May 6, 1969 M. E. HILLIER 3,442,374

FEEDING OF NAILS AND THE LIKE FOR FASTENING MACHINES

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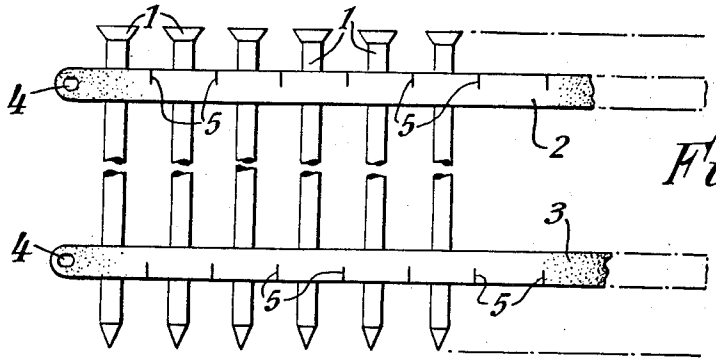


Fig. 1.

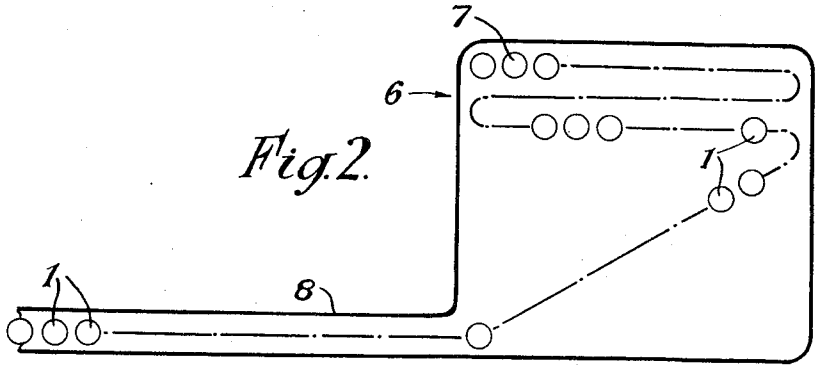


Fig. 2.

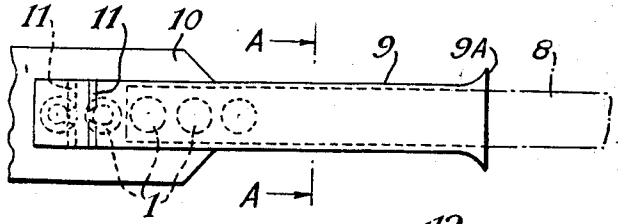


Fig. 3.

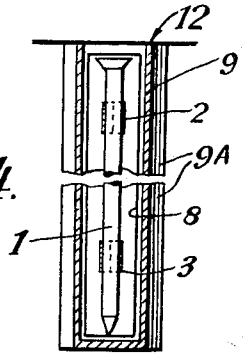


Fig. 4.

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FEEDING OF NAILS AND THE LIKE FOR FASTENING MACHINES

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Int. Cl. B65d 83/00
U.S. Cl. 206—56 7 Claims

ABSTRACT OF THE DISCLOSURE

There is described a pack of nails interattached for use in an automatically self-feeding pneumatic fastener gun, in which the interattachment is formed by one or more tape-like ligaments, and these are incised partially across their breadth to localise and facilitate tearing of the ligaments when the nails are driven.

This invention relates to the feeding of nails and the like for fastening machines. Air-operated fastening machines are used for driving nails in sequence, and for pins, staples and corrugated fasteners. Whilst the invention is especially concerned with the supply in such machines of fairly large nails of orthodox (e.g. round headed) type, it may be applicable to such other fasteners albeit with some modification.

The invention resides in a pack of nails for use in a fastening machine, which pack comprises a plurality of parallel nails of equal length interattached in spaced equidistant relationship and as a series of individual nails, by at least one ligament which, between adjacent nails, is incised through part of its breadth so as to localise and facilitate tearing when one nail is forced by the machine lengthwise to separate from its neighbour. Preferably the nails and ligament or ligaments are arranged at right angles to one another so that if a ligament is horizontal, the nails are vertical; there are preferably two ligaments and they are spaced apart by a distance less than the length of the nails, that is to say, their remote edges are respectively spaced below the heads and above the points of the nails. The incisions are preferably from that edge of the ligament which is nearer the heads and they are preferably simply cuts. Where in the specification the nails are described as being parallel, it is to be understood that this means that they are parallel at the time when the belt is assembled. Because of the pliability of the ligaments, the nails may depart from parallelism, for instance when they are bunched up so that their pointed ends tend to converge.

The ligaments preferably employed consist of two laminates of thin pliable sheet material (such as paper, plastics, metal foil) stuck together where they have an interface between adjacent nails and between them surrounding each nail. Such strips are preferably of the material known as Sellotape or a material of like properties.

The interattached assembly of nails can fairly be described as a belt, by analogy with a belt of cartridges for use in a machine-gun. A pack according to the invention includes a container of disposable material (i.e. of material so cheap as to be not worth conserving) which material is adapted by its shape and structure to be complementary to the structure of the machine, in the sense that it is designed to be attached to the machine in an operative manner enabling the machine to be self-feeding from the container. Such a container preferably consists of a magazine part, able to contain a belt of bunched-up nails, and a chute leading therefrom to pass the belt out to the machine in an aligned manner. The belt may be housed in

the magazine part as a coil, or a zig-zag array, or even in random manner, providing that the belt can run out into the machine, on demand.

