Nov. 30, 1943. A. M. WALLACE 2,335,715

METHOD AND APPARATUS FOR FORMING PIN TICKET STAPLES

Filed Dec. 26, 1940

Fig. 1.

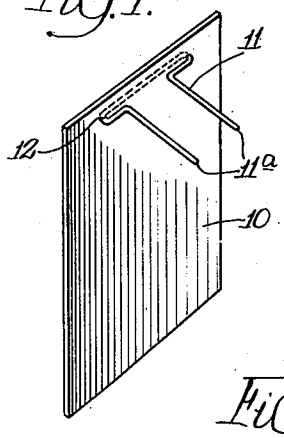


Fig. 2.

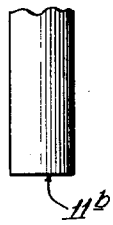


Fig. 3.

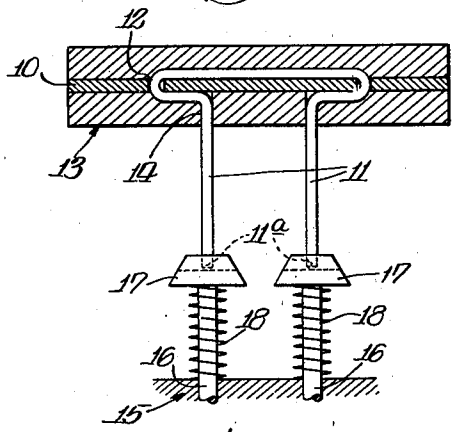


Fig. 4.

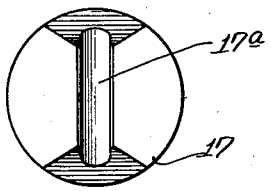


Fig. 5.

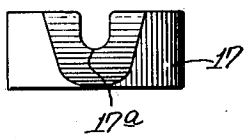


Fig. 6.

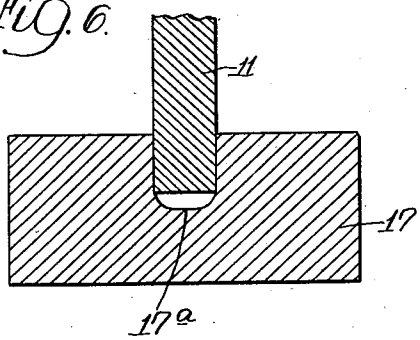


Fig. 7.

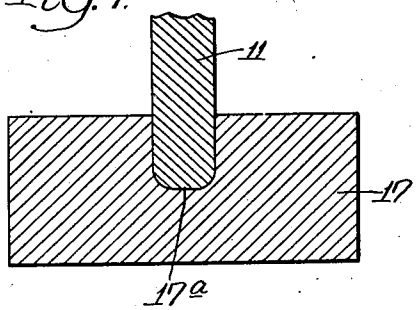
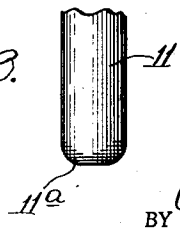


Fig. 8.



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METHOD AND APPARATUS FOR FORMING PIN TICKET STAPLES

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Application December 26, 1940, Serial No. 371,848

7 Claims. (Cl. 29—13)

My invention relates generally to pin tickets of that type having wire staples secured thereto for fastening the same to a textile fabric or other object, and it has to do more particularly with the method and apparatus for forming the staples for such tickets.

Pin tickets of the foregoing character are usually provided with staples formed of a comparatively soft and ductile wire and having free ends adapted to pierce fabric or other material of an object to which the ticket is to be attached. This wire material is capable of being permanently drawn out or molded or worked to a predetermined form. It is required that the free ends of the staples be pointed sufficiently to pierce the material without being sharp enough to injure the hand of the user during ordinary handling of the ticket, and it is also highly desirable that such ends be free of burrs, rough surfaces, or the like, which would tend to catch the material of the object, so to speak, and damage the same.

One of the objects of my invention is to provide an improved pin ticket having a staple which may be readily and easily applied to a piece of fabric or the like without injuring the fabric and which will not injure one's hand, if it should contact the free ends of the staple, during ordinary handling of the ticket.

Another object is to provide an improved staple having its ends rounded to a substantially hemispherical shape and so formed and shaped that they are smooth without burrs, sharp edges and rough surfaces which would tend to engage a piece of fabric or other object, the roundness of the staple ends being sufficient to enable the ends of the staple to readily pierce a closely woven textile fabric but not sufficiently sharp to pierce the hand of the user during ordinary handling.

