April 14, 1959 H. PALMLEAF 2,881,636

MAGNETIC TENSION RELEASE FOR STRAPPING TOOLS

Filed Oct. 22, 1957 2 Sheets-Sheet 1

Fig. 1

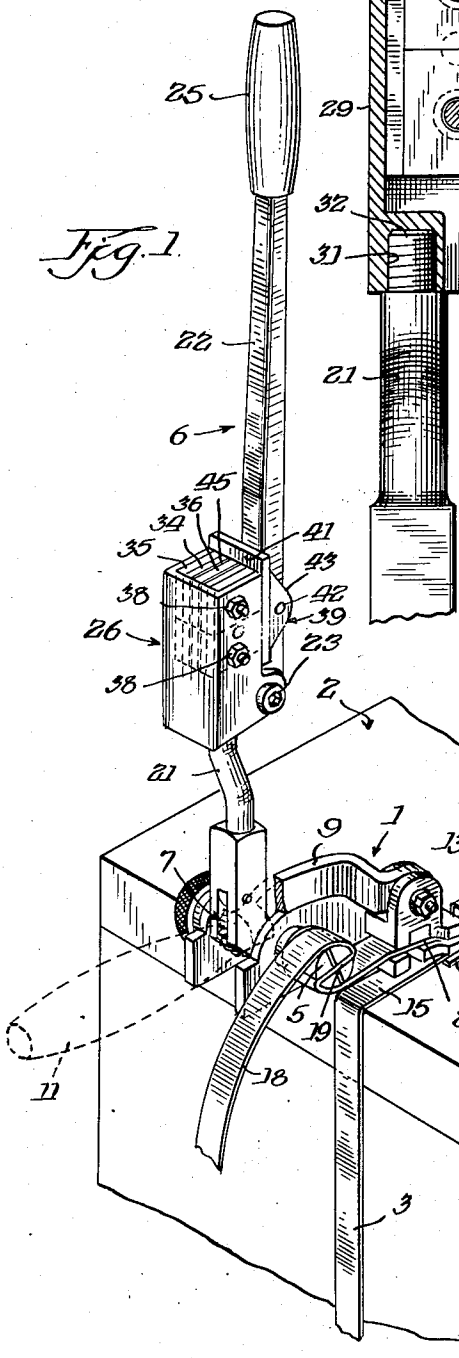


Fig. 5

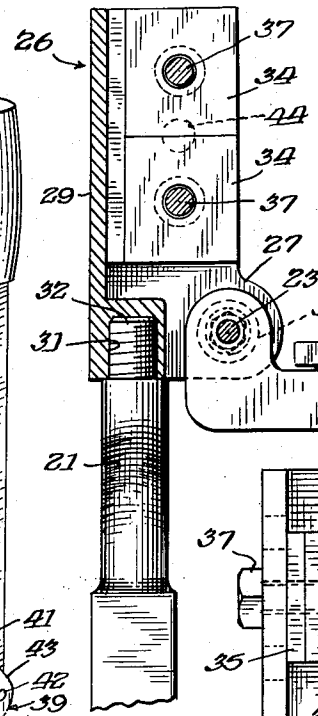


Fig. 6.

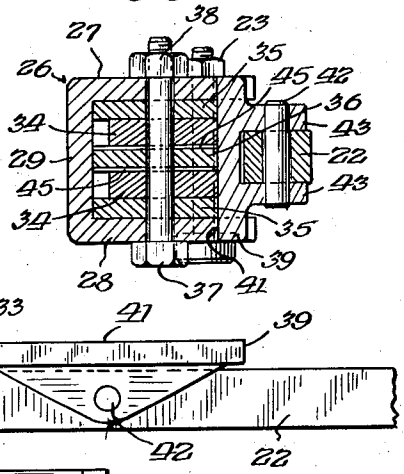


Fig. 8.

