



(22) Date de dépôt/Filing Date: 2005/05/24

(41) Mise à la disp. pub./Open to Public Insp.: 2006/11/24

(51) Cl.Int./Int.Cl. *B23P 19/00* (2006.01),
B65D 63/06 (2006.01), *B65B 13/34* (2006.01),
F16G 11/14 (2006.01), *F16L 3/00* (2006.01)

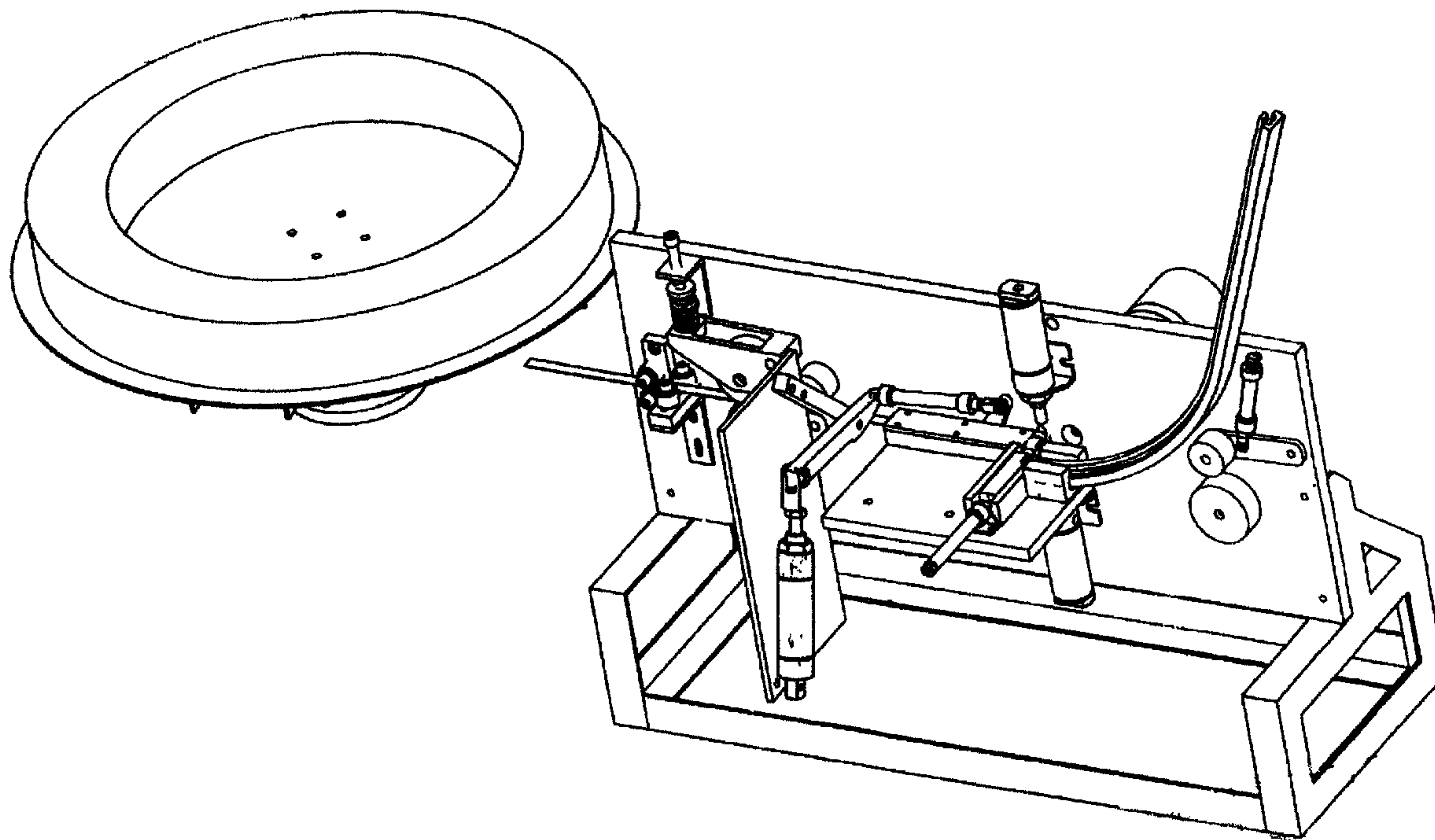
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(54) Titre : METHODE ET DISPOSITIF DE BANDEROLAGE AUTOMATIQUE