Still another object is to provide an improved method of making a pin ticket of the foregoing character.

An additional object is to provide a method of making a pin ticket of the foregoing character whereby the free ends of the staples are first square-cut and then given a forming or burnishing operation by applying thereto a burnisher or burnishing die rotating at high speed and of such shape as to give the staple ends a rounded point of hemispherical shape, the burnisher surface engaging the staple being very hard, smooth and highly polished to provide the desired smoothness of the point merely by the shaping operation and without further treatment.

Still another object is to provide a method of the foregoing character wherein the staple ends are fully shaped quickly and uniformly.

Still another object is to provide improved burnishing apparatus, including a novel burnishing die by which the advantages of my invention may be attained.

Other objects and advantages will become apparent as this description progresses and by reference to the drawing illustrating one form of ticket embodying my invention, and the method of forming the same, and wherein,

Figure 1 is a perspective view of a finished pin ticket embodying the invention hereof;

Fig. 2 is an enlarged fragmental view illustrating one of the free ends of the staples shown in Fig. 1 at a preliminary stage in the method of forming the same;

Fig. 3 is a diagrammatic view illustrating structure adapted to shape the free ends of the staple;

Fig. 4 is an enlarged top plan view of one of the forming dies illustrated in Fig. 3;

Fig. 5 is a side elevational view of the structure shown in Fig. 4;

Fig. 6 is an enlarged fragmental view diagrammatically illustrating the condition of one of the free ends of the staple before the forming operation has begun;

Fig. 7 is a view similar to Fig. 6 except showing the condition of one of the free ends of the staple at the end of the forming operation; and

Fig. 8 is an enlarged fragmental elevational view of one of the free end portions of the staple after the same has been fully shaped.

This invention may be employed in the forming of various kinds of pin tickets having staples with one or more free ends adapted to pierce the material of the object to which the ticket is to be applied, the end of the staple, after it is applied to the object, being turned or bent over to secure the ticket to the object. It is to be understood, therefore, that the ticket shown in the drawing has been chosen merely to facilitate explanation of the invention.

The pin ticket shown in the drawing includes a body portion 10 to which identifying marks or the like may be applied. The body portion is adapted to be fixed to an object by a staple 11 formed of a soft and ductile wire, as is customary. The staple wire is retained in the body portion 10 by looping the wire through openings 12 in the ticket body and by clamping the legs of the staple, adjacent the body 10, inwardly upon the face of the ticket body in such a way

as to provide spaced-apart staple ends 11a. These staple ends 11a should be sufficiently pointed to enable them to readily pierce the fabric or other material to which the ticket is to be applied by exerting a slight pressure thereon, but they should not be sharp enough to injure one's hand during ordinary handling of the ticket or the object to which it is attached. Otherwise, the staple ends 11a should be so smooth and free from burrs or rough surfaces that they will not catch the fibers of and injure the fabric or other material to which the ticket is applied. The method and apparatus hereinafter described has to do with a burnishing operation by which the desired smooth and rounded end is formed without any treatment thereof other than the burnishing operation.

To the foregoing end, the staple wire, preferably, is first cut to the desired length by a tool which cuts the same at right angles to the axis thereof, as shown at 11b in Fig. 2. This may be done before the staple wire is applied to the ticket body 10, or the staple wire may first be applied to the pin ticket and then so cut. By "burnishing operation" I mean a spreading or spinning operation by which the material of the wire is permanently worked or formed to the desired shape. After the ends 11a are cut, as stated, they are subjected to a burnishing operation which gives them the desired smooth and rounded shape shown in Fig. 8. If it should be desirable, the wire ends may be completely shaped before they are applied to the ticket without departing from my invention.

The burnishing operation may be accomplished by various mechanisms, one such mechanism being diagrammatically illustrated in the drawing. This mechanism includes a ticket support 13 in which the pin ticket body 10 is clamped or otherwise secured (Fig. 3). The support 13 is provided with openings 14 through which the free ends 11a of the staple 11 guidingly project. In this way, the staple ends 11a are given support, which minimizes the tendency of the same to bend or distort during the burnishing operation.

The burnishing mechanism shown includes a reciprocable die unit 15 that rotatably supports a pair of spaced shafts 16 carrying at their upper ends burnishers or burnishing die members 17 in which are received the free end portions 11a of the staple 11. The burnisher unit may be reciprocated by any suitable mechanism (not shown). Also, the burnisher shafts 16 may be rotated by any desired and well-known form of mechanism (not shown), the arrangement being such that they are rotated simultaneously and at the same speed. The shafts 16 are also arranged to reciprocate with and relative to the head 15, light springs 18 being mounted upon the shafts 16 between the burnishers 17 and head 15, constantly urging the burnishers 17 and shafts 16 to their outermost positions.

