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(54) System for processing continuous computer-printed forms

(57) The system (13) presents a form cutting and trimming device in turn presenting a transverse form cutting unit (18) with a straight blade (21), and at least one longitudinal form trimming unit (19) with a pair of rotary knives (22,23). The trimming unit (19) is located downstream from and adjacent to the cutting unit (18), so that the rotary knives (22,23) engage the form as soon as it is cut by the blade (21). The forms are fed by means of a guide (92) located upstream from and extending up to the vicinity of the cutting unit (18), and which presents

two facing metal surfaces (21,57) extending across the full width of the forms. The device for cutting and trimming a number of continuous forms may be supplied selectively with a number of continuous forms by means of respective guides (92',93',93); and, for each continuous form, there is provided a pair of drive units (25,26,25',26',25'',26'') so controlled as to invert displacement of the form after it is cut by the blade (21), and so withdraw the edge of the cut-off form from the cutting line into the respective guide (93,93',93'').

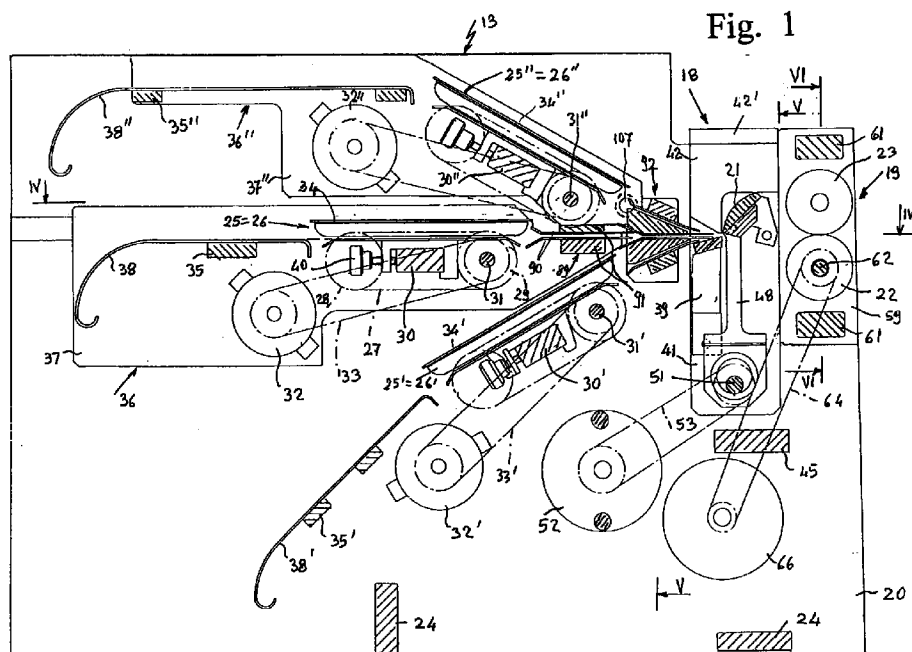


Fig. 1

Description

The present invention relates to a system for processing continuous computer-printed forms, and featuring a form cutting and trimming device.

Various types of devices, commonly referred to as cutters, are known for cutting and trimming continuous forms, and comprise a straight transverse blade for cutting off the forms, at least two pairs of rotary lateral knives for cutting off the perforated edges, and possibly also at least one pair of rotary intermediate knives for cutting the forms longitudinally.

On known cutters, the pairs of rotary knives are located upstream from the blade so as to trim the form while it is still attached to the continuous strip. This is because, if they were located downstream from the blade, the longitudinal distance between the blade and the rotary knives and the rigidity of the controls governing the mechanisms would make it extremely difficult to push the continuous form forward to trim the edges.

Cutters are also known featuring only a transverse blade, but which provide for selectively cutting two or more types of forms for collection at other stations within the system. Cutters of this sort, however, require a separate trimming unit for each form drive unit, so that they are relatively expensive to produce.

Moreover, once the perforated edges are cut off, the form may slip and be cut transversely out of line, thus preventing the detached form from being aligned correctly with others in a pack; and the cut-off perforated edges must be chopped and compacted for easy disposal.