(54) Title: AUTOMATIC BANDING DEVICE AND METHOD



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ABSTRACT

A machine for manufacturing a band of desired length having fastening means at one end thereof, said machine comprising spindle means for maintaining a spool of metal band material in proximity to the machine; feeding means for feeding and ejecting a metal strip material into the machine; end determination means for determining the location of the end of the band material; fastener placement means for positioning the fastener means; band folding means for bending the band about the fastener means; crimping means for crimping the fastening means to the band; cutting means for cutting a desired length of band; and control means for controlling the manufacturing process.

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TITLE OF THE INVENTION**AUTOMATIC BANDING DEVICE AND METHOD****TECHNICAL FIELD OF THE INVENTION**

The present invention relates generally to banding systems, and more particularly to a
5 device and method for automatically measuring, cutting and attaching a clip to a band.

BACKGROUND OF THE INVENTION

In the oil, gas and chemical refinery industries, there is a requirement for insulation to be
wrapped around pipes. The insulation serves to conserve energy by limiting heat
exchange with the surrounding atmosphere. The insulation is traditionally held in place
10 with jacketing which protects the insulation from deterioration, and metal bands placed
approximately every twelve inches along the length of the insulated pipe. A particular
installation may require a million or more feet of pipe to be insulated. As the pipe
diameters and insulation thickness may vary, there is no standard band length which can
be produced in advance. Rather, bands must be measured and cut on site to meet the
15 requirements of the particular installation.

There is a need for an automated apparatus and method for measuring and cutting a
desired length of steel band and attaching a wing type seal clip to the band for use as a
pipe insulation retaining band.

It is known to provide a machine for automatically securing a band around a box or other
20 object to be banded. Such devices are described in U.S. Patent No. 2,781,516 to
Eisenberg ("Eisenberg"), U.S. Patent No. 3,120,171 to Hall et al ("Hall") and U.S. Patent
No. 3,041,962 to Workman ("Workman"). Eisenberg teaches a machine which nails a
metal band to a box, but does not attach a clip to the band, and does not automatically
measure and cut bands for later application to an object. Hall teaches a hydraulic

machine for repeatedly wrapping a band about a box and sealing the band to itself. Workman describes a machine which wraps a band about an object in a controlled manner which will optimize energy expenditure.

5 It is known to provide a machine for measuring and cutting a band to a desired length, using a programmable controller which controls a system of rollers to feed and eject band supply and cut it to a desired length. Such a device is described in U.S Patent No. 5,287,802 to Pearson ("Pearson"). The device in Pearson does not attach a clip to one end of the band.

10 U.S. Patent No. 5,146,847 to Lyon et al. ("Lyon") describes a band feed assembly which is capable of wrapping a band about an object using a drive wheel connected to a reversible drive motor. A controller permits control of the speed, direction, acceleration and tensioning of the band. Lyon does not attach a clip to the band.

15 It is known to provide a device for applying heat-sealable bands around objects including a programmable control system which receives signals from sensors in the machine to regulate the bandping cycle. An example of such a device is described in Canadian Patent No. 2,271,591 to Chak et al ("Chak"). Chak does not teach a method and apparatus for attaching a clip to a band of a desired length.

20 European Patent Application No. 1,481,901 to Sickels describes a method and control system for a bandping machine which permits determination of a foreign object in proximity to the machine and starting and stopping of the bandping cycle in response.

