

TAG PIN ASSEMBLY

5 The present invention relates to an assembly of tag pins of a type which are used to attach tags or labels to commodities, and more particularly, to an integral
10 moulded tag pin assembly of the type in which a number of tag pins are anchored in a comb-like assembly to a connecting rod through respective anchors such that they are directed at a right angle with respect to the connecting rod.

15 One tag pin known in the prior art is discussed in U.S. Patent No. 3 103 666; this known tag pin is composed of a head, a cross bar, and a filament connecting the former two components, and is moulded as a whole of a synthetic plastics material such as nylon or polypropylene. Generally speaking, tag pins are made rather small, for example, the cross bar may have a diameter of 0.8 to 1.0 mm and a length of 8 to 10 mm
20 and the head may have a width of 8 to 10 mm, a height of 3 to 5 mm and a thickness of 0.7 to 1.0 mm. On the other hand, the filament generally has a length of between 7 and 125 mm after elongation, the length being different for different commodities to be used therewith. The filament also has a minimum diameter
25 of 0.3 to 0.4 mm after elongation. Moreover, each tag pin has a weight of about 0.04 to 0.1 g. Thus, the tag pin is made remarkably thin. As for the heads of tag pins, it is known to form these with a rectangular shape or as an irregular pentagon with the edge remote from
30 the filament in the form of a shallow V-shape with its apex directed away from the filament.

Since individual tag pins are made remarkably small, and because of the requirements in their production and use, a number of tag pins are integrally moulded as a unit in which the individual tag pins are anchored in a comb-like assembly to a connecting rod.

Generally speaking, the number of tag pins anchored to one connecting rod is usually about 25 to 50 although sometimes up to 100 are provided. If the filaments have a relatively short length of about 7 to 20 mm, the tag pins are regularly anchored. If the filaments are longer than about 20 mm or more, they become liable to sway so that the positions of the heads can change without any substantial resistance whereby the filaments and the heads can become entangled. If, for example, the tag pins are made of a nylon resin, they have a relatively stable shape immediately after the moulding and elongating processes, but their filaments become softer and softer as they gradually absorb the surrounding moisture. As a result, the tag pin assemblies are entangled, when they contact each other, or the arrangement of the tag pins in each assembly becomes irregular. In practice, after the tag pin assemblies have been moulded, a number of them are usually packaged in a box for their subsequent transportation. However, the heads of different tag pin assemblies in the box can easily become entangled, so that if one tag pin assembly is to be taken out, a number of assemblies come out together. This results in a disadvantage that any given tag pin assembly cannot be used before its entanglement is released. On the other hand, similar entanglement also takes place when a tag pin assembly is temporarily stored in the box, in the course of its

use and is subsequently taken out for reuse. On the other hand, when a tagging machine is charged with a tag pin assembly for the tag pins to be used, the heads of these tag pins can sway when the tag pins are to be implanted in the commodities, with the result that the tag pins can have their heads entangled to invite the difficulty that the tag pin having been implanted in the commodity cannot be easily removed from the tag pin assembly.

As means for eliminating the disadvantage described above, there has been proposed an arrangement in which the heads of adjacent tag pins are connected by means of a connecting element. Such an arrangement is described for example, in British Patent No. 1417131. However, this connecting element is elongated and torn off, when an individual tag pin having been implanted in the commodity is to be cut out of the tag pin assembly, to leave a "whisker-shaped" projection on the surface of the head of the tag pin thus cut. In the case of a tag pin made of nylon, for example, if the aforementioned connecting element is elongated until it is torn off, the connecting filament is also elongated to have a length of about four to five times its original length so that a considerably long "whisker" is formed to project from the surface of the head of the tag pin. There are a variety of commodities to which price tags are attached by means of such tag pins. These include knitted or woven fabric using fine fibres, which may have their fibres caught by the aforementioned "whisker" thereby to cause a defect such as a cut or fray. On the other hand, it is remarkably difficult to make the