A so-called twin cutter has also been proposed, wherein two continuous forms are fed selectively to one cutting and trimming point, where each form is first trimmed along the edges and then cut transversely. This type of cutter, however, is also subject to misalignment, and requires subsequent chopping and compacting of the cut-off perforated edges.

Finally, a drawback common to all known cutters for cutting at least two types of form is that relatively large portions of the forms are superimposed prior to engaging the cutting unit, so that, throughout the time it is being trimmed, the form, which is fed by conventional sprocket type drive units, is forced to slide over a temporarily stationary form. Such sliding frequently results in jamming, especially at the folds across the continuous forms and which are frequently perforated.

It is an object of the present invention to provide a system for processing continuous forms, featuring a highly straightforward, reliable form cutting and trimming device designed to overcome the aforementioned drawbacks typically associated with known systems.

According to the present invention, there is provided a system for processing continuous computer-printed forms, and featuring a device for cutting and trimming the forms; said device comprising means for feeding the continuous forms; a unit for transversely cutting the continuous forms, and presenting a straight blade; and at least

one unit for longitudinally trimming the continuous forms, and presenting a pair of rotary knives; characterized in that said trimming unit is located downstream from and adjacent to said cutting unit, so that said rotary knives engage the edge of a form as soon as it is cut by said blade.

According to a further characteristic of the present invention, said feed means comprise a guide for guiding the uncut forms, and located upstream from and extending up to the vicinity of said cutting unit; said guide comprising two facing metal surfaces extending across the full width of the forms.

According to a further characteristic of the present invention, the system comprises further feed means for at least one further continuous form, and a metal guide for each continuous form; said feed means comprising, for each continuous form, a pair of drive units so controlled as to invert displacement of the form following operation of said blade, and so withdraw the edge of the cut-off form from the cutting line of said blade into the corresponding metal guide.

A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a partial longitudinal section of a system for processing continuous computer-printed forms, and featuring a cutting and trimming device in accordance with the present invention;

Figure 2 shows a larger-scale portion of Figure 1;

Figure 3 shows a partial longitudinal section of the system, illustrating feeding of the continuous forms; Figure 4 shows a partial horizontal section along line IV-IV in Figure 1;

Figure 5 shows a partial longitudinal section along line V-V in Figure 1;

Figure 6 shows a section along line VI-VI in Figure 1; Figure 7 shows a section along line VII-VII in Figure 6;

Figure 8 shows a section along line VIII-VIII in Figure 6;

Figure 9 shows a section along line IX-IX in Figure 6; Figure 10 shows a schematic vertical section of a detail of the system;

Figure 11 shows a schematic plan view of the system;

Figure 12 shows a diagram of the electronic control unit of the system.

Continuous computer-printed forms are in the form of a strip 10 (Figures 3 and 4) of fanfold paper, possibly with a perforated line along each fold 11, and present a column of feed holes 12 along each lateral edge. Each page of the form may be printed with one or more documents which, in the latter case, may be shorter than the page and/or be arranged longitudinally in two or more columns.

With reference to Figure 11, the system according to the present invention comprises at least one form cut-

ting and trimming device indicated as a whole by 13 and hereinafter referred to as a "cutter"; a station 14 for collecting the cut-off forms into packs; a pack conveyor 16; and a pack stapling station 17 followed by an enveloping station (not shown) where the pack of forms is inserted inside an envelope. In general, the forms in each pack are cut selectively in a predetermined number from different continuous forms 10.

Cutter 13 (Figure 1) comprises a unit 18 for transversely cutting continuous forms 10, and presenting a straight blade 21; and a unit 19 for longitudinally trimming continuous forms 10, and in turn comprising at least one pair of rotary knives 22 and 23. As shown in more detail later on, knives 22 and 23 may be so arranged as to trim the edge of form 10, or cut it longitudinally to separate two sets of side by side printouts. Units 18 and 19 are mounted on a support of cutter 13 comprising two sides 20 connected by cross members 24.

Cutter 13 also comprises at least one pair of drive units 25 and 26 (see also Figure 4) for feeding continuous form 10, and of the type comprising a pin chain 27 looped about two toothed rollers 28 and 29 and engaging holes 12 in form 10. The rollers 29 of units 25 and 26 are fixed angularly to a transverse shaft 31 driven by an electric motor 32 via a drive belt 33; and each unit 25, 26 presents a plate 34 pivoting on the outer edge of respective unit 25, 26, and which provides for keeping the edges of form 10 in contact with chain 27.

