

⑫

EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of patent specification: **13.11.85**

⑤① Int. Cl.⁴: **D 03 D 47/30**

②① Application number: **82901144.4**

②② Date of filing: **29.04.82**

⑧⑧ International application number:
PCT/GB82/00129

⑧⑦ International publication number:
WO 82/03877 11.11.82 Gazette 82/27

⑤④ **WEAVING LOOM.**

③⑩ Priority: **02.05.81 GB 8113632**

④③ Date of publication of application:
04.05.83 Bulletin 83/18

④⑤ Publication of the grant of the patent:
13.11.85 Bulletin 85/46

⑧④ Designated Contracting States:
BE CH DE FR GB LI

⑤⑩ References cited:
GB-A-2 027 066
GB-A-2 027 945
GB-A-2 043 717
GB-A-2 059 019
GB-A-2 065 727
GB-A-2 073 790

⑦③ Proprietor: **Sulzer Brothers Limited**
CH-8400 Winterthur (CH)

⑦② Inventor: **GRIFFITH, John D. Bonas Machine**
Company Limited
Pallion Industrial Estate
Sunderland, SR4 6SX (GB)

⑦④ Representative: **Dealtry, Brian et al**
Eric Potter & Clarkson 14, Oxford Street
Nottingham NG1 5BP (GB)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European patent convention).

Courier Press, Leamington Spa, England.

EP 0 077 787 B1

Description

The invention is concerned with a loom including weft yarn guide which guides an air flow for directing a weft yarn across a warp sheet.

When directing a weft yarn along a weft yarn guide it is desirable to provide auxiliary air jets along the guide which serve to help project the yarn along the guide.

The weft yarn guide is usually mounted on the reed shaft and so during operation the auxiliary jets move in unison with the reed shaft. This creates the problems of providing a connection between the source of pressurised air and each auxiliary jet which is reliable and interferes as little as possible with the running of the loom.

It has been proposed to arrange the auxiliary jets into groups, each group being supplied from a single source an air distributor. The air distributor may be mounted on the loom frame as for instance disclosed in published U.K. Patent Application 2065727A or on the reed shaft as disclosed in published U.K. Patent Application 2027066A. In both of these types of construction it is necessary to provide a valve means to control each distributor and the valve means is mounted on the loom frame.

Both of these types of construction suffer the disadvantage that the air supply connection either from the static air distributor to the moving auxiliary air jets or between the moving air distributor and the static valve means is achieved using flexible pipes. These are undesirable as they can suffer from fatigue caused by being repeatedly flexed; they can wear by rubbing against adjacent machine parts, and they tend to clutter the internal working space of the loom.

It is a general aim of the present invention to overcome these drawbacks.

According to the present invention there is provided a fluid jet weaving loom comprising a reed shaft rotatably mounted in the loom frame for oscillatory rotary motion, a reed mounted on the reed shaft, a weft insertion channel mounted adjacent to the reed, jet nozzles spaced along the weft insertion channel for carrying the weft yarn along the channel during weft insertion, the jet nozzles being arranged in groups of nozzles spaced along the length of the channel, the nozzles of each group communicating with a source of pressurised fluid via a common valve means, characterised in that each valve means is mounted on and adjacent the reed shaft, each valve means including cam follower means which is movable mounted to actuate the valve means, and in that a cam shaft is rotatably mounted on the loom frame at a position so as to co-operate with the cam follower means during weft insertion.

Reference is now made to the accompanying drawings in which:—

Figure 1 is an end view of part of a loom incorporating guide teeth and auxiliary jets in accordance with the present invention;

Figure 2 is a side view of the loom shown in Figure 1;

Figure 3 is a schematic end view of guide teeth and auxiliary jets arranged in accordance with the present invention;

Figures 4a—4f show schematically alternative cross-sectional shapes of the internal wall of the guide teeth;

Figure 5 is a view similar to Figure 3 of an alternative arrangement according to the present invention; and

Figures 6a—6b show alternative shapes of guide teeth.

In Figures 1 and 2 there is shown an air guide channel 10 for weft yarn insertion which extends across the warp sheet of a loom 12. The channel 10 is composed of a plurality of individual guide teeth 13 which will be described hereinafter. Spaced along the channel 10 are auxiliary air jets 15 which are spaced apart by a desired number of guide teeth 13.

