped bridge including a pair of substantially parallel legs joining a corresponding portion of each of said points, and a coplanar arch-like member beneath said bridge joining the other portion of each of said points.

2. As an article of manufacture, a self-clinching staple comprising a single, continuous length of material having a pair of spaced points formed by doubling back spaced portions of said material so that each point has spaced rearward end portions, a substantially U-shaped bridge including a pair of substantially parallel legs joining a corresponding end portion of each of said points, and a coplanar arch-like member beneath said bridge joining the other end portion of each of said points.

3. As an article of manufacture, a self-clinching staple comprising a single, continuous length of material having a pair of spaced points formed by doubling back spaced portions of said material so that each point has spaced rearward end portions, a substantially U-shaped bridge including a pair of substantially parallel legs joining a corresponding end portion of each said points, and a coplanar arch-like member beneath said bridge joining the other end portion of each of said points, said arch-like member being arcuate throughout its length and having its central portion secured to the central portion of said bridge.

4. As an article of manufacture, a self-clinching staple comprising a single, continuous length of material having a pair of spaced points formed by doubling back spaced portions of said material so that each point has spaced rearward end portions, a substantially U-shaped bridge having a pair of parallel legs joining a corresponding end portion of each of said points and a bight portion joining said legs, and a coplanar arch-like member beneath said bridge joining the other end portion of each of said points, said arch-like member including a substantially straight portion spaced from and parallel to the bight portion of the U-shaped bridge.

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CARL W. TOMLIN, *Primary Examiner.*

R. S. BRITTS, G. A. MILWICK, *Assistant Examiners.*