Motor 32 and shaft 31 are fitted to a frame 36 in turn fitted to sides 20 of cutter 13, as described in more detail later on, and comprising two sides 37 connected by a cross member 30 and at least a further cross member 35. Units 25 and 26 are fitted to cross member 30 by a screw 40, and are movable transversely along cross member 30 and shaft 31 to adjust to the width of continuous form 10. The other cross member 35 is fitted with a sheet metal support 38 for continuous form 10.

According to the present invention, trimming unit 19 is located adjacent to and downstream from cutting unit 18 in the feed direction of forms 10, so that rotary knives 22 and 23 engage the transverse edge of the form as soon as it is cut by blade 21. More specifically, cutting unit 18 is fitted to a further frame comprising two rectangular side plates 41 connected by a cross member 42 which, together with a bar 39, forms the cutting matrix of unit 18. Cross member 42 (see also Figure 5) presents two appendices 42' by which unit 18 is fitted adjustably to the two sides 20 of cutter 13, with the shorter sides of plates 41 positioned horizontally.

Blade 21 of unit 18 is fitted removably and adjustably to a crossbar 43 (Figure 2), the two ends of which present two arms 44 pivoting at 46 on plates 41. A hinge pin 47 at each end of crossbar 43 supports one end of a connecting rod 48, the other end of which engages a respective cam 49.

The two cams 49 are fitted to a shaft 51, which is rotated cyclically one turn by a further electric motor 52 (Figure 1) via a toothed belt 53. Motor 52 is fitted to one of sides 20 of cutter 13; and shaft 51 (Figure 5) is fitted

to plates 41 by means of bearings and in an adjustable position in relation to a cross member 45 fitted to sides 20.

Cross member 42 and bar 39 define a substantially trapezoidal-section opening 56, the bottom side of which is fitted with a counterblade 57; and the rear edge of counterblade 57 is engaged by blade 21 to transversely cut forms 10, and therefore forms the cutting line of cutter 13.

Unit 19 is also fitted to a further frame also comprising two rectangular side plates 59 (Figures 1 and 4) connected by two cross members 61 and fitted to the two sides 20 of cutter 13 so that cutting unit 18 is located as close as possible longitudinally to trimming unit 19.

Plates 59 (Figure 6) are fitted with a rotary shaft 62, one end 63 of which extends beyond plate 59 and is rotated clockwise, together with shaft 62, by a further electric motor 66 (Figure 1) via a toothed belt 64. Shaft 62 and cross members 61 are fitted with two symmetrical units 68, 69 (Figure 6) for trimming the edges of forms 10.

Each unit 68, 69 comprises a support 70 fitted to the top cross member 61 in a transverse position corresponding to the width of forms 10, and presents two sleeves 71, 72 fitted angularly with knives 22 and 23, the diameter of which is such as to keep the two cutting edges slightly overlapped radially. By means of rolling bearings 73, sleeves 71 and 72 rotate on support 70; and sleeve 71 is driven by shaft 62 and a friction joint 74.

Sleeves 71 and 72 are fitted with respective identical gears 75, so that knives 22 and 23 rotate synchronously in opposite directions. Knife 23 is fitted rigidly to sleeve 72, while knife 22 is angularly integral with sleeve 71, but movable axially along it by means of a Belleville washer 67 which pushes knife 22 transversely to keep it against knife 23.

Each unit 68, 69 presents an opening 80 extending along part of its length to permit the passage of form 10 to be trimmed, and which is fitted inside with two sheet metal plates 76 (Figure 7) for guiding form 10. Guide plates 76 comprise a flat, horizontal front portion 77; and a rear portion divided into a flat central portion 78 coplanar with portion 77 and for guiding the trimmed form, and a downwardly bent lateral portion 79 for downwardly conveying the edges cut off form 10.

Trimming unit 19 may also be provided with one or more longitudinal cutting units 81 (Figures 6 and 8) located between units 68 and 69, for separating any side by side documents on form 10. As each unit 81 is similar to units 68 and 69, the components performing the same function as in units 68, 69 are indicated using the same reference numbers with superscripts, and with no further description. As form 10, however, must be fed through each unit 81, this presents a support comprising a bottom portion 70' and a top portion 70'' connected separately to the two cross members 61.