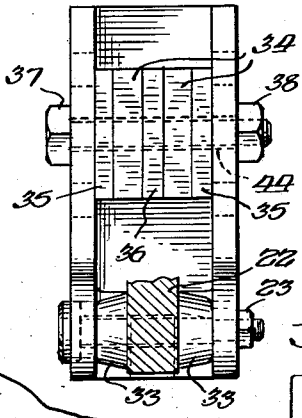
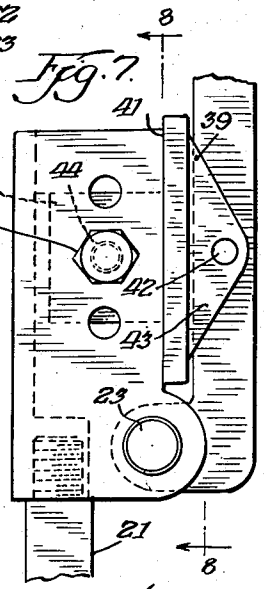


Fig. 7.



Inventor,
Herbert Palmleaf.
By Lee & Lee
Attys.

April 14, 1959 H. PALMLEAF 2,881,636

MAGNETIC TENSION RELEASE FOR STRAPPING TOOLS

Filed Oct. 22, 1957 2 Sheets-Sheet 2

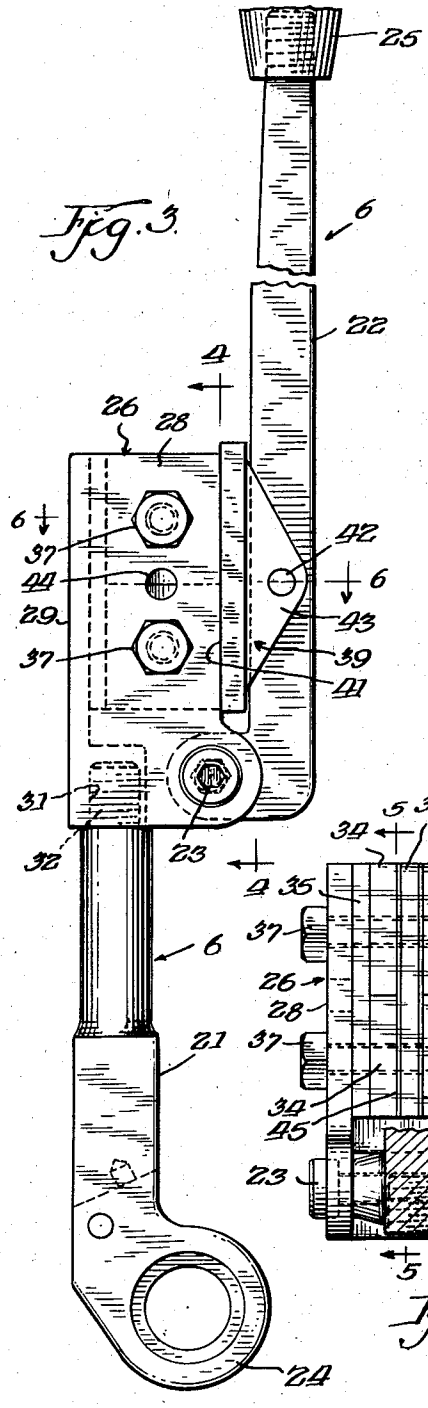


Fig. 3.