The guide teeth 13 and auxiliary jets 15 are mounted on the reed shaft 18 of the loom so as to be located in front of the beat-up reed 19. Conventionally the guide teeth 13 have a base portion 20 which is received in a rebate 21 formed in a support member 22 secured to the beat-up shaft 18. Individual clamp plates 23 are provided along the support member 22 and each is secured thereto by a pair of bolts 25 so that individual clamp plates 23 may be removed to permit removal of blocks of guide teeth 13. The guide teeth include a pair of arms 60, 61 which have internal edges defining the sides and upper confines of the channel. The lower confine of the channel is defined by the upper edge of the upper portion 20a and the base portion 20. The lower portion 20b of the base portion is a greater thickness than the remainder of the tooth so that abutting lower portion 20b of adjacent teeth serve to space the respective arms 60, 61 of the adjacent teeth apart by a predetermined amount. The lower portion 20b are provided with projections 20c on one side and complimentary recesses on the opposite side so that abutting teeth are maintained in correct alignment. Conveniently the teeth 13 are moulded in one piece from a suitable plastics material.

The auxiliary air jets 15 are arranged in groups along the length of the channel 10 wherein the air jets in each group are supplied with air from a common valve 30. Only one group and valve 30 are shown in Figure 2. During insertion of weft yarn the valves 30 are operated sequentially by the cam shaft so that auxiliary jets are operated sequentially along the channel as the weft yarn end travels therealong. Conveniently the auxiliary jets are each mounted on a guide tooth having one arm removed to permit its inclusion. Preferably the auxiliary jet is moulded with the tooth so that its position may be accurately attained.

To operate the valves 30, a cam 31 is provided for each valve 30 and operates a cam follower 34. Each cam follower 34 is in the form of a lever having a roller 35 at one end and an abutment

face 36 at the other end for operating a plunger 37 in valve 30. The lever is biased by a spring 34a so that the plunger 37 is normally depressed, in which position the plunger urges a ball 38 against a conical seat 39 surrounding an air inlet port 40 to a chamber 43 in which ball 38 is housed.

The air inlet port 40 communicates via a conduit 41 with a bore 18a within a shaft 18 which is supplied with compressed air. During rotation of the camshaft 33 the cam 31 operates cam follower 34 to move away from plunger 37 and accordingly air pressure at the inlet port 40 forces the ball 38 away from seat 39 and into contact with a conical seat 45 surrounding the bore housing plunger 37. Air from conduit 41 enters chamber 43 and flows via exit ports 46 to auxiliary jets communicating therewith.

In order to permit all the auxiliary jets to be operated, say during a setting up procedure, a shaft 50 having a plurality of radial arms 51 for co-operation with the cam followers 34 is provided. On rotation of shaft 50 in an anti-clockwise direction as seen in Figure 1 the radial arms strike the cam-followers to deflect them away from their associated valve 30.

As mentioned above the guide teeth 13 each have two arms 60, 61 which have internal edges which define opposed sides and top of the channel 10. The bottom of the channel 10 is defined by the upper edge of the base portion 20. The arms 60, 61 have terminal ends spaced apart to define a mouth 63 through which weft yarn may escape from the channel during beat-up.

The auxiliary jets 15 are each provided with a nozzle 65 (see Figure 3) which is arranged to direct a flow of air toward an internal edge 70 of the guide tooth 13a adjacent to and downstream of the jet 15 so that a curtain of air 65a extends across the mouth 63 of tooth 13a to discourage exit of weft yarn through that mouth. The internal edge against which the flow of air is directed is shaped so as to deflect the flow of air along the channel 10. At least one of the remaining internal edges is preferably shaped so as to encourage removal of air from the channel between adjacent teeth. In this way the weft yarn is encouraged to move toward those edges.

In Figure 3, the nozzle 65 directs a flow of air toward the lower part of the internal edge 70 defined by arm 60. The edge 70 defined by arm 60. The edge 70 is inclined to the axis of the channel so that it progressively approaches the centre of the channel in the direction of travel of the weft yarn. The angle of inclination between the edge 70 and longitudinal axis of the channel is about 10°.