It is also known to provide a control mechanism for a feed and tension unit in a bandping apparatus. Such a mechanism is described in U.S. Patent No. 6,782,679 to Helland et al. ("Helland"). In Helland, a desired length of band can be measured and cut, however, no clip is attachable to the measured band.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described by reference to the preferred embodiment and the drawings thereof in which:

Figure 1 is a perspective view of the banding device according to the invention;

5 Figure 2 is a top view of the banding device according to the invention;

Figure 3 is a front view of the banding device according to the invention;

Figure 4 is a perspective view of the clipped band according to the invention;

Figure 5 depicts the steps involved in the method of the invention; and

10 Figure 6 is a schematic of the alarms of the control system, according to the invention.

DETAILED DESCRIPTION OF THE BEST MODE AND PREFERRED EMBODIMENT OF THE INVENTION

There is provided an apparatus for attaching a wing type seal, or "clip" to a band of desired length. As shown in Figs. 1, 2 and 3, the apparatus includes a housing, source
15 material retaining means, band feeding means, band end alignment means, clip positioning means, band bending means, band and clip crimping means, band cutting means, protective guard means and control system means.

The source material retaining means may be a spool or other portable means. The band feeding means may be pairs of rollers adjustable to the dimensions of the band to be fed
20 into the apparatus. The infeed includes a beveller to avoid misfeeding of the band when the band has a small radius near the end of a coil.

Preferably, the metal band material is stainless steel strapping, although other metals such as aluminum are also possible. The wing type seals, or clips, are also preferably of stainless steel, although other materials such as aluminum are also possible.

5 The band feeding means include urethane wheels to reduce slippage. A passive encoder is provided to measure the desired band length.

The clip positioning means includes vibrators to position the clips and brushes to stabilize the clips, as well as a photo-eye to detect poor positioning.

10 As shown in Fig. 4, the resulting product from the apparatus and method of the invention is a metal band having a sealable clip at one end. The clip is formed of a unitary member.

15 The apparatus is equipped with several alarm systems to detect problems during operation. An emergency stop button may be pressed to stop the apparatus. Upon reset of an emergency stop, a clearing emergency stop alarm is activated for five seconds before operation resumes. On occasion, a band may slip in the apparatus. If slippage occurs for more than ten cycles of the apparatus, an over slip detection alarm is activated. On occasion, clips in the clip dispenser will become jammed. If there is a clip jam which cannot be cleared by the apparatus in ten attempts, a clip jam alarm is activated. The over slip and clip jam alarms are deactivated by toggling the manual/automatic switch between automatic and manual.

20 The apparatus may be operated in manual mode or automatic mode.

25 According to the method of the invention, the apparatus is prepared by ensuring sufficient band material is available on the source material retaining means, and ensuring the clip dispenser is loaded with clips. The operator selects the desired Forward Length Control setting, Back-up Length Control setting and Band Length Control setting. The operator then sets the Part Number Control to the desired number of bands to be produced. The operator next starts the apparatus and clipped bands are produced. Once in operation, the

apparatus may be stopped at anytime and when restarted, will resume the run which was interrupted.

A length of band is fed into the apparatus and the position of the end of the band is located. The band is retracted slightly and a clip is dropped into position. The band is
5 fed through the clip and a portion of the band extending beyond the clip is bent back upon itself. The band is retracted until the inner surface of the bend of the band comes into contact with the edge of the clip, whereupon the bent band is crimped about the clip. The clip is then crimped about the band. The desired length of band is next fed off the source material coil, severed at the desired length and ejected from the apparatus. The
10 process then repeats to produce the next clipped band.

In operation, the terminus of the metal band is bent back over a wing type seal clip before the band bend and the clip are crimped to firmly attach to one another.

It will be appreciated by those skilled in the art that other variations of the preferred embodiment may also be practised without departing from the scope of the invention.