The facing surfaces of portions 70' and 70'' are fitted with two parallel sheet metal plates 76' for guiding the cut form 10 and wherein the downwardly bent portion is obviously dispensed with; sleeves 71' and 72' present no

gears 75, so that knife 23 is rotated by friction; knife 22 is fitted to sleeve 71', which is driven by shaft 62 via a friction joint 74'; and knife 23 is pushed axially against knife 22 by Belleville washer 67'.

Unit 19 also comprises a number of rubber-coated rollers 82 (Figures 6 and 9) for feeding forms 10, and which are fitted angularly integral with shaft 62 by a screw-tightened elastic clamp 85. Each roller 82 cooperates with a small rubber-coated pressure roller 83 fitted to an arm 84 (Figure 9) pivoting on a support 86; arm 84 is pushed clockwise (in Figure 9) by a spring 87 to keep roller 83 resting on roller 82; and each support 86 is fitted to top cross member 61 of unit 19 in the transverse position in which form 10 is to be engaged.

According to a further characteristic of the present invention, between drive units 25, 26 and cutting unit 18 (Figures 1 and 4), there is provided a first guide 89 for guiding the uncut forms 10, and which comprises two parallel sheet metal plates 90 fitted to two cross members 91 of frame 36. Plates 90 present a bent lead-in portion, are positioned facing each other, and extend across the full width of forms 10, which are thus fed to cutting unit 18 with very little friction.

Behind guide 89, there is provided a group of guides indicated as a whole by 92 and comprising the main guide of each continuous form. The main guide of form 10, indicated by 93 in Figure 2, comprises two parallel sheet metal plates 94 presenting a bent front lead-in portion 95 engaged by plates 90 of guide 89.

Plates 94 lie in the horizontal plane through the cutting line of unit 18, extend rearwards over counterblade 57 in opening 56, and are fitted to two facing surfaces of two metal crossbars 96 fitted to two sides 99 of group 92. By means of sides 99, therefore, group 92 may be fitted directly and adjustably to sides 20 of cutter 13.

More specifically, crossbars 96 (Figure 2) are in the form of a substantially trapezoidal prism with the inclined surfaces of the prism parallel to each other; plates 94 are fitted to the inclined surfaces; and lead-in portion 95 rests on the smaller side of the prism.

Cutter 13 also presents a further two pairs of drive units 25', 26' and 25'', 26'' (Figures 1 and 3) for a further two continuous forms 10' and 10''. As these are identical to pair 25, 26, the corresponding parts are indicated in the drawings using the same reference numbers, with the same superscript as the relative pair of units, and with no further detailed description.

More specifically, pairs of drive units 25', 26' and 25'', 26'' present respective main guides 93' and 93'' lying in respective planes incident on and substantially symmetrical in relation to the plane of plates 94 through the cutting line; and plates 94 extend inside opening 56, beyond the line of incidence of guides 93' and 93''.

More specifically, main guide 93' of bottom form 10' (see also Figure 3) is formed by the surface of the larger side of the prism of one of crossbars 96, and by a sheet metal plate 94' fitted to a rectangular-section bar 97 fitted to sides 99; and main guide 93'' of top form 10'' is formed by the surface of the larger side of the prism of the other

crossbar 96, and by another sheet metal plate 94'' fitted to another rectangular-section bar 98 also fitted to sides 99.

Motors 32, 32', 32'' of the three pairs of drive units, motor 52 of cutting unit 18, and motor 66 of trimming unit 19 all present a respective position transducer or encoder EN (Figure 12), and are controlled by an electronic control unit 100, which is so programmed as to selectively feedback activate, by means of respective actuators AZ, motors 32, 32', 32'' to feed forms 10, 10', 10'' alternately to cutting unit 18, and motors 52, 66 for a cutting and trimming cycle.

The system also presents a proximity sensor S1 for detecting the position of blade 21 (see also Figure 1) to permit control unit 100 to synchronize the travel of forms 10, 10', 10'' with the operation of blade 21; and an optical-fiber sensor S2 for detecting the edge of form 10, 10', 10'' in guide group 92, to permit control unit 100 to synchronize operation of cutting and trimming units 18, 19 with the position of the edge of form 10, 10', 10'', and for also indicating the absence of the form, e.g. due to tearing, or because the form has run out.