Edge 10 may alternatively be rounded as shown in Figures 4d or 4e. The flow of air is deflected by edge 70 towards internal edge 71 of arm 61. This edge 71 can be shaped to encourage air loss between adjacent teeth so as to encourage the main flow of air whilst travelling toward the next auxiliary jet to remain close to edge 71.

Examples of cross sectional edge shapes suitable for edge 71 are illustrated schematically in

Figures 4a to 4f. Each of these edges is designed to cause a negative pressure immediately downstream of the tooth to cause turbulence and thus loss of air from channel 10. The outer internal edges 72 and 73 may be shaped so as to encourage the desired air flow, for instance edge 72 may be inclined in a similar manner to edge 70 so that flow of air impinging on edge 72 is deflected downwardly toward edge 73 and edge 73 may be shaped in a similar manner to edge 71 so that air loss is achieved between adjacent teeth at the bottom of channel 10. Accordingly flow of air along channel 10 between adjacent auxiliary jets is in the main encouraged to flow near to the corner between edges 71 and 73 which urges the weft yarn to travel along the channel 10 at a location which is remote from the mouths 63 of adjacent teeth.

However, it is not essential to have edges 70, 71, 72 and 73 of different shape. They could all be of a shape which allows edge 70 to deflect the air from the nozzle, but which also allows sufficient air escape from all the edges to prevent a pressure build up inside the guides and consequent air escape from gap 63.

It will be appreciated that by directing a flow of air against an internal edge for deflecting the flow along the channel, it enables the auxiliary jets to be arranged to direct the flow of air upwardly across mouth 63 for subsequent deflection toward the bottom of the channel as schematically illustrated in Figure 5.

It is appreciated that the effect of the auxiliary jets directing a flow of air against an internal wall for subsequent deflection can cause the air flow within the channel to circulate, in a vortex fashion, as it moves along the channel. Accordingly, arms 60, 61 are shaped so that the exit mouth 63 does not permit the yarn to exit therethrough should it be gyrating due to the circulating flow of air within channel 10. Thus in Figure 3 it is assumed gyration of the yarn would be anti-clockwise whereas in Figure 5 it would be clockwise. Figure 6a illustrates an alternative guide tooth having a stepped mouth 63 for replacement of the teeth illustrated in Figure 3 whereas Figure 6b illustrates an alternative guide tooth having a stepped mouth 63 for replacement of the tooth illustrated in Figure 5. Figure 6a illustrates a tooth which could be used as an alternative for either of the teeth illustrated in Figures 3 and 5.

Claims

1. A fluid jet weaving loom comprising a reed shaft (18) rotatably mounted in the loom frame for oscillatory rotary motion, a reed (19) mounted on the reed shaft, a weft insertion channel (10) mounted adjacent to the reed, jet nozzles (15) spaced along the weft insertion channel for carrying the weft yarn along the channel during weft insertion, the jet nozzles being arranged in groups of nozzles spaced along the length of the channel, the nozzles of each group communicating with a source of pressurised fluid via a common valve

means (30), characterised in that each valve means (30) is mounted on and adjacent the reed shaft (18), each valve means including cam follower means (34) which is movably mounted to actuate the valve means, and in that a cam shaft (12) is rotatably mounted on the loom frame at a position so as to co-operate with the cam follower means during weft insertion.

2. A weaving loom according to Claim 1 wherein the reed shaft includes an internal bore (18a) for supplying pressurised fluid to each valve means.

3. A weaving loom according to Claim 1 or 2 wherein the valve means for each group of jet nozzles includes a valve body having a chamber (43) housing a valve element (38), an inlet port (40) and outlet ports (46) communicating with the chamber, and biasing means (34a) for biasing the valve element into contact with the inlet port, the biasing means being acted upon by the cam follower means.

4. A weaving loom according to Claim 3 wherein the valve element (38) is spherical and the inlet port is provided with a conical seat (39) against which the valve element is seated when biased by the biasing means.