connecting element thinner thereby to eliminate the defect which is caused in the commodity by this "whisker". This is because the connecting element has its diameter limited at 0.1 to 0.15 mm by the current mould fabricating techniques. Moreover, if the connecting element is made excessively thin, it is liable to be cut during transportation or during handling of the assembly. A tag pin assembly having its connecting element partially severed can become involved in a far more complex entanglement than a tag pin assembly having no such connecting element so that its handling becomes much more difficult. On the other hand, the formation of this thin connecting element requires a fine treatment in the fabrication of its mould so that such a mould is expensive while having a shortened lifetime. Thus, the connection of the heads of the tag pins by means of a connecting element results in a variety of problems as discussed above irrespective of the thickness of the connecting element so that it is judged undesirable.

The present invention seeks to provide a tag pin assembly in which the aforementioned disadvantages of the prior art arrangements are overcome; in particular the present invention seeks to provide a tag pin assembly in which intertwin and entanglement of the heads can be avoided without forming the heads of the tag pins with a connecting element.

According to the present invention, there is provided an integral tag pin assembly moulded from a synthetic plastics material, comprising a plurality of tag pins each anchored at one end to a connecting rod through

respective anchors such that they are directed at a right angle with respect to said connecting rod in a comb-like assembly, each of the tag pins having a head, a cross bar, and a filament connecting the said head and the said cross bar, the spacing between adjacent heads of adjacent tag pins in the comb-like assembly being smaller than the thickness of each head, each cross bar having a diameter substantially equal to that of each head, and the spacing between adjacent cross bars of adjacent tag pins in the comb-like assembly being smaller than the diameter of each cross bar whereby tangling of the tag pins of one assembly with those of another is substantially avoided.

A feature of the present invention is that a dense type tag pin assembly can be provided, in which an increased number of tag pins per unit length of a connecting rod can be fabricated by means of a small-sized mould. Further, the present invention is notable in that it can provide a tag pin assembly which has little sway in the filaments of the tag pins, which is made compact while having an excellent appearance, and which is easy to handle. Moreover, a tag pin assembly made in accordance with the principles of the present invention has a low production cost per tag pin

Various embodiments of the present invention will now be more particularly described, by way of example, with reference to the accompanying drawings in which:

Figures 1(A) and 1(B) are front elevations showing the shapes of the heads of conventional tag pins, respectively;

5 Figure 2 is a perspective view showing a conventional tag pin assembly;

Figure 3 is a perspective view showing the condition, under which the heads and filaments of the conventional tag pin assembly are entangled;

10 Figure 4 is an enlarged side elevation showing a portion of a tag pin assembly according to a first embodiment of the present invention;

15 Figure 5 is a front elevation of the same;

Figure 6(A) and 6(B) are respective front elevations showing tag pins of the first embodiment in their condition yet to be processed for elongation or stretching;

20 Figures 7, 8 and 9 are top plan views showing the shape of the heads of the tag pins according to second, third and fourth embodiments, respectively;

25 Figure 10 is a front elevation showing a tag pin according to a fifth embodiment of the present invention;

Figure 11 is a front elevation showing a tag pin according to a sixth embodiment of the present invention;

30 Figures 12(A), 12(B), 12(C), 12(D), 12(E), 12(F) and 12(G) are front elevations showing the heads of tag pins according to seventh, eighth, ninth, tenth, eleventh,

twelfth and thirteenth embodiments of the present invention, respectively;

5 Figure 13 is a front elevation showing the shape of the head of a tag pin according to a fourteenth embodiment of the present invention; and

Figure 14 is a front elevation showing a tag pin having its filament elongated over its whole length.

10 Figure 2 illustrates a prior art tag pin assembly, in which each tag pin has a head 1, a cross bar 2, and a filament 3 connecting the two components 1 and 2. The tag pins thus formed are anchored in a comb-like
15 assembly to a connecting rod 5 through respective anchors 4 such that they are directed at a right angle with respect to the connecting rod 5, thus constituting a tag pin assembly A. Because of the relatively wide
20 separation of the heads 1, these can become intercalated and entangled as shown in Figure 3, although, because of the flexibility of the filaments 3 the entanglement in practice would be more complicated.