According to a further characteristic of the present invention, unit 100 is so programmed as to activate motor 66 for a time corresponding to the length of the form to be trimmed, and then temporarily stop motor 66 and activate motor 52 for one cycle of cutting unit 18 to cut the form transversely.

As soon as the form is cut, motor 66 is again activated to allow unit 19 to finish trimming the portion of the form which, when the form was cut, was located between the cutting line and knives 22, 23. Perfect synchronization of motors 52 and 66 thus ensures stressfree cutting and trimming of the form; and the paper strip trimmed off the edges of the forms is thus chopped, i.e. cut into pieces of the same length as the cut-off forms, for easy disposal.

Moreover, to prevent two forms 10, 10', 10'' superimposed in the small space between plates 94, 94', 94'' from contacting each other, control unit 100 is so programmed that, as soon as the form is cut transversely, the relative motor 32, 32', 32'' is inverted for a predetermined time, to withdraw into the respective guide the portion of form 10, 10', 10'' between the cutting line and the edge of guide 93, 93', 93'', and so prevent friction with the next form 10, 10', 10''.

Frame 36' (Figure 3) of the bottom pair of drive units 25', 26' is fixed to sides 20 of cutter 13, and is provided with a respective fixed basket 101 for continuous form 10'.

Similarly, frame 36 of the middle pair of drive units 25, 26 is provided with a further fixed basket 105, and presents bushes 102 traveling along two parallel guides 103 fitted to sides 20 of cutter 13. Frame 36 is locked on to guides 103 by a known spring-operated push knob 104, and is released by pulling knob 104. To assist insertion of form 10' between drive units 25' and 26', after pulling out knob 104, frame 36 may be shifted forward into the position shown by the dotted line in Figure 3.

Finally, frame 36" of the top pair of drive units 25", 26" presents two transverse bushes 106 rotating on two pins 107 on sides 20; the edge 108 of sides 37" of frame 36" normally rests on a respective stop 109 on respective side 20; and frame 36" is provided with a basket 110 for continuous form 10".

Basket 110 is fitted to a structure 111 (Figure 10), on either side of which are hinged the ends of two levers 112, the other two ends of which are hinged at 113 to two plates 115 fitted to sides 20, so as to form an articulated parallelogram on either side.

Frame 36" may be rotated about pins 107 into the position shown by the dotted lines in Figures 3 and 10; and basket 110 may be moved parallel to itself into the position shown by the dotted line in Figure 10, to clear the space in front of frame 36 and so insert form 10 between drive units 25 and 26.

Finally, support 20, 24 of cutter 13 is connected to the system frame on one side by a side hinge 114 (Figure 11), and on the other side by a clamping member (not shown in Figure 11), to enable cutter 13 to be rotated about hinge 114 and so permit access to the inside of the system for maintenance or repair work.

Figure 11 shows a second cutter 13' also fitted on a hinge 114'; and the cut and trimmed forms of the two cutters 13, 13' are collected into programmed packs at collecting station 14, are fed by conveyor 16 to stapling station 17, and finally to the enveloping station.

Both cutters 13 and 13' are controlled by the same control unit 100; and, in Figure 12, the reference numbers of the parts of cutters 13 and 13' connected to unit 100 are accompanied by letters A and B respectively.

The advantages of the system according to the present invention will be clear from the foregoing description. In particular, it provides for eliminating any danger of the forms jamming, thus enabling an increase in operating rate or speed.

Clearly, changes may be made to the system as described and illustrated herein without, however, departing from the scope of the present invention. For example, bar 39 may pivot on the bottom of sides 41 and be pushed by a spring (not shown) to keep counterblade 57 resting elastically on blade 21 during the cutting operation.

Also, frame 36' of the bottom pair of drive units 25', 26' may be dispensed with, and the parts of the drive units fitted directly to sides 20; and control unit 100 may comprise dedicated circuits as opposed to a programmable computer.