5. A weaving loom according to Claim 4 wherein the biasing means includes a plunger (39) which is slidably received in a bore aligned with the inlet port (40), the chamber being shaped so that when the cam follower means actuate the biasing means the valve element moves the plunger out of the chamber so that the valve element sealingly engages the mouth of the bore.

6. A weaving loom according to Claim 5 wherein the mouth of the bore is provided with a conical seat (45) for the valve element.

7. A weaving loom according to Claim 5 to 6 wherein the plunger extends outside the body of the valve and the cam follower means (34) comprises a pivotally mounted lever one end of which (36) is biased to move the plunger toward the valve element, the opposite end of the lever being co-operable with the cam shaft (12) which on rotation intermittently deflects the lever to permit the plunger to move outwardly of the valve body.

8. A weaving loom according to Claim 1 wherein the cam shaft is arranged to sequentially operate the valve means of successive groups of nozzles.

9. A weaving loom according to Claim 1 wherein the weft insertion channel is defined by a plurality of spaced guide teeth each having an open mouth through which the weft yarn can escape during beat-up, each jet nozzle being arranged to direct a flow of air into the channel to form a curtain of air across the mouth of at least one adjacent guide tooth in order to discourage yarn to exit through said mouth.

10. A weaving loom according to Claim 9 wherein said adjacent teeth have an internal deflection edge against which the jet nozzles direct the flow of air, the direction of air flow from the jet nozzle and the shape of said deflection edge being such as to direct the air flow to flow

generally axially along the channel.

Revendications

5 1. Métier à tisser à tuyères de fluide comprenant un arbre (18) de peigne monté de manière à pouvoir tourner dans le châssis du métier afin d'être animé d'un mouvement rotatoire et oscillatoire, un peigne (19) monté sur l'arbre du peigne, un canal (10) d'insertion de trame monté en un endroit contigu au peigne, des ajutages (15) de tuyères espacés le long du canal d'insertion de trame pour acheminer le fil de trame le long du canal pendant l'insertion de la trame, les ajutages de tuyères étant disposés en groupes d'ajutages espacés sur la longueur du canal, les ajutages de chaque groupe communiquant avec une source de fluide pressurisé via un moyen de valve commun (30), caractérisé en ce que chaque moyen de valve (30) est monté sur l'arbre (18) du peigne en un endroit contigu à celui-ci, chaque moyen de valve comportant un moyen de galet de came (34) qui est monté de manière à être mobile pour actionner le moyen de valve, et en ce qu'un arbre à came (12) est monté en rotation sur le châssis du métier à un endroit tel qu'il coopère avec le moyen de galet de came pendant l'insertion de la trame.

30 2. Métier à tisser selon la revendication 1, où l'arbre du peigne comporte un alésage intérieur (18a) pour fournir un fluide pressurisé à chaque moyen de valve.

35 3. Métier à tisser selon la revendication 1 ou la revendication 2, où le moyen de valve pour chaque groupe d'ajutages de tuyères comporte un corps de valve ayant une chambre (43) qui renferme un élément de valve (38), un orifice d'entrée (40) et des orifices de sortie (46) qui communiquent avec la chambre, et un moyen de sollicitation (34a) pour solliciter l'élément de valve afin de l'amener en contact avec l'orifice d'entrée, le moyen de sollicitation étant actionné par le moyen de galet de came.

45 4. Métier à tisser selon la revendication 3, où l'élément de valve (38) est sphérique et l'orifice d'entrée comporte un siège conique (39) sur lequel l'élément de valve est assis lorsqu'il est sollicité par le moyen de sollicitation.

50 5. Métier à tisser selon la revendication 4, où le moyen de sollicitation comprend un plongeur (39) qui est reçu en coulissement dans un alésage aligné avec l'orifice d'entrée (40), la chambre ayant une forme telle que, lorsque le moyen de galet de came actionne le moyen de sollicitation, l'élément de valve déplace le plongeur pour le faire sortir de la chambre de sorte que l'élément de valve est en contact étanche avec l'embouchure de l'alésage.

60 6. Métier à tisser selon la revendication 5, où l'embouchure de l'alésage comporte un siège conique (45) pour l'élément de valve.