25 The present invention will now be described in detail in conjunction with the embodiments thereof. Figures 4 and 5 show a first embodiment of the present invention, and three tag pins P_1 , P_2 and P_3 are shown in Figure 4 for convenience of illustration. Here, the tag pin P_1
30 is composed of a head 1, a cross bar 2, and a filament 3 connecting the former two. The tag pin P_1 thus constituted is anchored through an anchor 4 to a connecting rod 5 such that it is directed at a right angle with

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respect to the connecting rod 5. The tag pin P_1 forms part of a tag pin assembly P together with the tag pins P_2 , P_3 and so on which are similarly anchored. The single tag pin assembly P is usually composed of
5 twenty five to fifty tag pins P_1 , P_2 , P_3 and so on, although up to 100 tag pins may be formed in the case of a tag pin assembly having the longest connecting rod 5.

10 The tag pin assembly is integrally moulded of a synthetic resin such as nylon or polypropylene. Immediately after the moulding process the filament has substantially the same diameter as that of the cross bar which is equal to the head thickness, and is relatively rigid
15 so that it is liable to be broken by bending. When the tag pin is attached to a desired commodity by means of a tagging machine, the cross bar 2 is inserted into the commodity in a condition with the filament deformed to be substantially parallel to the cross bar 2. After
20 the cross bar 2 has been implanted in the commodity, the filament 3 would be reluctant to return from its deformed shape because it is folded by the deformation. With this in mind, therefore, the filament 3 is elongated after the moulding process so that, due to the orienta-
25 tion of the polymer molecules, it develops the property of flexibility and increased strength so that it is resistant to folding.

Before it is stretched, the filament 3 may have a tapered shape as shown in Figure 6(A) or a shape devoid of tapering as shown in Figure 6(B).
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The thickness t of the head 1 generally has a value of 0.7 to 1.0 mm, which is substantially equivalent to

that of the diameter of the cross bar 2. Incidentally, the cross bar 2 has a diameter of about 1.0 mm, for example, so that it will not be deformed into a V-shape when the tag pin is implanted in the commodity and the filament is subjected to tension. The spacing l between the head 1 and an adjoining head 1' is usually sufficient if it lies between 0.2 mm and 0.7 mm, preferably, 0.2 to 0.5 mm, or more preferably, 0.2 to 0.3 mm. If the spacing l falls within one of the above-specified ranges, the strength of the walls defining the cavity of the mould between the heads 1 and 1' can be maintained at such a level as to raise no problem in the moulding process. Moreover, with the defined spacing the separation between adjacent heads is smaller than the thickness t of the heads so that, even if the two tag pin assemblies come into contact with one another, the head of one tag pin assembly cannot easily enter the clearance between the adjoining heads of the other tag pin assembly to cause them to become entangled. Moreover, even if one tag pin is about to shift in the transverse direction the adjoining tag pin simultaneously takes its position change in accordance with the shift of the former tag pin, if the spacing l is from 0.2 mm to less than 0.7 mm, so that the assembly as a whole behaves as it were a gang, whereby displacement of only one tag pin and irregularity in the arrangement can be eliminated. This in turn is effective in preventing the entanglement between the assemblies. Especially if the spacing is 0.2 to 0.5 mm, preferably, 0.2 to 0.3 mm, the heads of the respective tag pins constituting the tag pin assembly adopt a state, at which they are held as if they were adhered to each other and integrated, so that the respective tag pins cannot exhibit independent behaviour, thus further reducing the entanglement

and intertwist between the assemblies.