CLAIMS

What is claimed is:

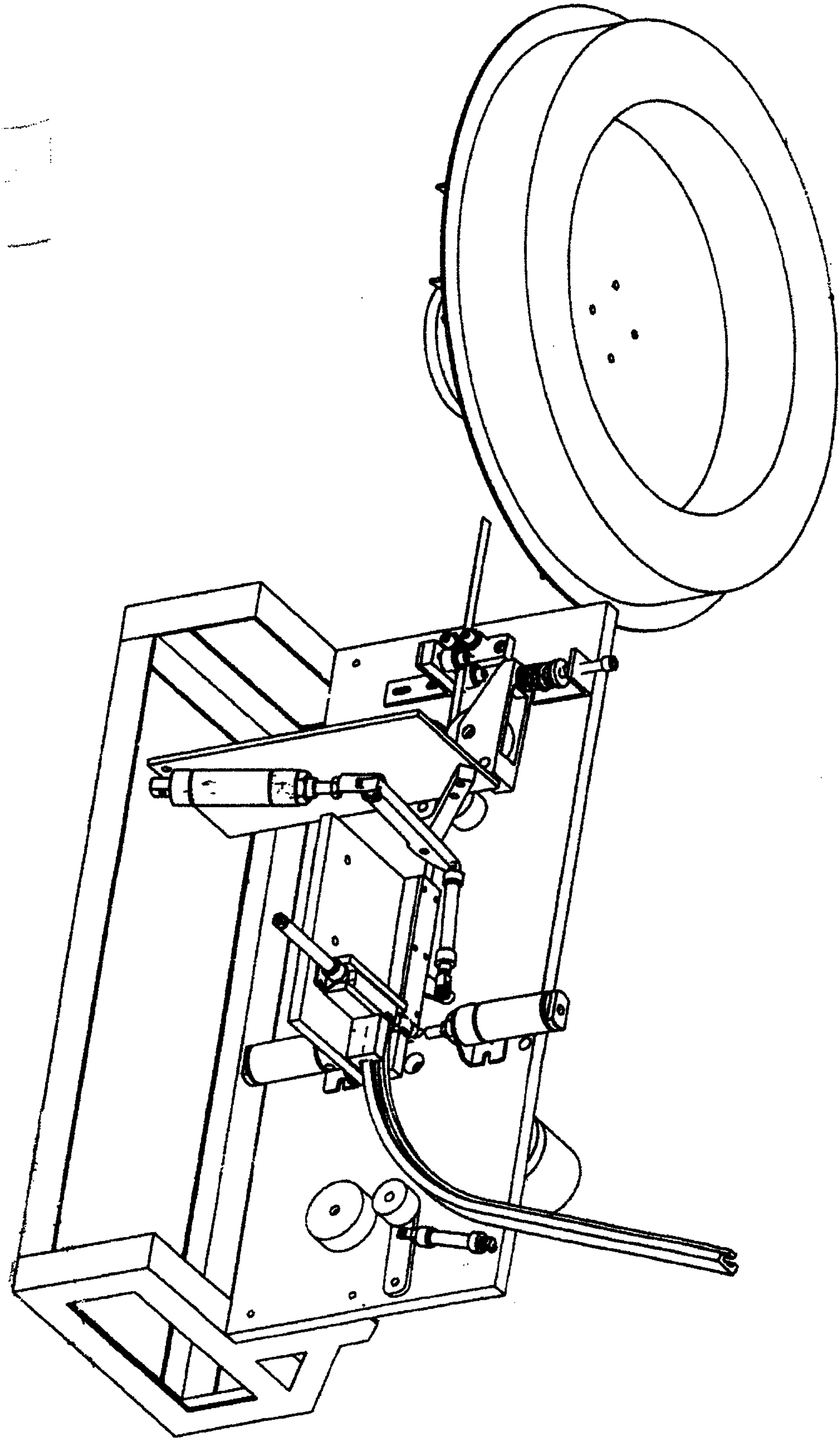
1. A machine for manufacturing a band of desired length having fastening means at one end thereof, said machine comprising:
 - 5 spindle means for maintaining a spool of metal band material in proximity to the machine,
 - feeding means for feeding and ejecting a metal strip material into the machine;
 - end determination means for determining the location of the end of the band material;
 - 10 fastener placement means for positioning the fastener means;
 - band folding means for bending the band about the fastener means;
 - crimping means for crimping the fastening means to the band;
 - cutting means for cutting a desired length of band; and

control means for controlling the manufacturing process.