65 7. Métier à tisser selon la revendication 5 ou la revendication 6, où le plongeur s'étend à l'extérieur du corps de la valve et le moyen de galet de came (34) comprend un levier monté en pivote-

ment, dont l'une de ses extrémités (36) est sollicitée de manière à déplacer le plongeur vers l'élément de valve, l'extrémité opposée du levier coopérant avec l'arbre à came (12) qui lors de sa rotation dévie par intermittence le levier de manière à permettre au plongeur de se déplacer à l'extérieur du corps de valve.

8. Métier à tisser selon la revendication 1, où l'arbre à came est disposé de manière à actionner séquentiellement le moyen de valve de groupes successifs d'ajutages.

9. Métier à tisser selon la revendication 1, où le canal d'insertion de trame est défini par une pluralité de dents de guidage, espacées les unes des autres, ayant chacune une embouchure ouverte par laquelle le fil de trame peut s'échapper pendant la frappe, chaque ajutage de tuyère étant disposé de manière à diriger un courant d'air dans le canal pour former un rideau d'air à travers l'embouchure d'au moins une dent de guidage contiguë dans le but d'empêcher que le fil sorte par l'embouchure.

10. Métier à tisser selon la revendication 9, où les dents contiguës ont un bord intérieur de déviation contre lequel les ajutages de tuyères dirigent le courant d'air, le sens du courant d'air à partir de l'ajutage de tuyère et la forme du bord de déviation étant tels que le courant d'air se trouve dirigé de manière à circuler dans un sens généralement axial dans le canal.

Patentansprüche

1. Strömungsmittelstrahl-Webmaschine, umfassend eine im Webstuhlrahmen für schwingende Bewegung drehbar gelagerte Blattwelle (18), ein an der Blattwelle montiertes Blatt (19), einen neben dem Blatt montierten Schußfadeneinzug-Durchgang (10), (und) längs des Schußfadeneinzug-Durchgangs auf Abstände verteilte Strahldüsen (15), um den Schußfaden beim Schußfadeneinzug längs des Durchgangs mitzunehmen oder zu führen, wobei die Strahldüsen in über die Länge des Durchgangs auf Abstände verteilten Düsengruppen angeordnet sind und die Düsen jeder Gruppe über eine gemeinsame Ventileinrichtung (30) mit einer Druckmittelquelle kommunizieren, dadurch gekennzeichnet, daß jede Ventileinrichtung (30) an und neben der Blattwelle (18) montiert ist, daß jede Ventileinrichtung eine Kurvenfühlereinrichtung (34) aufweist, die zur Betätigung der Ventileinrichtung bewegbar gelagert ist, und daß eine Nocken- oder Kurvenwelle (12) am Webstuhlrahmen drehbar in einer Stellung gelagert ist, in welcher sie beim Schußfadeneinzug mit der Kurvenfühlereinrichtung zusammenwirkt.

2. Webmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die Blattwelle eine innere (zentrale) Bohrung (18a) für die Zufuhr des Druckmittels zu jeder Ventileinrichtung aufweist.

3. Webmaschine nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Ventileinrichtung für jede Gruppe von Strahldüsen einen Ventilkörper mit einer Kammer (43) zur Aufnahme eines

Ventilglieds (38), eine Einlaßöffnung (40) und mit der Kammer kommunizierende Auslaßöffnungen (46) sowie ein Vorbelastungsmittel (34a) zum Vorbelasten des Ventilglieds in Anlage gegen die Einlaßöffnung aufweist, wobei auf das Vorbelastungsmittel die Kurvenfühlereinrichtung einwirkt.

4. Webmaschine nach Anspruch 3, dadurch gekennzeichnet, daß das Ventilglied (38) sphärisch ausgebildet ist und die Einlaßöffnung mit einem konischen Sitz (39) versehen ist, gegen den sich das Ventilglied bei Vorbelastung durch das Vorbelastungsmittel anlegt.

5. Webmaschine nach Anspruch 4, dadurch gekennzeichnet, daß das Vorbelastungsmittel einen Stößel (39 bzw. 37) aufweist, der verschieblich in eine mit der Einlaßöffnung (40) fluchtende Bohrung eingesetzt ist, (und) die Kammer so geformt ist, daß bei der Betätigung des Vorbelastungsmittels durch die Kurvenfühlereinrichtung das Ventilglied den Stößel aus der Kammer herausbewegt, so daß das Ventilglied sich mit Dichtungsberührung an die Mündung der Bohrung anlegt.

