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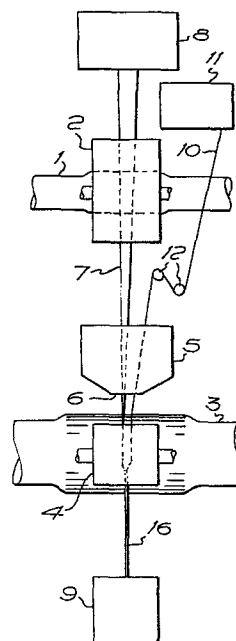
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⑤④ **Composite textile yarns, and method of and apparatus for their production.**

⑤⑦ A method of producing the equivalent of a two-fold twisted textile yarn with a saving in machinery involves the step, whilst a roving (7) of untwisted or slightly-twisted staple fibres is being drafted in a drafting zone, of introducing a previously prepared yarn, (10) of the same or different fibre content, alongside the roving (7) towards the end of the drafting zone, and twisting the primary and secondary yarns together as they emerge from the drafting zone.



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Method of and apparatus for producing composite textile yarns.

This invention relates to a method of and apparatus for
5 producing a composite textile yarn.

The fundamental step in most processes for the production of yarns is spinning. In the production of yarns from staple fibres, as opposed to the production of filament
10 yarns, several of the major spinning systems, for example the cotton and worsted systems, involve subjecting a roving or other continuous strand of staple fibres (either untwisted or loosely twisted together and for the sake of convenience hereinafter referred to simply as rovings) to a
15 combination of drafting and twisting, the former conventionally being carried out in a drafting zone and the latter conventionally being effected by means of a spindle.

20 Worsted yarns produced by spinning alone, commonly referred to as singles yarns, are usually not suitable for use as warp in weaving, and it is common practice therefore to twist together two singles yarns and use the resultant twisted or, as they are sometimes known, twofold yarns for
25 weaving. The opportunity is usually taken to remove faults such as slubs from the singles yarns prior to two-folding.

The twisting together of singles yarns as normally practiced involves the use of an additional machine and in
30 consequence consumes additional labour, time and space

and to alleviate this disadvantage, a machine has recently been introduced wherein two singles yarns are spun side by side from separate rovings and then combined together at one and the same spindle and in one and the same passage to that spindle. Although the technique dispenses with an extra machine, not all conventional spinning machines can readily be converted to effect the combined spinning and twisting process. Moreover, the absence of a separate spinning step means that there is no opportunity of clearing faults from the individual singles yarns before they are twisted together. It has now been found that the saving in machinery afforded by the above mentioned development can be at least partially achieved whilst its above-mentioned disadvantages may be mitigated and a wider range of applications afforded by adoption of our discovery.

According to one aspect of the invention there is provided a method of producing a composite textile yarn comprising the step of, whilst a roving is being passed through a drafting zone and spun into a secondary yarn, introducing a previously prepared primary yarn alongside the roving towards the end of the drafting zone and twisting the primary yarn with the secondary yarn.

Preferably the primary yarn is spaced from the roving at the end of the drafting zone as defined by the front roller nip, and the primary yarn may be spaced laterally of the secondary yarn by between about $5/16$ ths and $5/32$ nds of an inch as they leave the front roller nip.

The primary yarn may be of a type which could not readily be produced on a machine having a drafting system similar to that through which the roving is passed, and thus if the drafting zone is one suitable for worsted, the primary yarn may, for example, be a cotton yarn. Alternatively, the previously prepared yarn may be a filament yarn.

According to a further aspect of the invention there is provided apparatus for producing composite textile yarns comprising means for introducing a previously prepared primary yarn alongside a roving towards the end of a drafting zone whilst the roving is being passed through the drafting zone and spun into a secondary yarn, and means for twisting the primary yarn with the secondary yarn

The apparatus may further comprise end break detector means mounted so as to be held in a first position by an intact primary yarn but to move under gravity on breakage of the primary yarn to a second position where it may break the secondary yarn.

