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54 **Inserting machine for sheets.**

57 The machine is comprised of a cabinet wherein besides units for collecting, stretching and conveying the sheets, there is mainly provided a cylinder (1) whereover each sheet (9) is pulled by tongs (12,13) moving along the lengthwise direction over said cylinder (1), characterized in that said cylinder is comprised of a torsion tube (1), and means are provided to twist said torsion tube (1) with motors (7,8) acting on the tube ends, about the lengthwise axis thereof as a function of the sensed faulty position of the sheet edge relative to the lengthwise axis of said torsion tube (1).

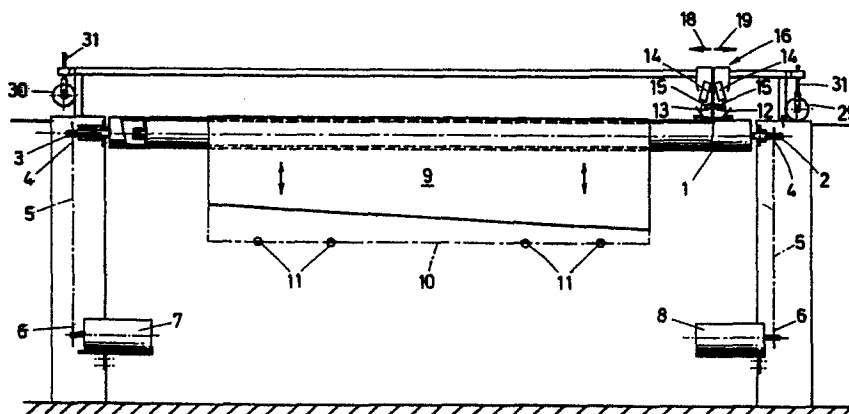


Fig.1.

### Inserting machine for sheets.

This invention relates to an inserting machine for sheets, comprised of a cabinet wherein besides units for collecting, stretching and conveying the sheets, there is mainly provided a cylinder whereover each sheet is pulled by tongs moving along the lengthwise direction over said cylinder.

Inserting machines for feeding sheets to an ironing machine, whereby each sheet is gripped in a corner by a tong and is lead over a cylinder or roller, are known.

Such machines operate relatively slowly because the sheet hanging over said cylinder or roller still has to be brought to the accurate position thereof by one or two operators. It is meant thereby that care should be taken for the edge of that sheet hanging over said cylinder, to be brought in parallel relationship with the cylinder center line. Such operations slow down the machine throughput and it is then also an object of the invention to perform said required operations automatically.

To obtain this according to the invention, said cylinder is comprised of a torsion tube, and means are provided to twist said torsion tube with motors acting on the tube ends, about the lengthwise axis thereof as a function of the sensed faulty position of the sheet edge relative to the lengthwise axis of said torsion tube.

Still according to the invention, said means are comprised of a number photocells which are arranged in a horizontal line level with the ideal position of the one edge from a sheet hanging over said torsion tube.

Other details and advantages of the invention will stand out from the following description of an inserting machine for sheets according to the invention, given by way of non limitative example and with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic front view of an inserting machine according to the invention.

Figure 2 is a diagrammatic-also side view of the same inserting machine.

The components of the inserting machine as shown in figure 1 belong to the invention substance, part of which is to be found also in figure 2.

Figure 1 shows the torsion tube 1 which is fitted at both ends with journals 2 and 3. Chain wheels 4 are mounted thereon, which are driven through chains 5 and chain wheels 6, from motors 7 and 8.

The torsion tube 1 is comprised for example of a spiral-wound wire covered with a flexible material.

In the figures, such difference is not made clear. The torsion tube can due to the materials it is made from, be twisted about the geometrical axis thereof, rightwards or leftwards depending on the revolution direction of motors 7 and 8.

A sheet 9 is shown in full lines as hanging in a faulty position over torsion tube 1, while the accurate position of the sheet is shown in dotted lines. The horizontal dotted line 10 corresponds to the ideal position of sheet 9 relative to torsion tube 1. Level with said lowermost edge of sheet 9 which is shown with dotted line 10, four photocells 11 are provided. Above said torsion tube 1, a set of two tongs 12 and 13 can be moved from the one torsion tube end to the other one (from right to left and vice-versa, as shown in figure 1). The tongs 12 and 13 are opened and closed pneumatically by means of cylinders 14 which are controlled in by contacts 15. The tongs 12 and 13 are part of a structure 16 which is movable to-and-fro along two small parallel beams 17.