2. A method for preparing a band of a desired length having a clip at one end, the method comprising the steps of:

- i. band is fed into machine and end of band located
- 5 ii. band is withdrawn;
- iii. clip is inserted into position;
- iv. band is reinserted into machine through loop in clip;
- v. band is bent around loop of clip;
- vi. band pulled back to engage bend with edge of clip loop;
- 10 vii. band is crimped onto loop;
- viii. clip is crimped about band;
- ix. band is fed to desired length; and

- x. strap is cut to desired length.



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Fig 1

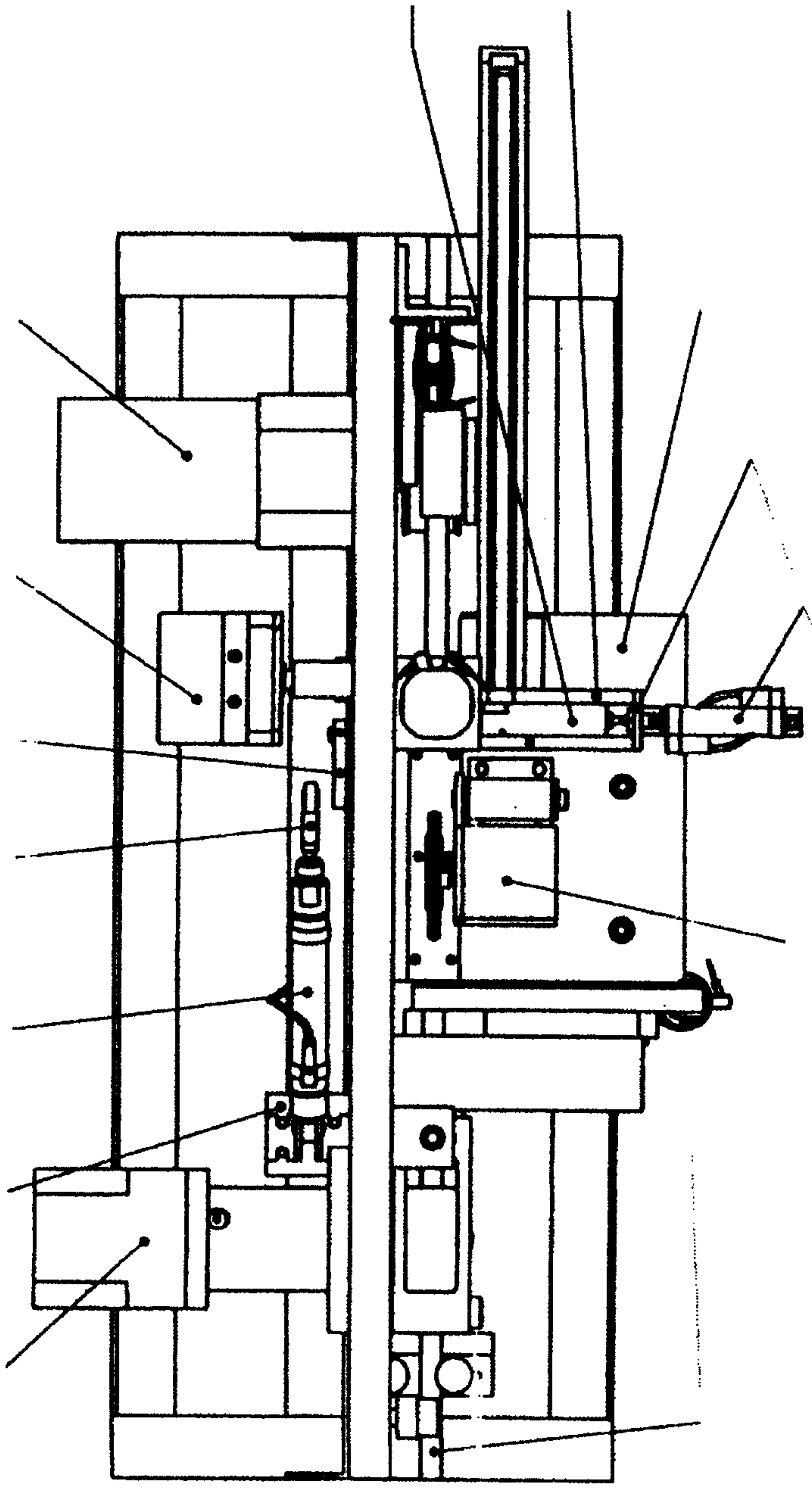
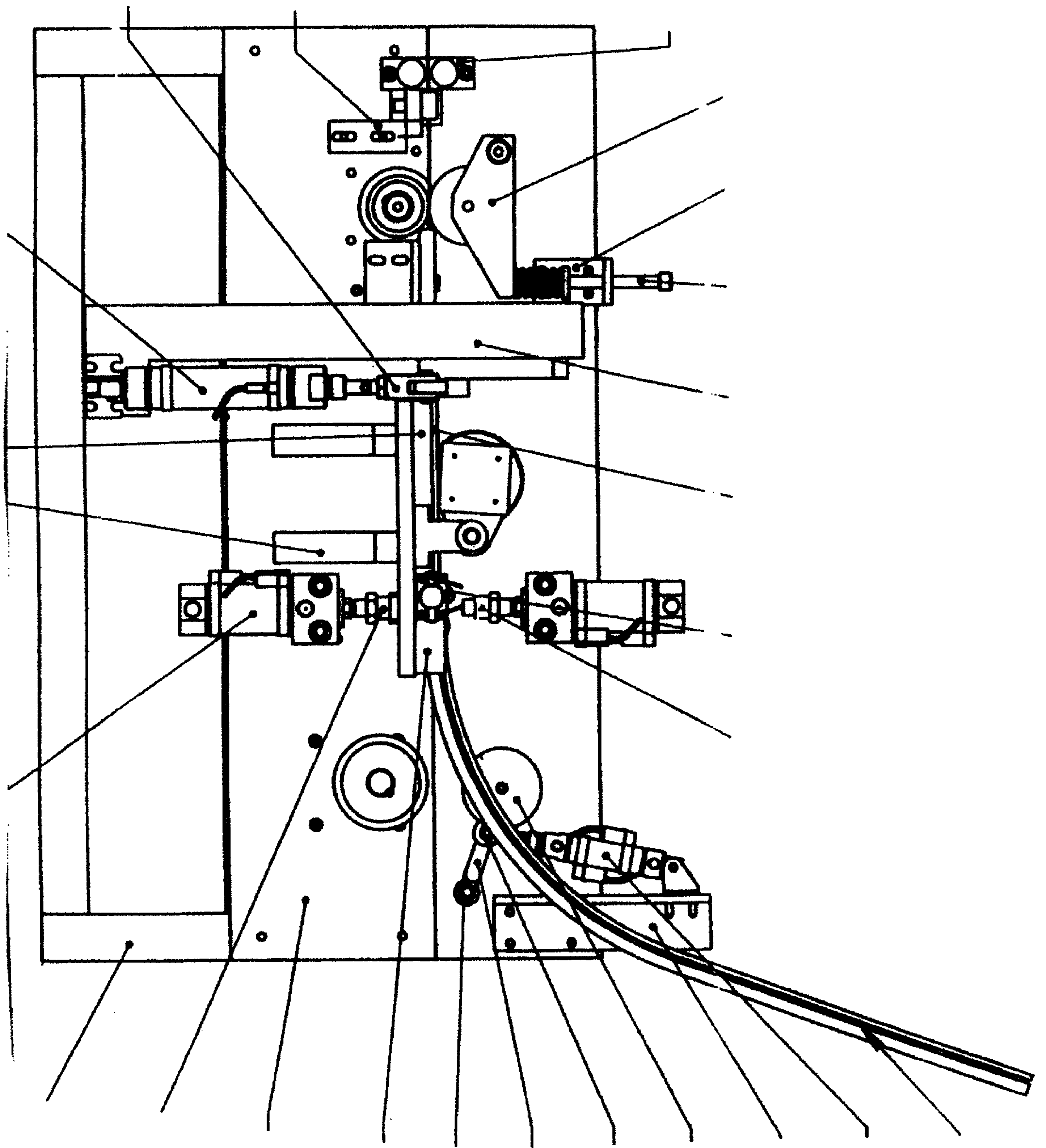
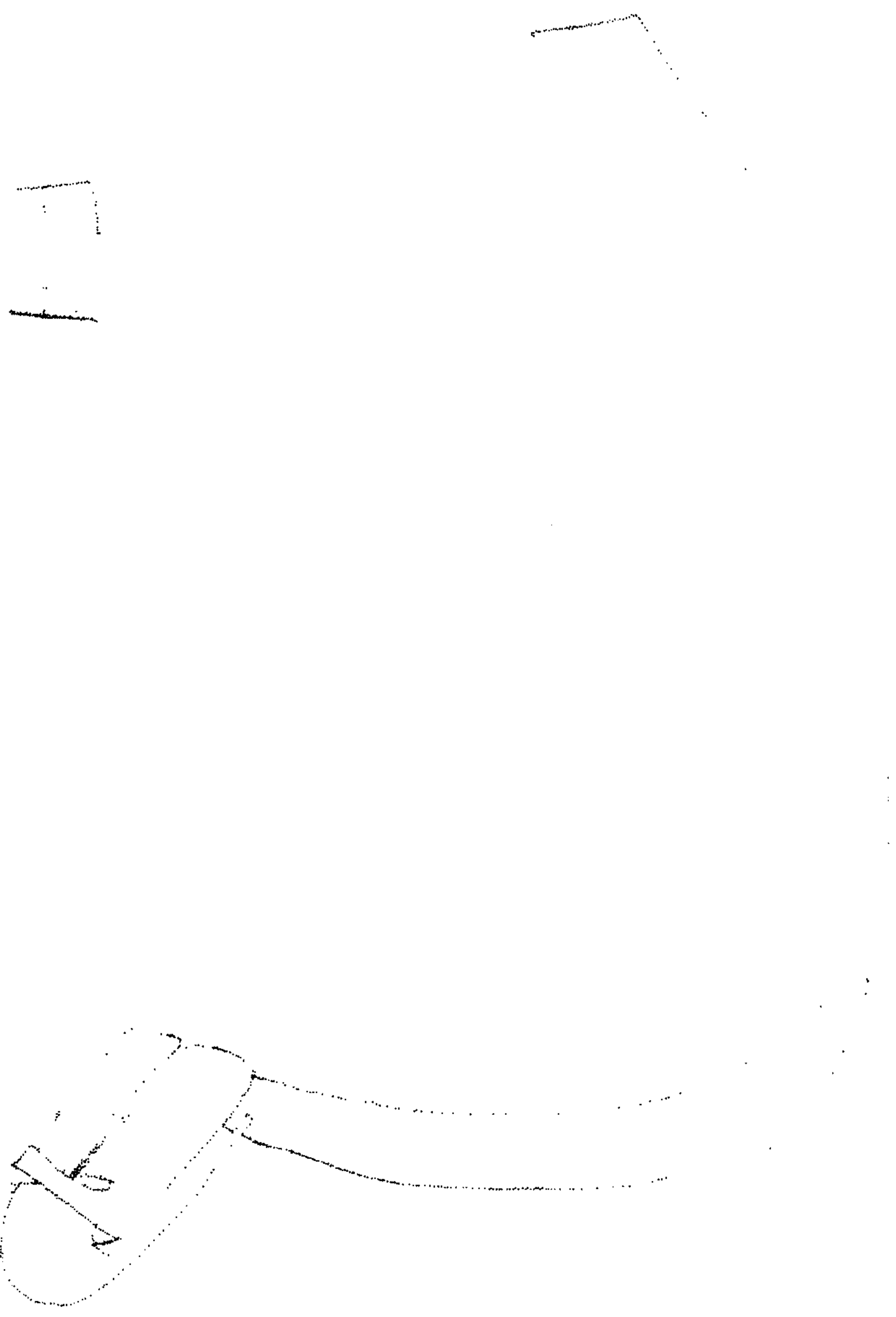
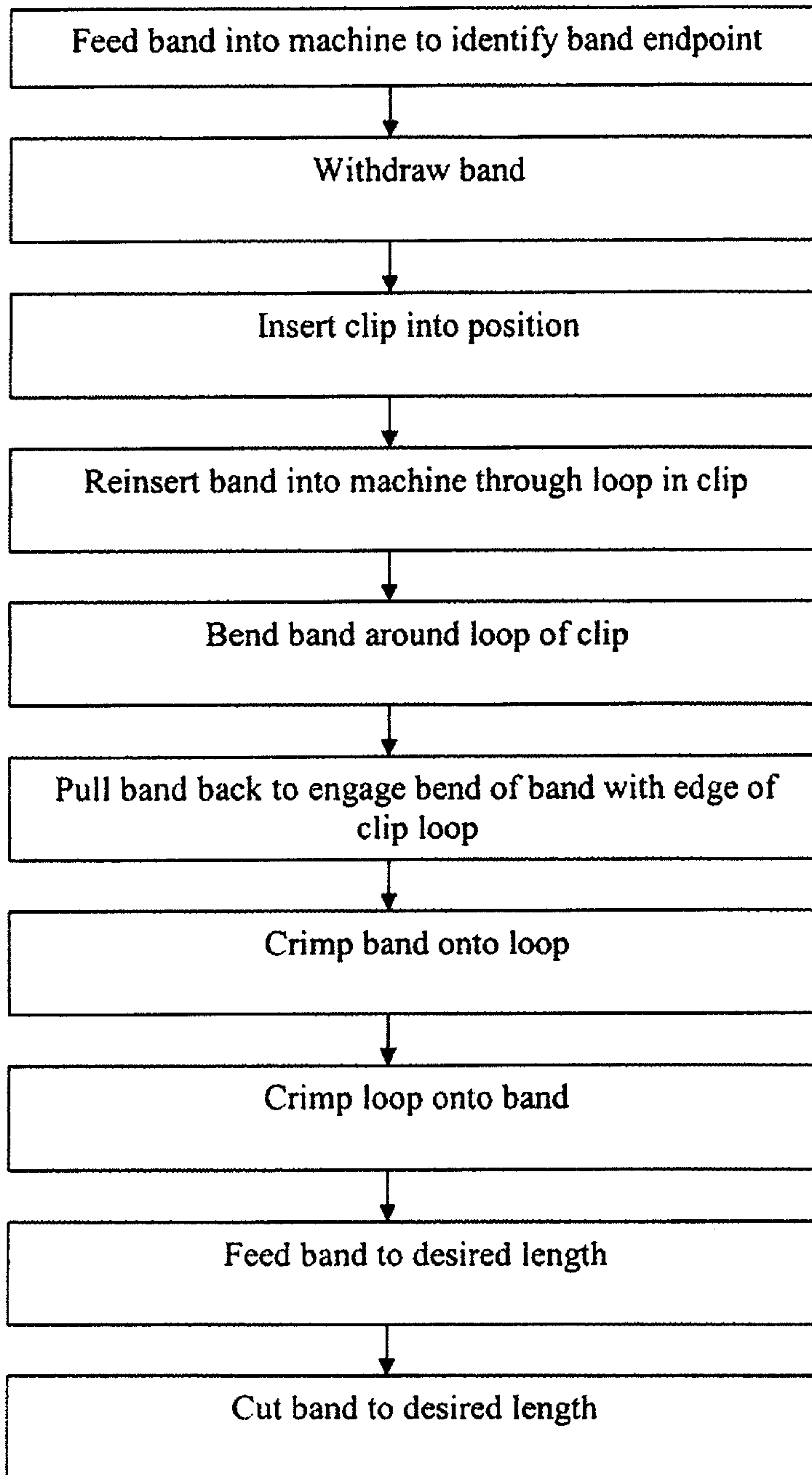


Fig 2





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