6. Webmaschine nach Anspruch 5, dadurch gekennzeichnet, daß die Mündung der Bohrung mit einem konischen Sitz (45) für das Ventilglied versehen ist.

7. Webmaschine nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß sich der Stößel aus dem Körper des Ventils herauserstreckt und die Kurvenfühlereinrichtung (34) einen schwenkbar gelagerten Hebel aufweist, dessen eines Ende (36) zum Verschieben des Stößels gegen das Ventilglied vorbelastet ist, während das andere Ende des Hebels mit der Kurvenwelle (12) zusammenzuwirken vermag, welche bei ihrer Drehung den Hebel intermittierend auslenkt, um den Stößel sich aus dem Ventilkörper herausbewegen zu lassen.

8. Webmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die Kurvenwelle zum sequentiellen Betätigen der Ventileinrichtungen aufeinanderfolgender Gruppen von Düsen angeordnet ist.

9. Webmaschine nach Anspruch 1, dadurch gekennzeichnet, daß der Schußfadeneinzug-Durchgang durch mehrere beabstandete Leitzähne festgelegt ist, die jeweils eine offene Mündung aufweisen, durch welche der Schußfaden beim Anschlagen entweichen kann, (und) jede Strahldüse so angeordnet ist, daß sie einen Luftstrom in den Durchgang richtet und damit einen Luftvorhang über die Mündung zumindest eines benachbarten Leitzahns bildet, um den Schußfaden an seinem Austritt durch die Mündung zu hindern.

10. Webmaschine nach Anspruch 9, dadurch gekennzeichnet, daß die benachbarten (Leit-)Zähne eine innere Ablenkkante aufweisen, gegen welche die Strahldüsen den Luftstrom richten, wobei Richtung des Luftstroms von der (jeder) Strahldüse und Form der Ablenkkante so gewählt sind, daß der Luftstrom zur Strömung im wesentlichen axial längs des Durchgangs gerichtet wird.