According to yet a further embodiment, the invention provides a composite yarn produced according to any one of the aforesaid methods.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, of which:-

Fig. 1 shows the essential parts of the drafting zone of a conventional unmodified worsted ring spinning frame in side elevation;

Fig. 2 shows the parts of Fig. 1 in front elevation and also, schematically, roving supply and yarn take-up elements;

Fig. 3 shows the parts of Fig. 2 in a machine modified to the requirements of the invention;

Figs 4 and 5 show in more detail some of the parts of Fig. 3.

Fig. 1 shows partially and Fig. 2 shows schematically the drafting zone to be found between a roving supply creel and the spindle of a typical worsted ring spinning frame, that is to say a frame before modification to accommodate the method of the invention. The drafting zone itself is defined as extending between the nips respectively of the back roller pair 1, 2 and the front roller pair 3, 4 and comprises a draft control unit 5 which has a so-called flume 6 projecting towards the nip of the front rollers.

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A single end 7 of roving, which may be twisted or twistless, is fed to the back roller nip from a creel-mounted bobbin or other supply schematically represented in Fig. 2 by block 8 and then passes through the draft control unit 5 and through the nip of the front rollers to an axially-rotating ring spindle schematically represented by the block 9. The draft control unit 5 is slowly reciprocated horizontally in order to spread the area of contact of the rollers with the roving being spun, and in particular to reduce the wear on the top front roller 4 of which the surface may be relatively soft.

In order to modify the conventional ring spinning frame described above to accommodate the method of the invention, a further creel is required to be fitted to support, for each spindle 9, at least one bobbin or other package of previously spun yarn. The means for mounting of the bobbins are not shown and are expected to be obvious to anyone skilled in the art of spinning machine manufacture.

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As shown in Fig. 3 one end 10 of primary yarn is taken from a bobbin schematically represented by block 11, and is passed through a tension device 12 mounted adjacent to the drafting zone and known per se. From the tension device the yarn is brought adjacent to but not in contact with the roving 7 by passing it into the draft control unit 5 through a slot 13 cut in a side wall of input guide 14,

which is located to the rear of the draft control unit 5 and shown in more detail in Fig. 4. The flume 6 provides an exit channel for the roving as in a conventional machine but, as shown in the rear view of the draft control unit 5 in Figure 5, the draft control unit also has a guide element 15 for guiding the primary yarn against the side wall 17 of the channel as it passes out of the draft unit towards the front rollers. The thickness of the side wall 17 thus determines the critical spacing of the primary yarn from the drafted roving at the nip of the front rollers.

From the drafting unit the primary yarn 10 is taken to the front roller nip and thence, on a first setting up of the operation, is pieced up with the secondary yarn being spun from the roving 7 so that together they form a composite yarn 16 which is then wound on a package of conventional type mounted on the spindle 9. Thereafter, as spinning proceeds, primary yarn and roving are each continuously drawn from their respective supplies and, after the drafting of the roving, are continuously twisted together at a position slightly below the front roller nip and wound on the package.

The direction of rotation of the spindle is expected normally to be such as to insert twist into the composite yarn in a direction opposite to that originally in the primary yarn. This arrangement appears to produce a better yarn than when the direction of rotation is such as to increase the twist in the primary yarn. It also has certain practical advantages, as will be described later.

Whilst it is important that the primary yarn and the roving being spun shall be close together at the front roller nip, at least so as not to place undue limitation on

the extent of lateral traverse of the drafting unit as mentioned above, it appears to be at least desirable and it may even prove to be essential that they emerge from the front roller nip spaced apart. This allows each to rotate
5 on its own axis under the influence of the spindle, with twist being removed from the primary yarn and being inserted into the secondary yarn, before they converge. Although the twist may be substantially removed from the primary yarn it does not break since the distance of the
10 convergence point below the nip is very short relative to the length of the component fibres.