Throughout the specification, reference is made to nails; this term is deemed to include other fasteners which are driven in the manner of nails. Providing the invention is slightly adapted it may, for example, apply to staples, in which case either one limb of each staple is interattached (in the manner of the invention) to one limb of its neighbours, or both limbs are included. In the former case, the staples may overlap one another in the belt, and in the latter case they are arranged as a series. Headless pins may, obviously, replace the headed nails described. Corrugated fasteners may be used though these usually being short compared to their breadth, will usually only be interattached by one ligament.

The word ligament herein is intended to mean a flexible strip or tape-like element usually of two laminae or plies of considerable tensile strength and not so elastic as to allow the nails to separate noticeably when the belt is tensed, or to be disarranged out of parallel by tension; and of such nature that tearing across is localised and facilitated by the incision, nick, or notch.

It is not essential that the incisions be in the nature of simple cuts from an edge. They may be V-shaped notches, or one or more cut-out perforations between the margins of a ligament. Simple cuts are shown by experiment to be very effective in two-ply Sellotape.

The invention has been found to be very effective when applied to packs of (say) 120 round-headed nails of 4" length.

When sticky tape such as Sellotape is used for the ligaments, and the nails are sandwiched between two interadherent strips, it is found that each nail parts quite readily from its follower when fired from a gun, and the attached pieces of tape go with the nail and pass into the wood (or whatever the workpiece is) that is being nailed or if not passed in, stay insignificantly around the nail beneath its head.

The invention is illustrated in a diagrammatic manner in the accompanying drawings in which:

FIGURE 1 illustrates several nails as they will be in a belt;

FIGURE 2 illustrates in plan a proposed "cassette" pack or disposable magazine for the belt of FIGURE 1, and a belt is indicated therein;

FIGURE 3 illustrates a lead-in of a gun to receive the pack of FIGURE 2; and

FIGURE 4 is a section on the line A—A of FIGURE 3.

Nails **1** are assembled as a belt, being interconnected by two so-called ligaments **2** and **3** each of which consists of two strips of adhesively-backed thin plastic tape, stuck together with the nails sandwiched between, as is indicated in FIGURE 4. Each assembled belt may have its ligaments **2**, **3**, provided with a loop or eye, as at **4**, for a purpose explained later.

The tapes are incised by being partly cut across at **5** from their upper margins, between each nail. Thus it is provided that tearing can happen quite readily, whilst the tensile strength of the belt remains adequate, and it will bunch together in an orderly manner.

Merely by rolling up or folding up (i.e. bunching) such a belt of nails, a "pack" is formed which can be used, for example, in the feed mechanism of our patent application No. 54,725/66 or to place in the magazines of other fastening machines. Such machines usually have feed-mechanism which brings sequential nails forward so that the leading nail is in a ready-for-use position, then being driven by a further operation. It is found that in such operation, the ligaments **2**, **3** tear quite readily and the

pieces of material which are torn off with the leading nail disappear in the work or become entirely insignificant; at least this is true in tests in which Sellotape was used.

In FIGURES 2, 3 and 4 is illustrated how the foregoing idea can be put to further practical use. In FIGURE 3 is seen a box-like carton or cassette having a container part **6** in which is contained a belt of nails made up as described and notionally indicated at **7**; in this case, and because it conforms to the rectangular shape of the carton **7**, the pack is shown folded zig-zag. The carton has an extension **8** in the form of a rectangular section (see FIGURE 4) chute or tunnel, sufficient in size for the aligned belt of nails to pass freely along it.

The gun has a corresponding but larger-dimensioned guideway **9** with a bell-mouth at **9A**, to receive and support the part **8** of the carton. Any suitable simple clip or detent may be used to retain the carton once fully entered in the guideway **9**. The guideway **9** terminates in the body of the gun or the feed-mechanism of the gun, indicated purely for identity at **10**. It is assumed that the gun (or its feed) has some such device as latches or detents, indicated at **11**, to engage and to draw on one at a time, the nails of the belt. Application No. 54725/66 describes a practical example of such mechanism. It is also assumed that the guideway **9** is attached to, or lies against, an under-part of a gun, notionally indicated at **12** in FIGURE 4. The object of the loops **4** previously referred to (which may have metallic eyelets), is to enable detents such as **11** to engage and pull the belt for its first step when a new belt has been loaded.

It is envisaged that the carton **6** will be of disposable nature; it may be of cardboard, plastics, or strong paper. If it is not disposable, it would be more suitably called a magazine, and fresh belts will be re-loaded into it as required. Its lightness and compactness—both matters of considerable interest to the actual user—may be of greater importance when large and heavy nails are used.

I claim:

1. A pack of nails for use in a fastening machine comprising:

a plurality of parallel nails of equal length in spaced equidistant relationship, and

a pair of parallel sheet-material ligaments extending perpendicular to and interattaching such nails, said ligaments being spaced apart by a distance less than the length of the nails and being incised through part of their breadth and between neighboring nails, the incisions localizing and facilitating tearing of the ligaments when one nail is forced by the machine lengthwise to detach it from its neighbor.

2. Pack according to claim **1** in which the nails are headed nails and in which said incisions extend from that margin of the ligament which is nearer to the adjacent heads or points of the nails.

3. Pack according to claim **1** in which each ligament consists of two laminae of thin pliable sheet material stuck together between adjacent nails the nails being surrounded by the laminae.

4. Pack according to claim **1**, further comprising a container of disposable material, said container being adapted to be attached to the machine in such complementary manner as to enable the machine to self-feed from the container.

5. Pack according to claim **4**, in which said container consists of a magazine part for the reception of a belt of the said interattached nails in a bunched-up condition and a chute leading from said magazine part to lead said belt out to the machine in an aligned manner.

6. Pack according to claim **1** in which the nails are round-headed nails spaced apart with space between their heads in the plane in which the heads lie.

7. Pack according to claim **1**, in which each ligament comprises a sticky tape with its breadth substantially parallel to said nails.

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