5 If the tagging machine is charged with a tag pin assembly and has its lever actuated, its gear is brought into meshing engagement with the anchor 4 thereby to feed the tag pins one by one and to cut off the anchors 4 one by one so that the tag pins are successively implanted in the commodities. In other words, the anchor 4 has the function of feeding the tag pins one by one and is formed in a mould part, which acts as a passage when a molten resin is injected into the mould. 10 With these in mind, therefore, the anchor 4 has to be such a diameter as to raise no difficulty in the resin injection and to be cut without difficulty. The connecting rod 5 is also formed in a mould part which serves as a guide passage for the resin when this resin is injected into the cavity of the mould for moulding the tag pins. Thus, the connecting rod 5 requires to have a desired shape such as a round, square, semi-oval or 20 hexagonal shape.

In the embodiment shown in Figures 4 and 5, since the spacing ℓ between the heads of the tag pins P_1 , P_2 , P_3 etc forming the tag pin assembly P is made smaller 25 than the thickness t of the heads, it is possible to prevent the heads of the tag pins of one tag pin assembly from entering into the spaces between the heads of the tag pins of the other pin assembly, even if a number of tag pin assemblies are held in conditions of potential mutual contact, thereby to prevent the head 30 and/or the filaments from being entangled. Moreover, the narrowness of the spacing ℓ between the heads is also effective in preventing irregularity in the arrangement of the heads in the assembly.

Figure 7 is a top plan view showing the shape of the heads of the tag pins according to a second embodiment of the present invention. In this second embodiment, specifically, the thickness t of the heads is made larger than the spacing l between the adjacent heads similarly to the case of the aforementioned first embodiment, and the heads indicated here at numeral $1a$ are deformed at one side from their centre portions to have a cranked shape. As seen in a top plan view from Figure 7, therefore, a clearance also having the cranked shape is formed between the adjacent heads $1a$ and $1a'$. As viewed from the side, however, the leading end y of the head $1a$ is in advance of the trailing end z of the adjacent head $1a'$ so that it cannot be seen from the side. As a result, the heads are arranged as if they had no clearance in between in a side view.

In this second embodiment, since the thickness t of the heads of the tag pins is larger than the spacing l between the heads of adjacent tag pins, and since the heads are arranged as if they had no clearance in between in a side view, the heads and/or the filaments become more reluctant to be entangled even if a plurality of tag pin assemblies are held in conditions where they can come into contact with one another. Because the heads are cranked as shown in Figure 7, the heads of one assembly cannot proceed as far as the centre portions of the heads of the other assembly, even if the heads of the two assemblies are entangled so as to start to interengage. As a result, it is possible for further entanglement to be prevented and for such entanglement as does take place to be easily released. Moreover, even if the head of one tag pin of one tag pin assembly,

e.g. the head la' is shifted sideways to come out of line with the remaining heads, its trailing end z comes into contact with the leading end y of the adjacent head la so that such irregularity in the arrangement of the heads can be avoided.

Figure 8 is a top plan view showing the heads according to a third embodiment. As shown, a head lb has a generally parallelogram shape, tapering in cross section from a thick central region to narrow lateral edges transversely of the filament. In this third embodiment, the thickness t of the heads is also made larger than the spacing l between the adjoining heads, and the heads have a cross section of parallelogram shape. As a result, a head cannot advance as far as half the distance of the clearance between heads, if one head should enter the space between two heads of another assembly, so that they can be prevented from completely overlapping, whereby the heads, if entangled, can be separated without any difficulty.

According to this third embodiment, moreover, if the original thickness of the heads is denoted by the letter t, the heads can be thinned to have a thickness (t - t₁) by reducing the original thickness to a value t₁ at the lateral edges. Then, the walls defining the cavities of the mould for forming the heads can be thickened to correspond to that thickness reduction so that the mechanical strength of the mould can be accordingly improved. The third embodiment also has the advantage that it is possible to remove the assembly from the mould with ease after injection.