The amount of twist which is removed from the primary yarn and inserted into the secondary may be varied, depending
15 on the nominal values of the twist of the primary and composite yarns, and also on the thickness of each component at any instant. The effect of the individual rotation of each component prior to convergence is to bind any loose fibres on the surface of each yarn into
20 the structure of the composite yarn which is thereby made suitable for use as, for example, a warp yarn in weaving.

Whilst the composite yarn is different from a conventional two-fold twisted yarn, it can be considered as equivalent
25 to such a yarn in that it comprises, in effect, a yarn spun substantially as normally from a roving combined, in a manner which involves twisting, with a previously prepared yarn.

30 The appearance of the resultant composite yarn depends upon, among other things, the linear densities of the primary yarn and of the drafted roving, the amount and direction of twist in the primary and secondary yarns, the separation of the primary yarn from the roving at the front
35 roller nip and the tension imparted by the tension unit 12, as well as the composition and colour of the component yarns.

The invention is susceptible of variations, and in particular it may be possible to introduce more than one primary yarn into a single roving. The or each primary yarn is expected normally to be a singles yarn but may possibly
5 itself be a two-fold or other composite yarn.

Alternative means may be found for guiding the previously prepared yarn or yarns into the required position relative to the roving at the front roller nip, and indeed the
10 arrangement of merging a previously prepared yarn with a roving being spun may be applied to drafting systems other than that described, such as apron or roller drafting systems.

15 Like the recently-introduced machine referred to above which simultaneously spins and twists two rovings, our system affords a significant saving in machinery, but relative to that machine, our system affords several advantages.

20 One advantage is that the previously prepared yarn can be cleared of slubs or other faults prior to the merging with the secondary yarn and thus there is a lower incidence of faults in the composite yarn. Moreover, such knots as need
25 to be made following the clearing of faults in the composite yarn are found to be more secure. Again, the apparatus may have less need for an end break detector to prevent singles yarns being wound on the take-up package. If the roving breaks the twisting effect of the spindle 9
30 will run back solely into the primary yarn and it will normally become untwisted to a point at which the yarn will break.

As the previously prepared yarn will already have been
35 cleared, it is unlikely to break, but a simple end-break detector has been developed for this machine. This comprises a wire or equivalent element, pivotted below

the front roller pair and having a portion capable of bearing on the rear of the primary yarn above the draft control unit. The arrangement is such that, in the event of the primary yarn breaking, the element swings forwardly and downwardly about its pivot to a lower position where it will break and singles yarn passing from the front rollers to the ring spingle.

- 10 As has already been indicated, the system allows for the production of yarns combining types of fibre such as cotton and wool which may not effectively be spun together in one drafting system. Depending on machine parameters the primary yarn may appear to varying degrees on the surface
15 of the composite yarn. Thus, if the fibres of the primary yarn are aesthetically pleasing but weak, a composite yarn with those fibres on the surface may be strengthened by the use of a secondary yarn of high strength. Also a coarser fibre than normally employed for a particular yarn may be
20 used for the roving, thereby achieving further economic advantage.

Claims:

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1. A method of producing a composite textile yarn comprising the step, whilst a roving is being passed through a drafting zone and spun into a secondary yarn, of introducing a previously prepared primary yarn alongside
5 the roving towards the end of the drafting zone and twisting the primary yarn with the secondary yarn.

2 A method according to Claim 1 wherein the primary yarn is spaced from the roving at the end of the drafting zone as
10 defined by the front roller nip.

3. A method according to Claim 1 or Claim 2 wherein the primary yarn is spaced laterally of the secondary yarn as they leave the front roller nip.

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4. A method according the Claim 3 wherein the spacing by between about $5/16$ ths and $5/32$ nds of an inch.

5. Apparatus for producing composite textile yarns
20 comprising means for introducing a previously prepared primary yarn alongside a roving towards the end of a drafting zone whilst the roving is being passed through the drafting zone and spun into a secondary yarn, and means for twisting the primary yarn with the secondary yarn.

