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(54) Manufacturing process of a nozzle for air looms.

(57) The invention concerns a manufacturing method of a secondary nozzle to produce secondary jets in air looms, of the type consisting of a tubular element open at one end and having a gauged hole in correspondence of the opposite end. According to the invention, said method comprises the following steps:
- cutting to size a steel rod and finishing its outer surface with centesimal tolerance;
- drilling said steel rod with an axial dead hole of gauged dimensions with centesimal tolerance; and
- permanently deforming on a die said drilled steel rod, with flattening of at least one part thereof near its closed end and shaping of this end according to an inclined plane, and subsequently forming a gauged hole on said inclined end surface.

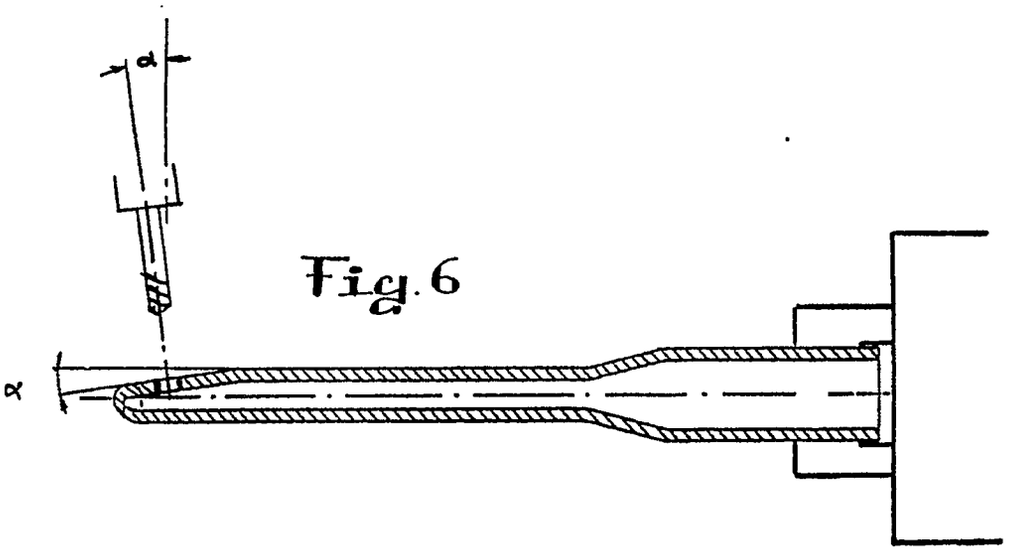

Fig. 6

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The technique of shuttleless looms is known to include the so-called air looms, wherein the weft yarn is drawn into the warp shed by a controlled air stream. Said air stream is produced by a main blow nozzle - positioned at the yarn inlet end of the loom, and through which the weft yarn is fed - and is maintained and controlled by a plurality of secondary nozzles, each of which produces a so-called secondary jet. A regular air stream is thus maintained in order to draw the weft yarn along the shed, starting from the yarn inlet end where the main blow nozzle is positioned, to the opposite end.

The production of secondary nozzles of the aforementioned type is started at present from small steel tubes which are cut to size and welded at one end. A hole of gauged diameter is then formed in correspondence of the welded end, and through said hole is blown the secondary jet apt to maintain the air stream drawing the weft yarn. Commercial tubes are normally used, with fairly wide tolerances, for instance of +/- 10% on the nominal diameter. Nevertheless, the end welding produces some variations in the outer and inner shape of the tubes. Hence, the nozzles thus obtained have - also on account of the subsequent machinings and strains - dimensional and thus operational features which are not sufficiently constant. This creates obvious difficulties in setting up the loom, whereby it is not possible to adopt standard principles, but it is rather necessary to resort to manual operations which are strongly tied to the skill of the testing expert.