When both tongs move along arrow 18, tong 12 only is closed. For the return movement, that is when the tongs move along arrow 19, tong 13 only is closed. Opening a tong occurs when sheet 9 lies in the accurate position on torsion tube 1. Such accurate position is determined by the conjugate operation of photocell 20 and a pulse counter 21.

The pulse counter is associated in a conventional way to a perforated disk 22 which is fast to shaft 23 of electric motor 24. The revolution movement of shaft 23 is conveyed by pulley 25, belt 26 and pulley 27 to shaft 28, which insures by means of a conventional arrangement, not further described here, the displacement in the one or the other direction, of said structure 16 with tongs 12 and 13.

While tongs 12 are closed and thus the sheet moves along arrow 18, the correcting rollers 29 start to operate. Both correcting roller 29 (with similar rollers 30 at the other end of torsion tube 1) are mounted on vertical shafts 31. Both said shafts 31 are mounted on a fixed machine component and are rotatable over 45° to the left or to the right by acting with a pneumatic cylinder 32 on horizontal arms which are welded to bushes 33 which are secured in turn to the top end of said shafts 31. As a tong 12 or 13 opens, the correcting wheels are raised.

A photocell 34 (figure 2) senses the position of a sheet edge and acts through conventional means on the rotation of said correcting wheels 29, 30, respectively.

Along the machine front side, pressure wheels 35 are provided with the object of retaining the sheet pressed against the torsion tube. Each pressure wheel 35 is fastened to an angle bar 36 which is hingedly mounted in 37 relative to the machine. A pneumatic cylinder 38 insures swinging along arrow 39 of said angle bar 36.

Said components as well as the units still to be described, are known and are part of conventional inserting machines.

Said units are among others, a so-called throwing rod 40 which is fastened to the end of two levers 42 swinging in 41. The throwing rod 40 has for object to lay that sheet hanging over the torsion tube on the machine inner side, over a conveying belt 43. Above said conveying belt 43, a cylinder 45 revolving as shown with arrow 44 is provided. The movement direction of the conveying belt is shown with arrow 46.

In figure 2, both positions of the swinging levers 42 are shown in solid line and dotted line, in such a way that the path followed by throwing rod 40 may be deduced therefrom. The alternating displacement of levers 42 is caused by the operation of two cylinders 47. At the end of the stroke from the one lever 42, a magnet contact 48 is provided which cooperates with a magnet 49 secured to that same lever. Closing of the magnet contact generates a signal which is used to cause a temporary faster rotation of motors 7 and 8. The sheet conveyed to the faster-rotating torsion tube 1 is thrown-over fast.

A set of two other swinging levers 50, with a swinging axis in 51, is moved to-and-fro by cylinders 52. At the end of the stroke of levers 50, a rod 53 mounted between the swinging levers, retains the sheet stretched opposite a set brushes 54 which are part of belts passing over pulleys 55.

The above-described components for throwing, brushing and further moving the sheet are known.

An essential characteristic of the invention is the torsion tube 1 and pertaining means for bringing the sheet 9 in the accurate position relative to said torsion tube. The working of said important component is as follows:

When sheet 9 lies in the middle of torsion tube 1, that is with both edges thereof at the same distance from said torsion tube ends, the lowermost edge 10 thereof does not generally lie horizontally. The sheet then lies as shown in solid lines in figure 1. The torsion tube is left to further rotate until that sheet edge which is directed most downwards, comes level with one of said photocells 11. As shown in figure 1, this is the rightwardmost photocell. Said photocell generates a signal whereby the motor 8 is stopped while motor 7 goes on rotating. When the sheet then comes level with the left-hand photocells, the motor 7 is stopped.

Each motor 7 and 8 is controlled by two groups photocells 11 (two leftward ones and two rightward ones). After the sheet has covered leftward or rightward, a group of two photocells, the pertaining motor 7 or 8 rotates until said sheet portion does no more cover the pertaining photocells. When this is the case, it may be considered that the correcting has been made and the sheet is laid over the conveying belt 43 by the above described throwing rod 40.

It is thus clear from the above description that with the use of a torsion tube, the position as sensed by a series photocells, of the sheet edge may be corrected under very good conditions, without requiring the intervention of a machine operator. The throughput of an inserting machine according to the invention is thus substantially increased.