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6. Apparatus according to Claim 5 further comprising end break detector means mounted so as to be held in a first position by an intact primary yarn but to move under gravity on breakage of the primary yarn to a second
30 position where it may break the secondary yarn.

7. Apparatus for producing composite textile yarns substantially as described with reference to Figures 3 to 5 of the accompanying drawings.

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8. A method of producing textile yarns substantially as described.

9. A composite yarn produced according to any one of the aforesaid methods.

10. A composite yarn according to Claim 9 wherein the primary yarn is of a type which could not readily be produced on a machine having a drafting system of the type through which the roving is passed.

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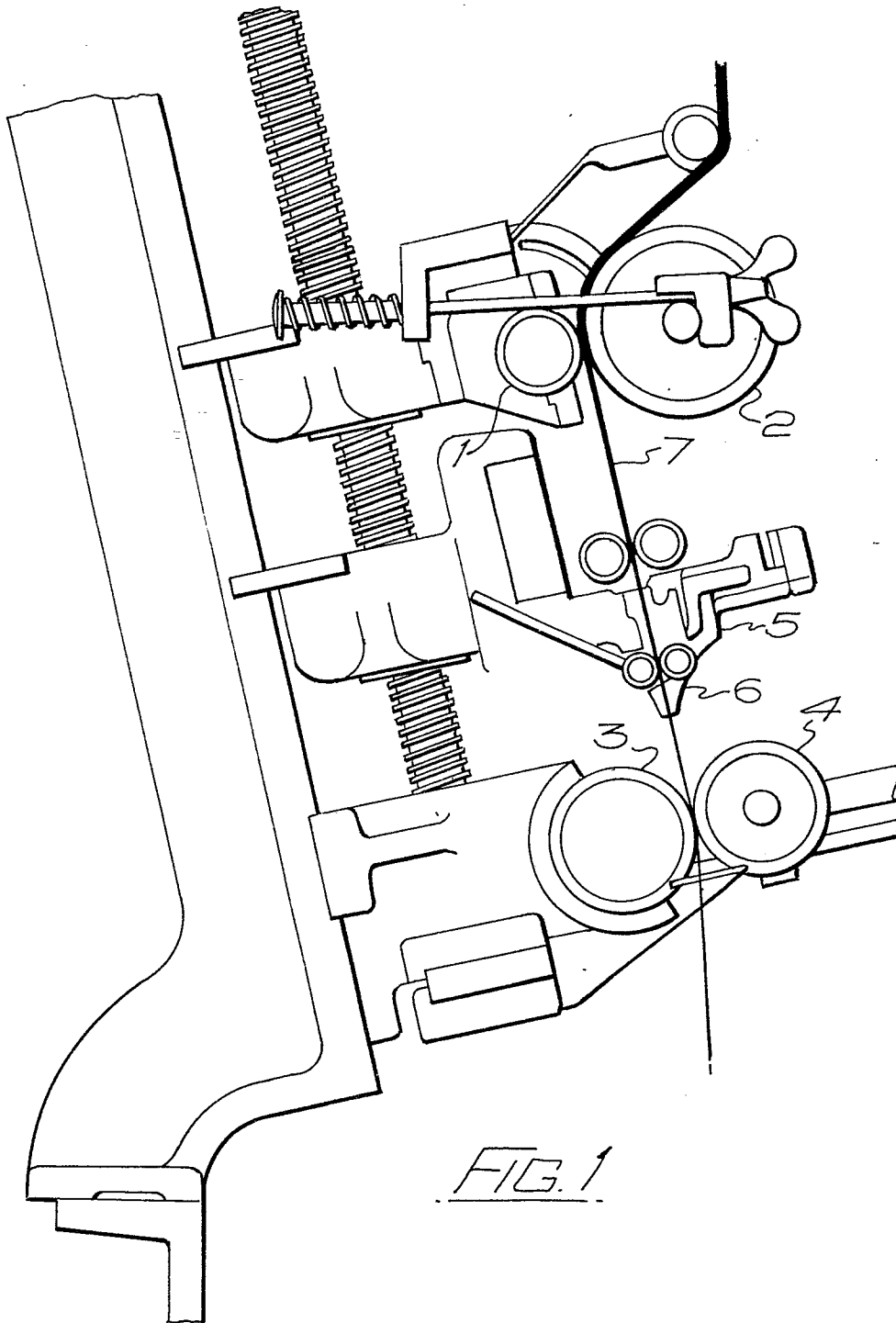
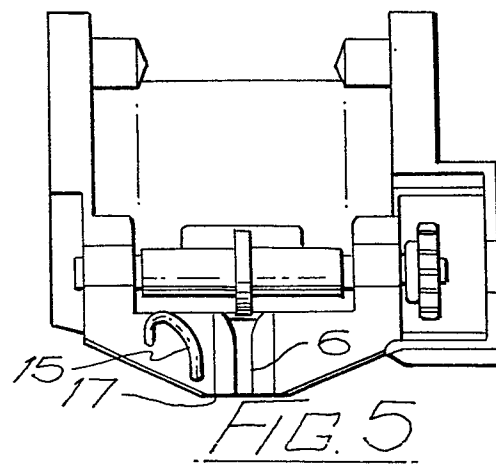
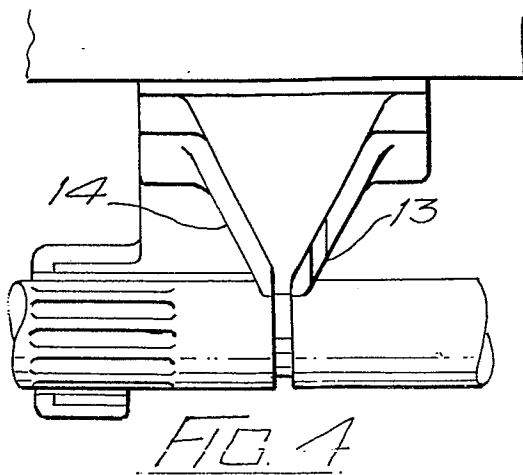
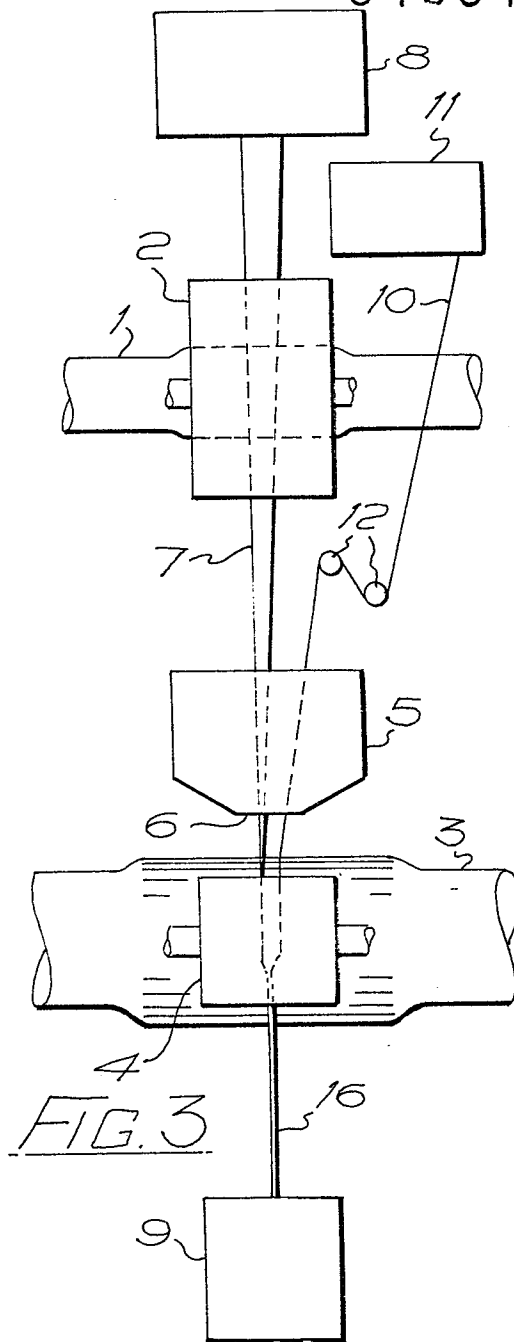
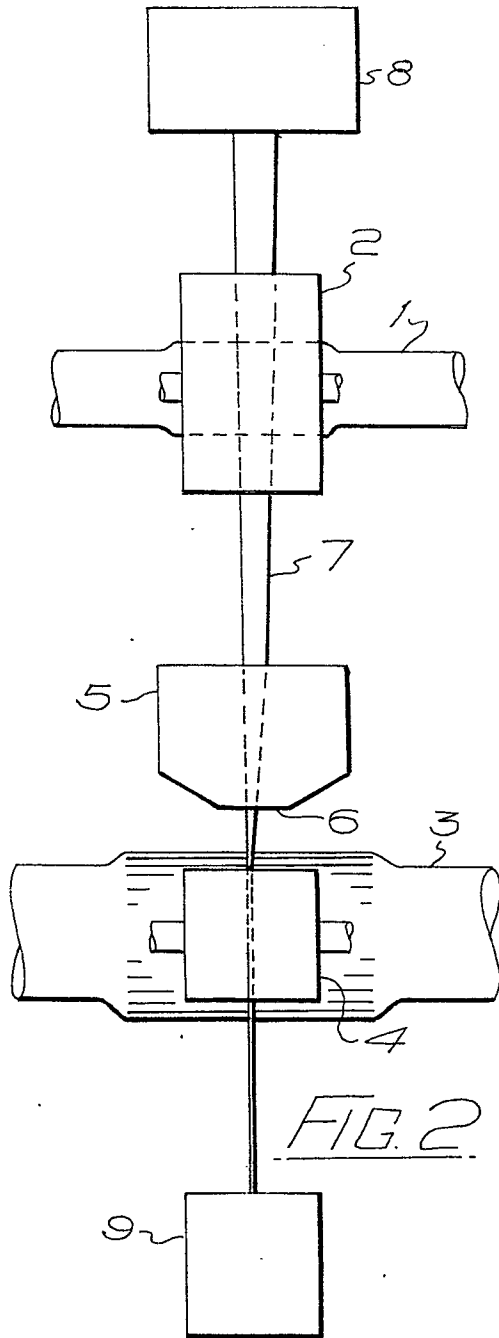