The object of the present invention is to propose a method allowing to produce secondary nozzles for air looms of extremely uniform characteristics, that is, with centesimal tolerances not only on the nominal diameter, but also on all the other dimensions of the finished piece. This result is obtained with the manufacturing method according to the present invention, which is essentially characterized in that it comprises the following steps:
- cutting to size a steel rod and finishing its outer surface with centesimal tolerance;
- drilling said steel rod with an axial dead hole of gauged dimensions with centesimal tolerance; and
- permanently deforming on a die said drilled steel rod, with flattening of at least one part thereof near its closed end and shaping of this end according to an inclined plane, and subsequently forming a gauged hole on said inclined end surface.

A preferred embodiment of the invention is now described in further detail, with reference to figs. 1 to 6 of the accompanying drawings, which illustrate as many steps of the nozzle manufacturing method according to the invention.

The method according to the invention hence comprises, in further detail, the following steps:

- cutting a steel rod section and machining the same in a lathe to the required diameter D;
- rounding off one of the section ends into a semispherical shape (fig. 1) by means of a tool and subsequently a grinding wheel;
- precision cutting the other end of said section to a set size (fig. 2);
- forming a small tube closed at one end, by drilling (fig. 3) a hole along the axis of said rod section with a tool of diameter d-δ and up to a depth p-δ1, and subsequently boring said axial hole (fig. 4) to the diameter d and to the depth p;
- permanently deforming on a die (figs. 5a, 5b, 5c) said drilled steel rod, with flattening of at least one part A thereof near its closed end, and shaping said part A according to a plane inclined by a suitable angle in respect of the median axial plane of said flattened part;
- trimming the deformed steel rod;
- locking the steel rod by its open non-flattened end, and forming (fig. 6) a hole on said inclined end surface; and finally
- tumbling and subsequently cloth-polishing the finished piece.

Claims

1) Manufacturing method of a secondary nozzle to produce secondary jets in air looms - of the type consisting of a tubular element open at one end and having a gauged hole in correspondence of the opposite end
- characterized in that it comprises the following steps:
- cutting to size a steel rod and finishing its outer surface with centesimal tolerance;
- drilling said steel rod with an axial dead hole of gauged dimensions with centesimal tolerance; and
- permanently deforming on a die said drilled steel rod, with flattening of at least one part thereof near its closed end and shaping of this end according to an inclined plane, and subsequently forming a gauged hole on said inclined end surface.

2) Manufacturing method as in claim 1), wherein the cutting to size operation of the steel rod includes:
- cutting a steel rod section and machining the same in a lathe to the required diameter D;
- rounding off one of the section ends into a semispherical shape by means of a tool and subsequently a grinding wheel; and
- precision cutting the other end of said section, to a set size, in respect of the rounded end.

3) Manufacturing method as in claim 1) or 2), wherein the drilling operation of the steel rod includes:
- drilling said section along its axis, with a tool of

diameter d-δ and up to a depth p-δ1;
- subsequently boring said axial hole to the diameter d and to the depth p.

4) Manufacturing method as in claim 1), 2) or 3), wherein the operation of permanent deformation of the drilled steel rod includes:
- permanently deforming on a die said drilled steel rod, with flattening of at least one part thereof near its closed end;
- shaping said end part according to a plane inclined in respect of the median axial plane of said flattened part;
- trimming the deformed steel rod;
- forming a gauged hole on said inclined end surface, after having locked the steel rod by its open, non-flattened, end; and
- tumbling and subsequently cloth-polishing the finished piece.