Claims

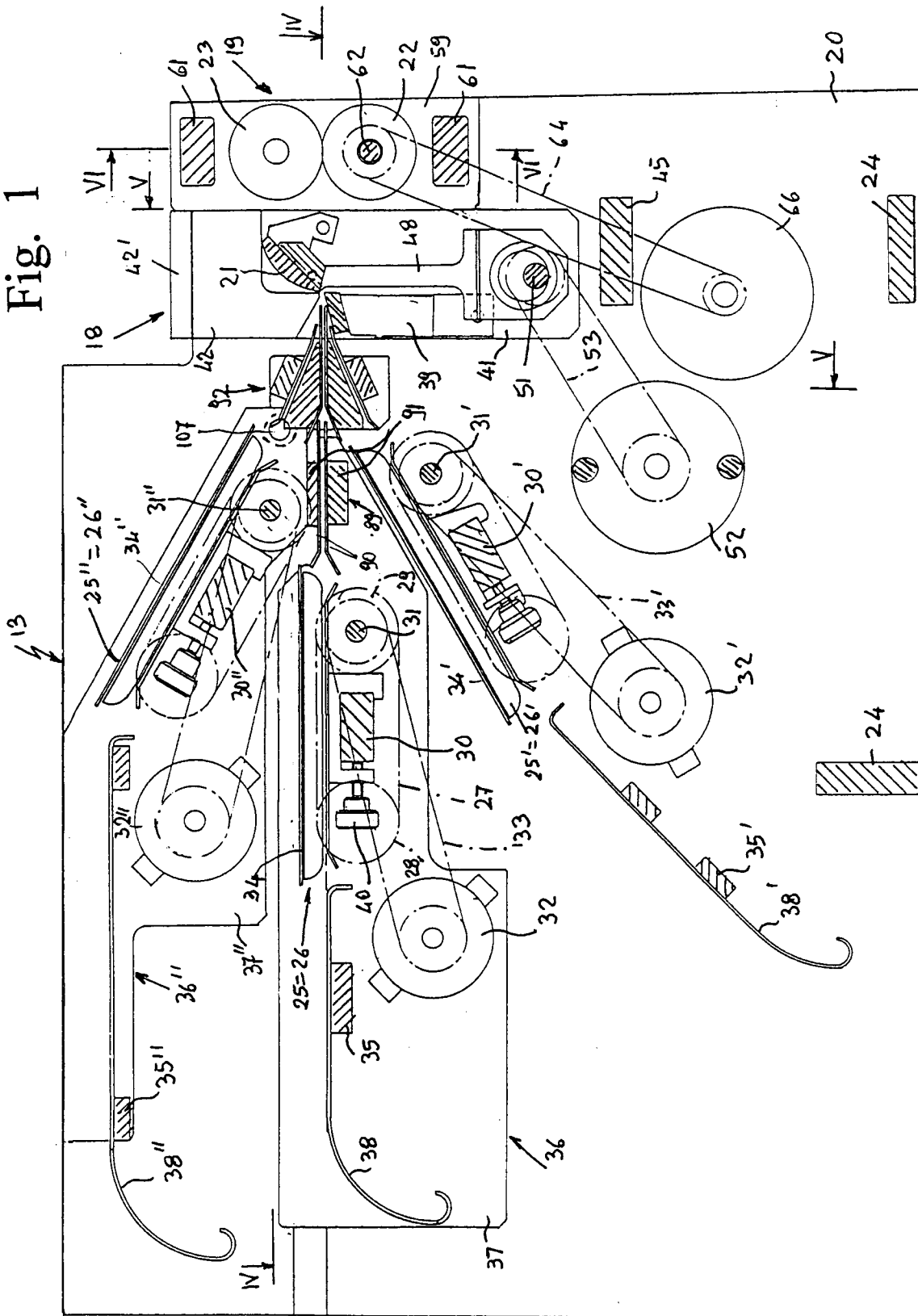
1. A system for processing continuous computer-printed forms, and featuring a device for cutting and trimming the forms; said device comprising means for feeding the continuous forms; a unit for transversely cutting the continuous forms, and presenting a straight blade; and at least one unit for longitudinally trimming the continuous forms, and presenting

a pair of rotary knives; characterized in that said trimming unit (19) is located downstream from and adjacent to said cutting unit (18), so that said rotary knives (22, 23) engage the edge of a form as soon as it is cut by said blade (21).