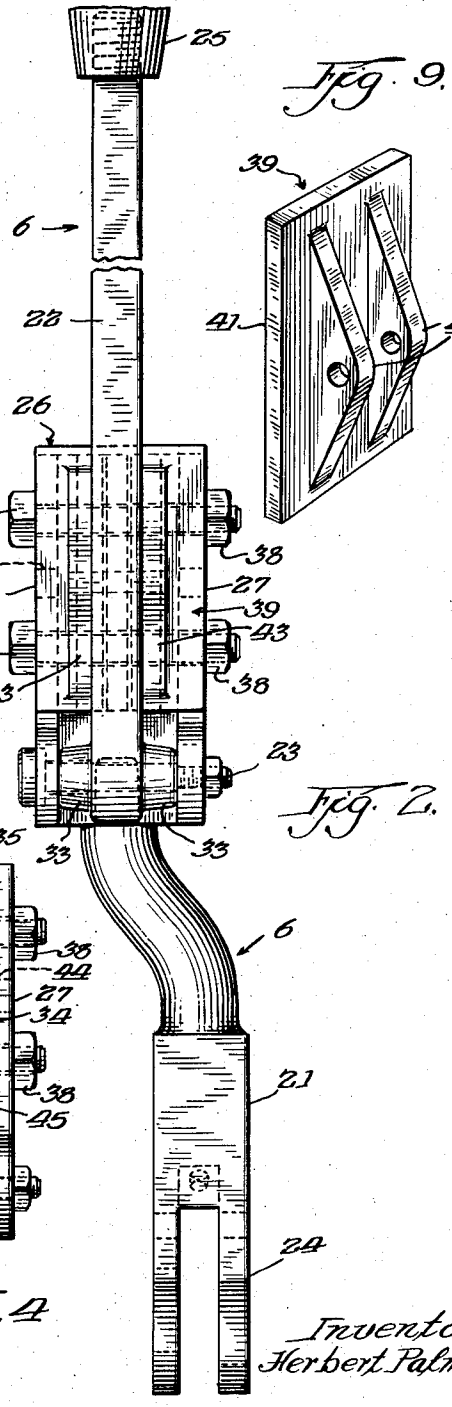


Fig. 2.

Fig. 9.

Fig. 4

Inventor
Herbert Palmleaf

By Lee & Lee
Attys.

United States Patent Office 2,881,636 Patented Apr. 14, 1959

2,881,636

MAGNETIC TENSION RELEASE FOR STRAPPING TOOLS

Herbert Palmleaf, Melrose Park, Ill., assignor to A. J. Gerrard & Company, Melrose Park, Ill., a corporation of Illinois

Application October 22, 1957, Serial No. 691,761

3 Claims. (Cl. 74—524)

The invention relates generally to strapping tools and the like and more particularly to tension controlling means therefor.

Tension straps or bands have been employed in numerous industries and fields for retaining and supporting objects, but use thereof in many applications has been limited by requirements of predetermined tension on the applied strapping or banding. For example, in connection with naval vessels and the like, which may contain many miles of electrical cables in connection with ship controls, fire control, radar etc., strapping would be extremely effective, provided that it is so applied that there is no danger of creating too much tension in the strapping and thus too much compression on the cables. Another typical example of a possible use for accurately tensioned banding, would be in connection with transformer cores wherein the strapping may be employed to retain the core assembly in proper relation, again requiring predetermined tensions to insure proper operation of the banding without damage to the core structure.

While torque indicating wrenches and the like have been designed, normally such type of structure merely gives an indication of the torque or tension created but does not prevent further operation. Likewise air operated tools have been developed that will produce predetermined tensions on strapping, but in most instances the cost of such equipment plus the requirement of having air compressors or other air pressure sources, has restricted the use of such type of equipment.

In the case of strap tensioning tools, it generally is desirable not only to provide an indication of the torque or tension on the strapping, but also to render the tool inoperative after the predetermined tension has been reached to eliminate the possibility of the operator inadvertently applying an excessive amount of tension to the strapping.

The present invention therefore has among its objects the production of a strap tensioning tool which is simple in construction and inexpensive to manufacture, and which will provide positive tension control whereby the tension of the strap may be brought into reasonably narrow limits which may range from a few pounds or less to five hundred pounds and more, depending upon the nature of the object to which the strapping is to be applied.

Another object of the invention is the production of such a tensioning tool having the above advantages, which is positive in action whereby the tool is rendered inoperative after the desired tension has been reached, preventing the operator from applying any additional excessive tension on the strapping.