The burnishers 17 are similar in construction and each of them, in order to accomplish the desired burnishing operation, is provided in its upper end with an elongated cavity 17a of semicircular shape in cross section. The cavity 17a is provided with a hard, smooth, highly polished surface which lends itself to the burnishing operation and which results in a staple end surface free of roughness. As will be pointed out hereinafter, high speed rotation of the burnishers 17 is required in order to burnish or form the ends of soft ductile staple wire, and I have found that an elongated burnishing cavity of a length greater than the diameter of the wire, as distinguished from a circular opening having an inlet of such size as to merely freely receive the squared end of the wire, is quite important. I am not certain as to the reason for this, but from demonstration I believe that, in carrying out the burnishing operation, the end of the wire should not be confined throughout its diameter,—otherwise, the working or drawing out or spreading operation is not accomplished. If the wire end were completely confined, as by the wall of a circular opening, then a binding action appears to exist and the forming that takes place appears to be one of wearing away. This is not satisfactory for my purposes. The elongated cavity avoids all difficulties and insures the proper working of the metal to accomplish the burnishing operation. The burnishers 17 are so located that the centers of their cavities 17a are spaced apart a distance equal to the spacing of the free ends of the staple 11 whereby, as the head 15 is moved upwardly, the burnishing cavities receive the free end portions 11a of the staple in the manner and to the extent indicated in Figs. 3 and 6. In engaging the burnishers 17 with the free ends of the staple 11, the supporting head 15 is moved upwardly to such an extent that the burnisher springs 18 are slightly compressed so that the rotating burnishers engage staples under slight axial pressure.

In shaping the staple ends, the pin ticket 10 is fixed in the support 13 which is so positioned that the free ends 11a of the staple are received in the burnishers 17. The free ends of the staple engage the polished cavity surfaces under slight pressure (Figs. 3 and 6). The burnishers are then rotated at a high speed, as a result of which, and due to the pressure exerted axially by the springs 18, a burnishing action takes place causing the metal at the end of the free end portions of the staple to be formed to the cross-sectional shape of the die as illustrated in Figs. 5 and 7. It is difficult to determine all of the factors entering into this shaping operation, but I believe that rotation of the burnisher surfaces at high speed under pressure against the staple end is one factor contributing to the smooth staple end surface formed. The burnisher is formed of a very hard and high grade steel material and this, with the highly polished burnisher surface, is another contributing factor in the surfacing results attained. I have found that the burnishing operation above described is effectively carried out by rotating the burnishers at a high rate of speed with the burnisher engaging the staple end under approximately one-half pound pressure and with the burnishing operation carried on for approximately one-half second in time. The speed of rotation is an important factor which I believe is related to the shape of the burnishing cavity 17a. I am not certain as to the reasons for this but I believe that the wire customarily employed for staples has a certain normal vibrating frequency and as the burnisher 17 rotates, due to the two-sided wire contact, there is a tendency for the wire to vibrate in a fixed path. As the wire tends to vibrate and approaches its normal vibrating frequency, the end thereof in the burnisher cavity 17a tends to move to an eccentric position in the cavity 17a, and, if the burnisher is rotated at a speed below the vibration frequency of the wire, the end of the wire appears to assume an eccentric position in the cavity 17a at such a time that the wire is moved around with the burnisher and is twisted and broken upon continued rotation of the burnisher.

However, if the burnisher is rotated at a speed substantially above the normal vibration point of the wire, the burnisher appears to be moving so fast that the wire does not have an opportunity to vibrate to an eccentric position before the longitudinal axis of the burnisher cavity 17a moves past the path of vibration of the wire. Hence, the wire is held substantially concentric and does not twist off.

By demonstration, I have found that, with the wire commonly employed for staples, good results may be attained by rotating the burnisher at a speed above 4000 R. P. M.; and I have also found that excellent results may be attained by rotating at a speed of approximately 4800 R. P. M. At speeds lower than 4000 R. P. M. the wire tends to twist off or break. It will be understood that these conditions may change as the character of the wire is changed; but I believe that in each instance the frequency of rotation should exceed the normal frequency of vibration of the wire in order to hold the wire concentric and to prevent its breakage. It is also to be understood that, while the foregoing example of time and pressure gives excellent results, these conditions, or any of them, may be varied somewhat without departing from my invention. For example, the speed may be reduced and the pressure increased, or vice versa; or the time of the operation may be varied while the other conditions may or may not be varied, et cetera.