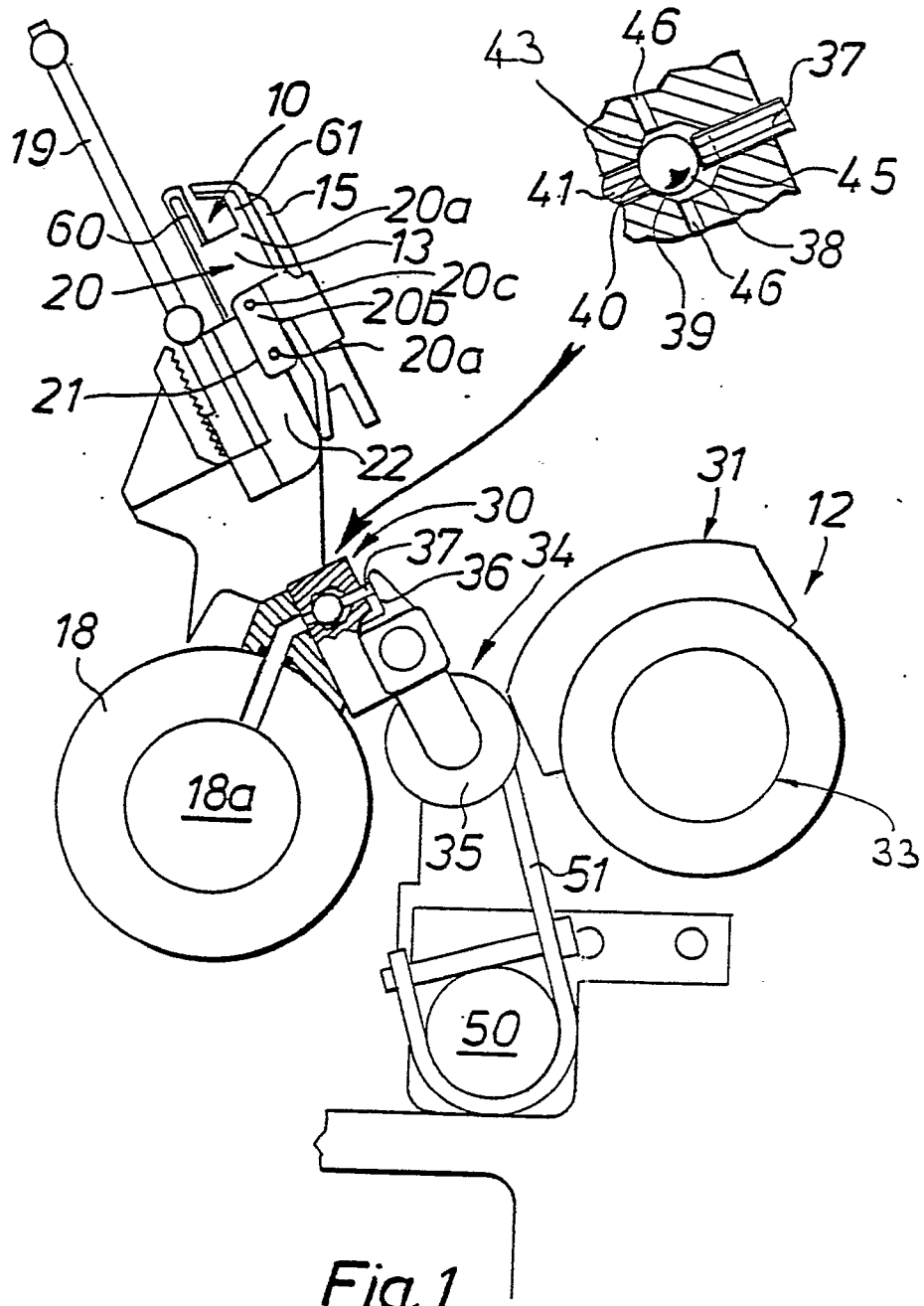


Fig. 1

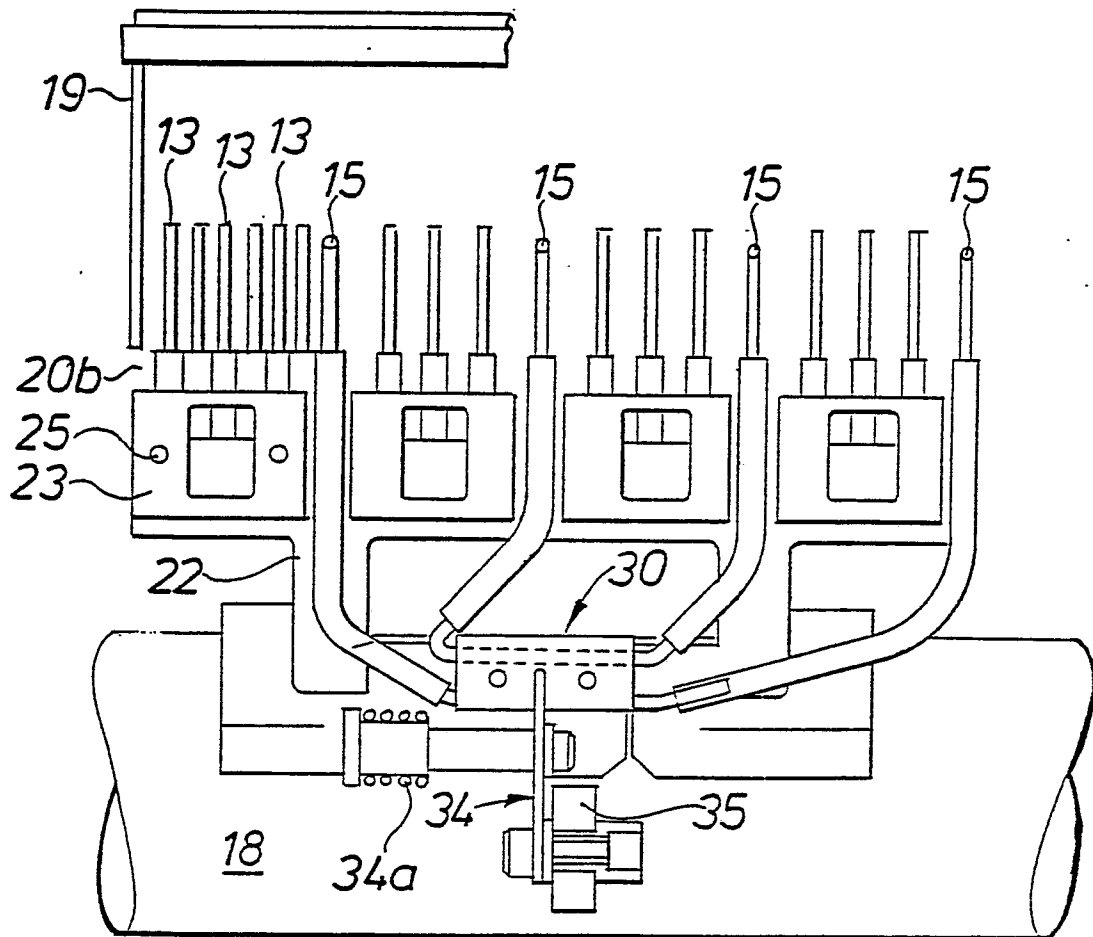


Fig.2

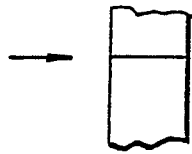


Fig 4a

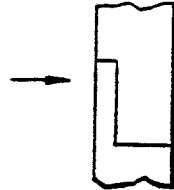


Fig. 4b

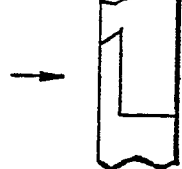


Fig. 4c

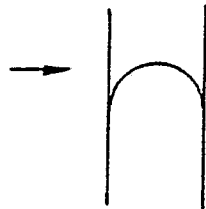


Fig. 4d