A further object of the invention is the production of such a tensioning control, which may utilize a magnetic structure for controlling the tensioning, eliminating the use of complex mechanical structures and arrangements, springs and the like, and which will retain its accuracy within reasonably close limits over long periods of time

without appreciable change in the original setting of the tool.

A further object of the invention is the production of such a tool which is so designed that a single tool may be readily adjusted for any predetermined tension, within a relatively wide range, eliminating the need for numerous models for each different tensioning requirement.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

In the drawings, wherein like reference characters indicate like or coresponding parts:

Fig. 1 is a perspective view of a strapping tool and a portion of a strap applied to an object with the tool in operative position;

Fig. 2 is a front elevational view of the operating or tensioning handle of the strapping tool illustrated in Fig. 1;

Fig. 3 is a side elevational view of the handle illustrated in Fig. 2;

Fig. 4 is a sectional view taken approximately on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken approximately on the line 5—5 of Fig. 4, with the handle member in broken position following the application of the predetermined tension;

Fig. 6 is a transverse sectional view taken approximately on the line 6—6 of Fig. 3;

Fig. 7 is a side elevational view similar to Fig. 3 of the magnetic structure, illustrating the utilization of a single group of magnets;

Fig. 8 is a sectional view taken approximately on the line 8—8 of Fig. 7; and

Fig. 9 is a perspective view of a magnetic armature employed in the construction illustrated.

The present invention contemplates the use of a strap tensioning tool which may be of more or less common type having an actuating handle by means of which the strap tensioning may be achieved, one of the elements being maintained in operative relation by a magnetic circuit which is so designed that it will break when the tension in the strap reaches the desired amount. In the embodiment of the invention illustrated, the magnetic circuit is incorporated in the actuating handle of the tensioning tool, the handle being made in two sections which are retained in operative relation by the magnetic structure and upon attaining the desired strap tension the handle will separate or break into an inoperative position, indicating that the desired tension has been reached and rendering the tool inoperative to apply additional tension to the strapping.

Referring to the drawings and more particularly to Fig. 1, the reference numeral 1 indicates generally a strapping tool, illustrated as being positioned on an object 2 for the purpose of tensioning a band or strap 3 on the object. The tensioning mechanism 1 may be of any suitable form, that illustrated being typical of the general type of structure which has been utilized over a long period of years, and briefly comprises a strap engageable portion 4, a strap receiving spindle 5 adapted to be actuated by a suitable lever indicated generally by the numeral 6, the latter being operatively connected to the spindle 5 through a suitable ratchet mechanism generally indicated by the numeral 7. The mechanism illustrated is also provided with a cutter structure indicated by the numeral 8 adapted to be actuated by a lever or handle 9, the hand gripping portion 11 thereof being indicated in dotted line to show the ratchet mechanism 7. In the construction illustrated the strap engaging portion 4 is provided with a seal engaging nose 12 adapted to engage the end portion of a seal 13, the latter being illus-

trated as generally of tubular shape and having a pair of upwardly extending, oppositely disposed ears **14**.

In use, one end **15** of the strap is brought around through the seal **13** with the free end **16** of the strap reversely bent underneath the seal. The opposite end **17** of the strap is then brought about the container or other object **2**, inserted through the seal **13** into the head **4** of the mechanism and the extreme end **18** inserted in one of the slots **19** in the spindle **5**. Thus by reciprocation of the handle or lever **6**, torque will be applied to the spindle **5** through the ratchet mechanism **7** to rotate the spindle and thus wind the free end of the strapping on the spindle to tension such strapping about the object, the opposite end of the strap being retained by the seal and its engagement with the nose **12** of the tensioning tool. Following suitable tensioning of the strap, the free end **17** of the strap may be bent sharply at the juncture of the seal **13** with the nose **12** of the strapping tool, this being accomplished by rotating the entire tool upwardly in a clockwise direction as viewed in Fig. 1, following which the strap end may be severed at the cutter **8** by actuating the handle **11** in a clockwise direction, the bend in the strap initially retaining the strap in tension position following its severance. The free end of the strap is then bent over the top of the seal **13** and the upwardly extending lugs **14** bent downwardly over the free end of the strap to retain it in interlocked relation with the seal.