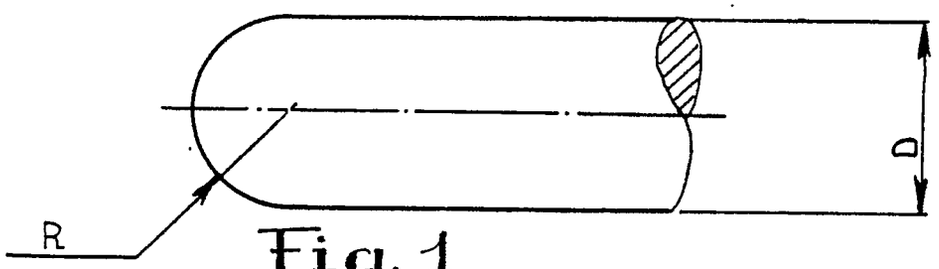

Fig. 1

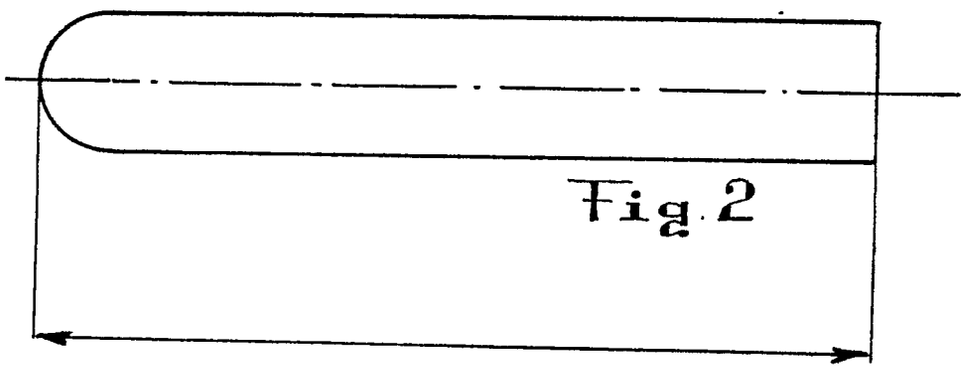

Fig. 2

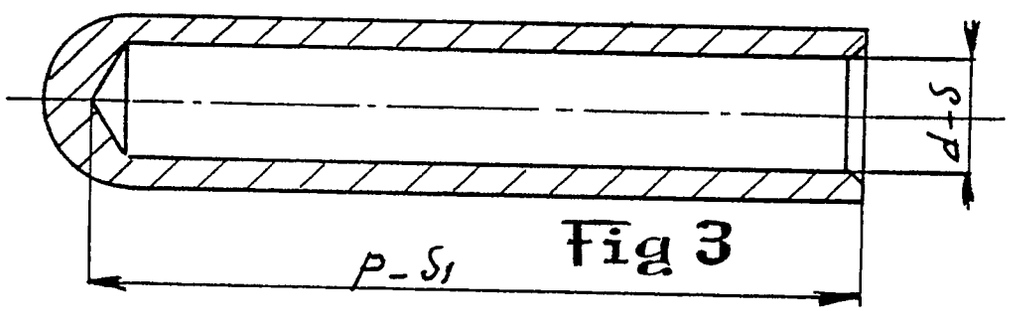

Fig 3

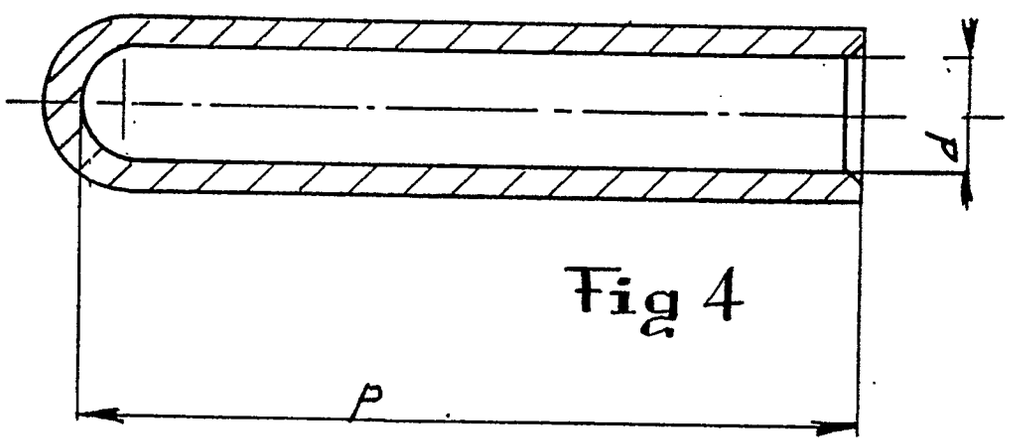

Fig 4

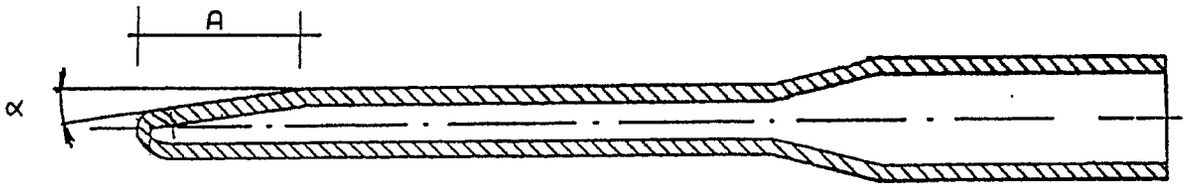

Fig. 5a

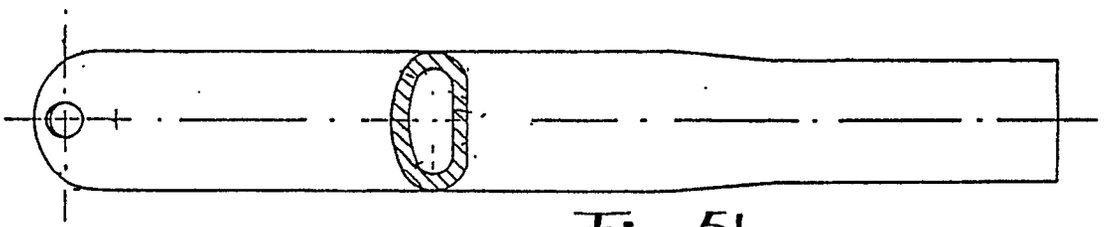

Fig. 5b

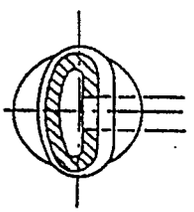

Fig. 5c

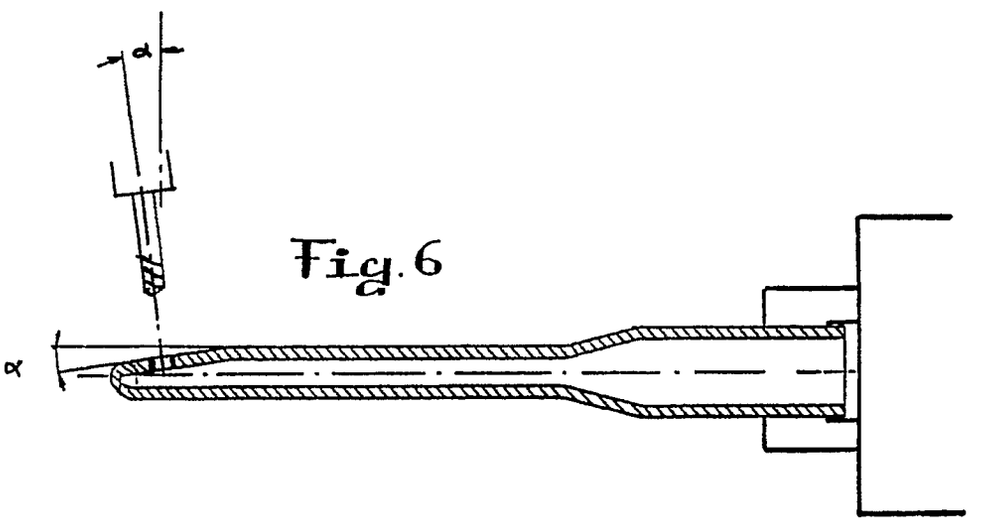

Fig. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 10 6798

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.5)
A	DE-A-2740108 (MASCHINENFABRIK RUTI AG) * the whole document *	1, 4	D03D47/30
A	EP-A-0066012 (N.V. WEEFAUTOMATEN PICANOL) * the whole document *	1, 4	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	01 AUGUST 1990	REBIERE J.L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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