In the foregoing manner, both of the free ends of the staple of a single pin ticket are simultaneously burnished or shaped. As soon as this operation is completed, the burnishing members 17 are withdrawn, the ticket body is removed from the support 13, and the ticket is in condition for its intended use. In the manufacture of pin tickets of this kind it is customary to form the same in gangs, so to speak. In that case, burnisher units, similar to that above described and adapted to handle gangs of tickets, may be employed, or the tickets may be separated from a gang and individually formed, as desired. Also, I have found that good results may be attained by a multiple-stage burnishing operation. For example, if the operation is a two-stage one, I employ a burnisher at each stage, similarly rotating under the speed conditions above stated. The staple end to be formed is then moved first to one burnisher and then to the other, the burnishing operation being started in the first stage and completed in the second. In this case the time condition is varied accordingly.

It is believed that the advantages of my invention will be well understood from the foregoing description. The staple ends may be given the desired rounded shape and they are provided with a smooth non-damaging surface merely by the forming operation. No further treatment of any kind, such as dipping, coating, polishing, or the like, is required to condition them for use.

I claim:

1. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form and which is free of burrs, rough surfaces and the like, by moving axially into engagement therewith and holding it constantly engaged with a hard and highly polished surface of semicircular shape and cross-section forming a cavity of greater length than the diameter of the wire, in which cavity said end is received and confined, then rotating said surface at a rate of speed in excess of the normal vibration frequency of the wire for a short interval of time, holding said end continuously so engaged and constantly applying a slight and substantially uniform yielding pressure axially of said surface against said engaged end while said surface is rotating.

2. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object, which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form free of burrs, rough surfaces and the like, by moving axially into engagement therewith a tool having an elongated, semicircular cavity of greater length than the diameter of the wire which has a hard and highly polished surface against which said squared end is snugly received and confined, rotating said tool at a speed above 4000 revolutions per minute for a short interval of time, and applying a slight pressure to the rotating tool axially of the wire.

3. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object, which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form free of burrs, rough surfaces and the like, by moving axially into engagement therewith a tool having an elongated semicircular cavity of greater length than the diameter of the wire which has a hard and highly polished surface against which said squared end is snugly received and confiined, rotating said tool at a speed of approximately 4800 revolutions per minute for a short interval of time, and applying a slight pressure to the rotating tool axially of the wire.

4. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form free of burrs, rough surfaces and the like by inserting said end into an elongated semicircular cavity of greater length than the diameter of the wire, the cavity having a hard and highly polished surface against which said square end is received and constantly engaged, rotating said cavity surface at a speed in excess of the normal rate of vibration of the wire for an interval of approximately one-half second and continuously applying a substantially uniform and yielding pressure axially of said cavity surface against said end while said surface is rotating against said engaged end.

5. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object, which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form free of burrs, rough surfaces and the like, by moving axially into engagement therewith a tool having an elongated, semicircular cavity snugly receiving the end of the wire and of greater length than the diameter of the wire and presenting a highly polished surface of greater hardness than the material of the wire and against which said squared end is re-

ceived, rotating said tool at a speed above the normal vibration frequency of the wire for an interval of approximately one-half second, and applying approximately one-half pound pressure axially of said tool against said end while said tool is rotating.

6. A burnisher unit adapted for forming the free and square-cut ends of wire staples for pin tickets, which comprises a burnisher adapted to be rotated and having an elongated cavity of semicircular shape in cross-section and of greater length than the diameter of the staple wire, the staple-engaging surface of said cavity being formed of a hard and highly polished material and being adapted to receive and engage the end of the staple and to confine lateral movement of the end in two opposite directions only, and spring means adapted for holding said burnisher continuously engaged with the staple end under a slight and substantially constant pressure.

7. The process of forming a wire pin ticket staple having at least one free end portion adapted to pierce the material of an object, which comprises cutting a length of wire at substantially right angles to its axis to form a square-cut end portion, then giving said end a smooth rounded shape of hemispherical form and which is free of burrs, rough surfaces and the like, by confining said free end against lateral movement in two opposite directions only between and in engagement with two opposed, curved, hard and highly polished and substantially parallel faces, said opposed faces together forming an elongated semicircular surface of greater length than the diameter of the staple wire against which said square end is snugly received and confined, rotating said opposed faces substantially on the axis of the wire at a rate of speed in excess of the normal vibration frequency of the wire for a short interval of time, and constantly holding said surface under slight axial pressure against said end while the surface is rotating.

ALBERT M. WALLACE.