Figure 9 shows a fourth embodiment, in which each of the heads has its right and left halves inclined with respect to the plane perpendicular to the plane defined by the array of filaments, both halves being inclined in the same direction during the moulding process thereby to have a shallow V-shape in top plan view. As a result, the heads appear from the side as if they had no clearance, similarly to the second embodiment shown in Figure 7, so that the heads can resist entanglement. At the same time, since the spaces between the heads change direction midway along their lengths, one head cannot advance further than midway along the space or clearance between two adjacent heads of another array, even if entanglement takes place, so that partially entangled heads can be easily separated. In the tag pin assembly shown in Figure 9, moreover, even if one tag pin is transversely shifted to come out of alignment, its head lc contacts at its point of inflection e with the leading end f of another head ld so that the irregularity in the arrangement of the tag pins can be prevented to maintain the stable arrangement at all times.

In the foregoing first to fourth embodiments, the description of the arrangement of the tag pins in a tag pin assembly has been made with reference to the side and top plan. However, the shape of each tag pin, as viewed in a front elevation, also plays an important role in preventing entanglement or facilitating release from entanglement and can be made to have a variety of shapes, as follows. In Figure 5 showing the aforementioned first embodiment, specifically, the head 1 has lower edges g and h formed such that they diverge away from the cross bar 2. As a result, if the heads

1 become entangled, the entanglement can be easily released due to the slopes of the lower edges g and h.

5 Figure 10 shows a fifth embodiment, in which the head 1 is formed into a shape of a Braun tube having its lower edges g and h curved. As a result, the entanglement-preventing effect of the fifth embodiment is more prominent than that in case where the lower edges g and h are formed straight as in Figure 5.

10 Figure 11 shows a sixth embodiment, in which the head 1 is moulded such that it is tilted to the left from its axis. As a result, the righthand lower edge g is steeply inclined. If such tag pins become entangled, 15 for instance if the head of another tag pin is caught by the lower edge g, the entanglement can be easily released because the slope of the lower edge g is made steep. On the other hand, if the head of another tag pin is caught by the other lower edge h, the head 1 is 20 able to deflect to the position indicated by broken lines so that the heads can be released from their interengaged conditions. Thus, the release of the entanglement can be facilitated by tilting the head either to the right or left.

25 Figures 12(A) to 12(G) show seventh to thirteenth embodiments, respectively. In the seventh embodiment shown in Figure 12(A), the head of the tag pin is moulded into an inverted triangular shape. In the eighth to tenth 30 embodiments shown in Figures 12(B) to 12(D), the head of the tag pin is moulded into sector, semicircular and heartshapes, respectively. In the eleventh to thirteenth embodiments shown in Figures 12(E) to 12(G), the

head has its lower edges g and h narrowed in the direction of the length of the filament 3, as shown in Figure 12(E), for example. The head having the shape shown in any of Figures 12(A) to 12(G) can be moulded either symmetrically with respect to the centre line of the filament, as shown in Figure 10, or with a tilt to the right or left with respect to the centre line of the filament, as shown in Figure 11. For example, the case in which the head having the shape shown in Figure 12(D) is tilted leftwardly with respect to the centre line of the filament, is shown in Figure 13. In this example, the lower edge g of the head 1 is formed to lie substantially on the extension of the filament 3. As a result, the head intertwist releasing effect can be more prominent. Thus, in case the head 1 is intertwisted upon the lower edge h, it is tilted rightwardly to the position indicated by broken lines so that it is released from its intertwisted condition.

Reverting to the first embodiment shown in Figures 4 and 5, an unelongated portion 3' is left between the head 1 and the filament 3. Such an unelongated portion 3' acts as a buffer giving the advantage that it is possible to provide a variety of sizes of tag pins from a blank of given size, by making of different lengths in accordance with their different elongations from the corresponding unelongated tag pins. Moreover, since the unelongated portion 3' acts as a buffer, no abnormal tension is applied to the corresponding filament 3 so that this filament can be prevented from being cut off due to excess elongation.

Turning now to Figure 14 showing the case in which the filament 3 is stretched over the whole of its length, it has a uniform diameter from the cross bar 2 to the head 1. By elongating the filament 3 over its whole length in this way, the filament 3 can have its strength and flexibility increased although it is thinned so that the attachment of the tag pin by the tagging machine can be performed with ease. At the same time, the price tag can be neatly implanted in a commodity although the head 1 has such a shape as is liable to sway relative to the filament.