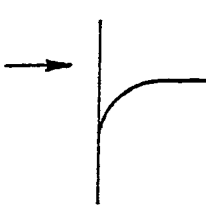


Fig. 4e

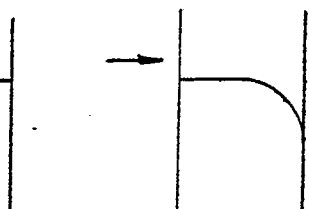


Fig. 4f

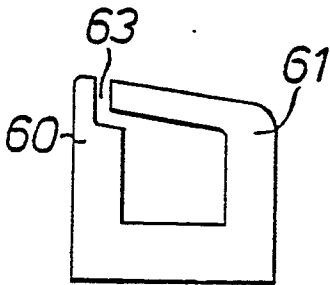


Fig. 6b

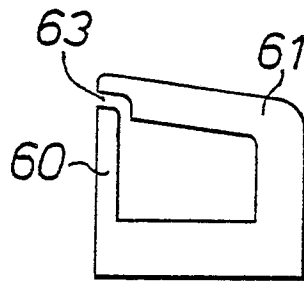


Fig. 6a

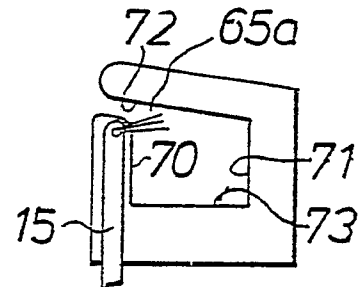


Fig. 5

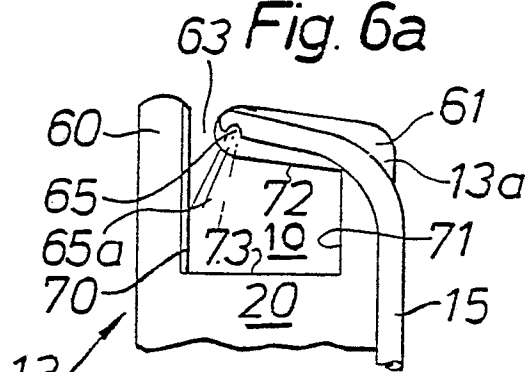


Fig. 3