## Claims

1. Inserting machine for sheets, comprised of a cabinet wherein besides units collecting, stretching and conveying the sheets, there is mainly provided a cylinder (1) whereover each sheet (9) is pulled by tongs (12,13) moving along the lengthwise direction over said cylinder (1), characterized in that said cylinder is comprised of a torsion tube (1), and means are provided to twist said torsion tube (1) with motors (7,8) acting on the tube ends, about the lengthwise axis thereof as a function of the sensed faulty position of the sheet edge relative to the lengthwise axis of said torsion tube (1).

2. Inserting machine as defined in claim 1, characterized in that said torsion tube (1) is comprised of a spiral-wound wire covered with a flexible material.

3. Inserting machine as defined in claim 1, characterized in that said means are comprised of a number photocells (11) which are arranged in a horizontal line level with the ideal position of the one edge from a sheet (9) hanging over said torsion tube (1), and each photocell (11) is so arranged as to generate when the sheet lowermost edge lies level with one said photocells (11), a signal which stops the pertaining motor (7 or 8) and causes said motor to rotate in the opposite direction until the sheet (9) lies anew above the pertaining photocell (11).

4. Inserting machine as defined in any one of claims 1 to 3, characterized in that two correcting wheels (29,30) are mounted above said cabinet for said tong (12,13), as considered along the sheet movement direction relative to said torsion tube (1).

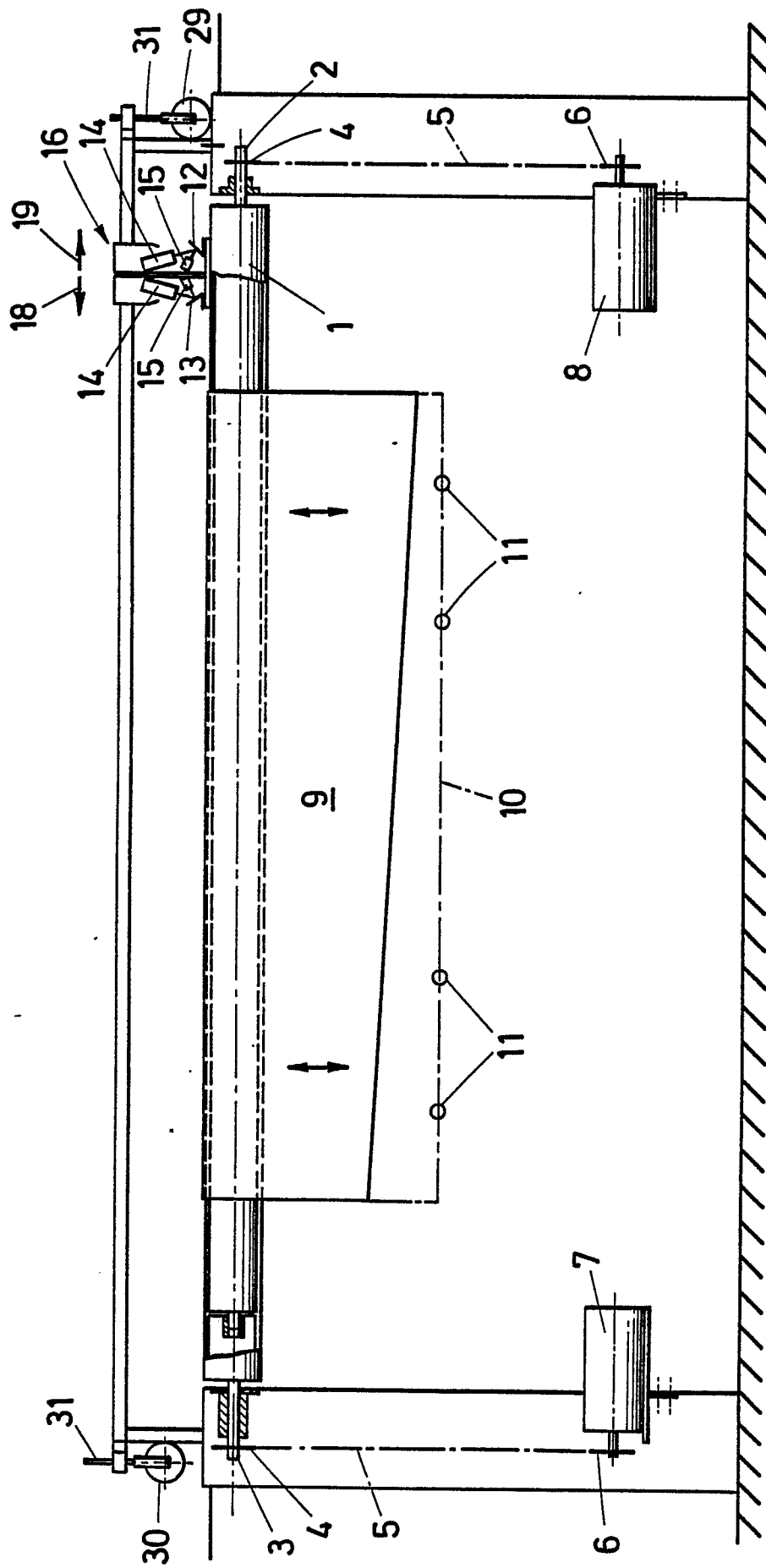


Fig.1.