As has been described hereinbefore, the present invention is characterised in that the spacing ℓ between the heads 1 of adjacent tag pins is made smaller than the thickness t of the heads such that it is usually from 0.2 mm to 0.3 mm, and the spacing between the cross bars of adjacent tag pins is less than the thickness of the cross bars. By making the inequality of $t > \ell$ hold, it is possible to prevent the head of the tag pin constituting one tag pin assembly from entering into the space between the heads of the tag pins of another tag pin assembly so that they are intertwisted or entangled.

As a test, one hundred tag pin assemblies having the spacing of $\ell = 0.6$ mm, as has been disclosed in the first embodiment, and one hundred tag pin assemblies having the relationship of $t \leq \ell$ according to the prior art (the tag pin assemblies of the two types having the same number of tag pins) were put at random into different boxes and were gently shaken for a predetermined time period by means of a reciprocating shaking machine. Then, the average values of the numbers of the

assemblies to be taken out of the respective boxes while being entangled with another assembly when this assembly was taken out were counted. The results of these countings are tabulated in the following table:

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Present Invention	Prior Art
0.4	2.6

10 From this table, it will be understood that the entanglement can be remarkably reduced according to the present invention in comparison with the tag pin assemblies according to the prior art and can be easily released. According to the present invention, moreover,

15 since the inequality $t > l$ holds, as has been described hereinbefore, a dense type tag pin assembly is fabricated to have an increased number of tag pins per unit length of connecting rod so that a number of tag pins can be continuously used. Moreover, since the

20 tag pins are densely anchored at the connecting rod, as has also been described hereinbefore, the assembly can be made neat as a whole thereby to make it possible to fabricate tag pins which are free from irregularity in their arrangement, which have excellent appearance

25 and which are easy to handle. Furthermore, since the assembly obtained has its tag pins densely anchored, the production rate of the tag pins can be improved, and the production cost for each tag pin can be reduced.



CLAIMS

1. An integral tag pin assembly moulded from a synthetic plastics material, comprising a plurality of tag pins each anchored at one end to a connecting rod through respective anchors such that they are directed at a right angle with respect to said connecting rod, in a comb-like assembly, each of the tag pins having a head, a cross bar, and a filament connecting the said head and the said cross bar, the spacing between adjacent heads of adjacent tag pins in the comb-like assembly being smaller than the thickness of each head, each cross bar having a diameter substantially equal to that of each head, and the spacing between adjacent cross bars of adjacent tag pins in the comb-like assembly being smaller than the diameter of each cross bar whereby tangling of the tag pins of one assembly with those of another is substantially avoided.
2. A tag pin assembly as claimed in Claim 1, wherein the spacing between adjacent heads in the comb-like assembly is from 0.2 mm to less than 0.7 mm.
3. A tag pin assembly as claimed in Claim 1 wherein the spacing between adjacent heads in the comb-like assembly is 0.2 to 0.5 mm.
4. A tag pin assembly as claimed in Claim 1, wherein the spacing between adjacent heads in the comb-like assembly is 0.2 to 0.3 mm.

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5. A tag pin assembly as claimed in any of Claims 1 to 4, wherein the heads of the tag pins have a crank shape in section perpendicular to the length of the filament.

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6. A tag pin assembly as claimed in any of Claims 1 to 4, wherein the head of each tag pin has a generally parallelogram shape in section perpendicular to the length of the filament such as to have greatest thickness in a central portion extending parallel to the length of the filament, and tapering transverse the length of the filament towards lateral edges of the head.

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7. A tag pin assembly as claimed in any of Claims 1 to 4, wherein the head of each tag pin has a V-shape in section perpendicular to the length of the filament.

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8. A tag pin assembly as claimed in any of Claims 1 to 7, wherein the head of each of the tag pins, is so shaped that the edges thereof nearest the cross bar diverge away from the cross bar.

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9. A tag pin assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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