The tensioning mechanism described and the seal utilized therewith are merely illustrative and, as will be apparent from the disclosure herein given, the present invention is applicable to other forms of tensioning mechanisms utilizing similar or other types of seals.

Referring to Figs. 2 through 6, which illustrate details of the handle member **6**, it will be noted that the handle member illustrated is made in two sections **21** and **22** pivoted together by suitable means such as a bolt **23**, the section **21** being suitably constructed at its free end for connection with the tensioning mechanism, such means comprising a bifurcated portion **24** adapted to receive the shank of the spindle **5** and cooperable portions of the ratchet mechanism **7**, while the other section **22** is provided at its free end with a hand engaging or gripping portion **25** by means of which the lever **6** may be grasped and reciprocated to rotate the spindle **5**.

The sections **21** and **22** are operatively connected through a magnet housing or retainer structure indicated generally by the numeral **26** which may be generally U-shaped in cross section, as illustrated in Fig. 6, having a pair of side wall portions **27** and **28** extending in spaced parallel relation and connected by an intermediate wall **29**, the lower portion of the retaining member being provided with a threaded socket **31** adapted to receive a threaded shank or stem **32** carried by the free end of the section **21**. The section **22** is illustrated as being operatively connected to the retaining member **26** by the bolt **23** which passes through the spaced walls **27** and **28** and a transversely extending lug or projection **33** formed on the adjacent end of the section **22**, whereby the latter is pivotally connected to the section **21** on the axis of the bolt **23**. Positioned between the walls **27** and **28** of the retainer is a plurality of magnets **34**, the particular construction illustrated in Figs. 1 through 6 utilizing two pairs of magnets positioned one above the other as apparent from a reference to Fig. 5. Positioned on each side of the pairs of magnets and interposed therebetween are spacer members **35** and **36**, the particular magnets being polarized on their faces whereby one face of each magnet is a north pole and the other face a south pole, and all of the magnets being similarly arranged with respect to their poles. The magnet assembly, including the magnets **34** and spacers **35** and **36**, are suitably secured in the retainer as for example, by bolts **37** passing through the magnets, spacers and side walls **27** and **28** and secured in position by nuts **38** threaded on the free end of the bolts **37**.

Carried by the section **22** and cooperable with the magnet assembly is an armature indicated generally by the numeral **39**, having a substantially flat face **41** adapted to be positioned in opposition to the magnet assembly when the section **22** is in operative position with respect to the section **21**, as illustrated in Fig. 1. The armature **39** is suitably carried by the section **22** by means of a pin **42** passing through the bifurcated portions **43** of the armature and through the handle section **22**, as illustrated in Fig. 6, thus permitting the armature to pivot and adjust to the exposed portions of the magnet assembly.

When the section **22** is in the position illustrated in Figs. 1, 2 and 3, the armature **39** will be engaged with the magnet structure. The retainer member **26** is preferably made of a non-magnetic material as are the spacers **35** and **36**, as for example, brass. Thus, within the limits of the magnetic attraction between the armature **41** and the magnet structure, the sections **21** and **22** will be rigidly connected and function as a single member. However, when the resistance of the spindle **5**, resulting from the tensioning of the strap **3**, reaches a certain amount, the force applied to the handle **25** to overcome such resistance will apply a greater separating force on the armature with respect to the magnet structure than the magnetic forces acting on the armature, permitting the latter to break away from the magnet structure, the section **22** pivoting about the axis of the bolt **23** to a position such as that illustrated in Fig. 5, thus preventing further tensioning of the strap at **3**. Obviously, the tension at which such action occurs will depend on a number of variables including the leverage forces in the handle design, the strength of the magnets and number thereof, etc.