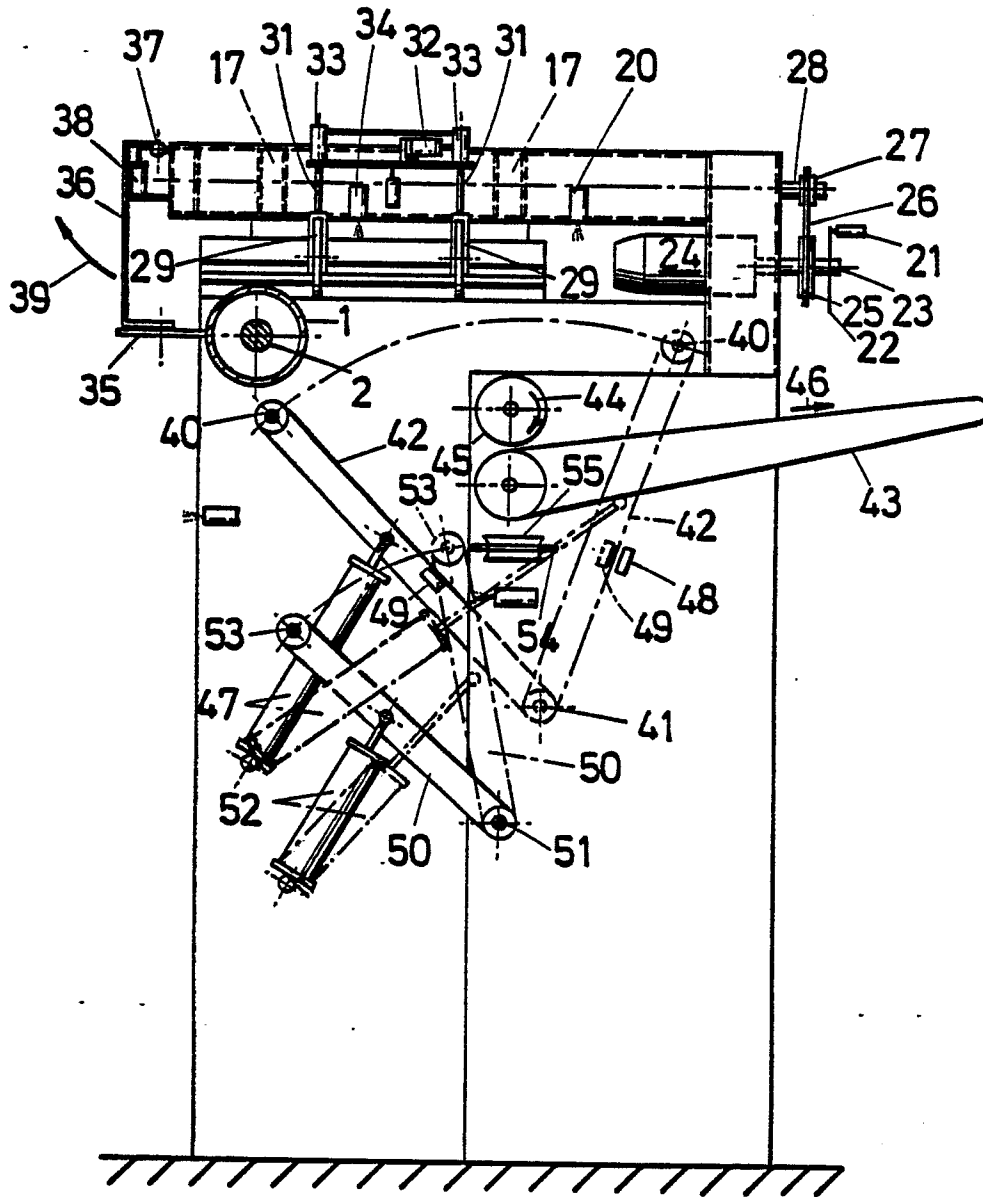


Fig.2.