FIG. 1





European Patent
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EUROPEAN SEARCH REPORT

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Application number

EP 83 30 4165

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	DE-B-1 201 221 (DOROTHEA RUDOLPH) * Whole document *	1-3,5,10	D 02 G 3/36
X	FR-A-1 515 512 (NIEDERER AND CO.) * Whole document *	1-3,5,10	
X	FR-A-2 476 692 (SAURER-ALLMA) * Whole document *	1-3,5,10	
X	US-A-3 739 564 (DEERING MILLIKEN RESEARCH) * Whole document *	1-3,5,10	
X	FR-A-1 193 060 (F. MASUREL) * Whole document *	1-3,5,10	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
X,P	US-A-4 365 464 (GRAHAM JR. et al.) * Whole document *	1-3,5,10	D 02 G
X	US-A-2 990 673 (E.M. ADKINS) * Whole document *	1-3,5,10	
X	US-A-3 722 202 (INDARTE) * Whole document *	1,5,10	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-11-1983	Examiner DEPRUN M.

CATEGORY OF CITED DOCUMENTS

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	US-A-3 070 950 (W.B. THOMAS) * Whole document *	1,5,10	
X	US-A-2 740 591 (E.L. WOODS) * Whole document *	6	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-11-1983	Examiner DEPRUN M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone * : particularly relevant if combined with another document of the same category - : prior art disclosure - : prior art disclosure		T : theory or principle underlying the invention E : earlier patent document, but published on or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	