The walls **27** and **28** of the magnet retaining structure may also be provided with bores **44** therein which permit only a single pair of magnets to be employed if so desired, such arrangement being illustrated in Figs. 7 and 8, wherein the single pair of magnets **34** are secured to the retainer structure by a single bolt **37** passing through the bores **44** and enabling the single magnet assembly to be centered with respect to the armature **39**. In addition to varying the number of magnets, the effective force of the assembly may be varied by utilizing one or more pair of magnetic spacing members **45** adjacent either or both magnets, such spacers having a tendency to reduce the effective magnetic field and, depending upon their number and position, provide a considerable flexibility in controlling the tension of the strapping **3**. In some cases it may be desirable to achieve higher operating tensions by varying the relation of the pivot of the section **22** with respect to the section **21**, as for example, spacing such pivots a greater distance from the magnet structure, thereby decreasing the effective leverage of the section **22** with respect to the armature **39**, whereby the ratio of the length of the section **22** from the pivot **23** to the pivot of the armature **42** with respect to the distance from such pivot **42** to the end of the handle **25** will be smaller, requiring greater force on the handle **25** to separate the armature from the magnet assembly.

While the invention may be employed by utilizing a magnet structure other than in the handle **6**, the particular embodiment of the invention illustrated enables the utilization of the present invention in a very simple form which may be readily applied to existing types of machines, merely by substituting a handle constructed in accordance with the present invention for the usual handle.

It will be apparent from the above description that I have provided a novel tension control structure which is exceedingly simple in construction and yet very efficient as well as flexible in its operation and use.

It will also be noted that the construction not only indicates when the desired tension has been reached,

but also prevents further tensioning action, eliminating any possibility of excessive tension on the strap.

Having thus described my invention, it will be obvious to those skilled in the art from the disclosure herein given that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement, and combination of parts herein shown and described, or uses mentioned.

What I claim to be new and desire to secure by Letters Patent is:

1. In an actuating handle for strap tensioning mechanisms, the combination of a first handle section adapted to be operatively connected at one end to a strap tensioning mechanism, and a second handle section having a hand gripping portion at its free end, a magnet retaining structure mounted on the free end of said first section, said structure being generally U-shaped in transverse section, having a pair of spaced parallel side walls and an intermediate connecting wall with the planes of said walls extending generally parallel to the axis of the handle, a plurality of flat, plate-like magnets, and a plurality of similarly shaped spacer elements between which said magnets extend, positioned between said retainer side walls, means extending between said side walls for retaining said magnets and spacers in operative positions, said second section being pivotally connected to said retaining structure adjacent the end thereof connected to said first section, with a portion of said second section extending in opposed relation with respect to said magnets, an armature carried by said second section in opposed relation with respect to said magnets and adapted to be positioned in the field of the latter,

said armature and magnets being operable to retain the sections of the handle in substantially rigid relation until the force manually applied to the second section overcomes the magnetic attraction between the magnets and the armature.

2. An actuating handle for strap tensioning mechanisms as defined in claim 1, wherein said armature is pivotally connected to said second section on an axis extending parallel to the axis of the pivotal connection between said first and second sections.

3. An actuating handle for strap tensioning mechanisms as defined in claim 2, wherein said retaining member is provided with means for mounting a series of magnets and spacers in any one of three positions with respect to said armature, one of such positions being directly opposite the pivotal axis of the armature and the other two positions being symmetrically disposed with respect to said axis on opposite sides of said first position and so spaced that two series of magnets and spacers may be employed, one in each of said symmetrical positions, the arrangement being such that the attraction on the armature is symmetrical with respect to the pivotal axis thereof when either one or two series are utilized.

References Cited in the file of this patent

UNITED STATES PATENTS

2,007,002	Porter	July 2, 1935
2,048,374	Childress	July 21, 1936
2,812,677	Paterson	Nov. 12, 1957

FOREIGN PATENTS

776,714	Great Britain	June 12, 1957