2. A system as claimed in Claim 1, characterized in that said feed means comprise a guide (93, 93', 93'') for guiding the uncut forms, and located upstream from and extending up to the vicinity of said cutting unit (18); said guide comprising two facing metal surfaces (94; 96, 94'; 96, 94'') extending across the full width of the forms.
3. A system as claimed in Claim 2, characterized in that it comprises further feed means for at least one further continuous form, and at least one metal guide (93', 93'') for said further continuous form; said feed means comprising, for each continuous form, a pair of drive units (25, 26; 25', 26'; 25'', 26'') so controlled as to invert displacement of the form following operation of said blade (21), and so withdraw the edge of the cut-off form from the cutting line into the corresponding metal guide (93, 93', 93'').
4. A system as claimed in one of the foregoing Claims, characterized in that said pair of knives (22, 23) is fitted to a pair of elements (71, 72) rotated in opposite directions by a first actuator (66); said blade (21) being activated cyclically by a second actuator (52); and control means (100) being provided to activate said first actuator (66) intermittently and in time with said second actuator (52).
5. A system as claimed in Claim 4, characterized in that said actuators comprise two electric motors (52, 66) controlled by control means comprising a programmable electronic unit (100).
6. A system as claimed in Claim 4 or 5, characterized in that a first element (71) in said pair of elements (71, 72) is fitted with one knife (22) in said pair; elastic means (67) being provided for pushing one of said knives axially against the other knife.
7. A system as claimed in Claim 6, characterized in that said elements (71, 72) are connected to each other by a pair of gears (75).
8. A system as claimed in Claim 6 or 7, characterized in that said elements (71, 72) are fitted to a support (70) fittable in an adjustable transverse position; said first element (71) being activated by a shaft (62) rotated by said first actuator (66); a number of form feed rollers (82) being fitted to said shaft (62); and said feed rollers (82) being engaged elastically by respective pressure rollers (83).

9. A system as claimed in Claim 5 and one of Claims 6 to 8, characterized in that said blade (21) is fitted to a cross member (43) pivoting on a transverse pivot (46) and activated cyclically by one of said electric motors via a mechanism comprising a cam (49) and a connecting rod (48). 5
10. A system as claimed in Claims 8 and 9, characterized in that said cross member (43) and said mechanism are fitted to a first frame (41, 42) supporting said cutting unit (18); said shaft (62), said support (70) and said rollers (82, 83) being fitted to a second frame (59, 61) supporting said trimming unit (19); and said first and second frames being fitted to the system adjacent to each other. 10 15
11. A system as claimed in Claim 2 and one of Claims 3 to 10, characterized in that said feed means comprise a pair of drive units (25, 26) upstream from said guide (93) and activated intermittently by a third actuator (32). 20
12. A system as claimed in Claims 5 and 11, wherein said third actuator comprises a third electric motor, characterized in that said third motor (32) is also controlled by said electronic unit (100). 25
13. A system as claimed in Claims 3 and 12, characterized in that said metal guides (93, 93', 93'') are so designed that said continuous forms (10, 10', 10'') come together at a cutting line; said continuous forms being fed alternately to said cutting line. 30
14. A system as claimed in Claim 12 or 13, characterized in that each said third motor (32, 32', 32'') is reversible; said electronic unit (100) being so programmed as to invert each said third motor following operation of said blade (21), and so withdraw the edge of the relative cut-off form from said cutting line into the respective metal guide (93, 93', 93''). 35 40
15. A system as claimed in Claim 13 or 14, characterized in that one (93) of said metal guides is substantially located in a plane through said cutting line; a further two metal guides (93', 93'') for a further two continuous forms being located in a further two planes incident on and substantially symmetrical in relation to said plane through said cutting line. 45
16. A system as claimed in Claim 15, characterized in that said metal guides are adjacent to said cutting line; said first guide (93) comprising two metal plates (94) fitted to two substantially trapezoidal-section crossbars (96). 50
17. A system as claimed in Claim 16, characterized in that said further metal guides each comprise a surface of one of said crossbars (96), and a metal plate (94', 94'') parallel to said surface; said two metal plates (94) fitted to said crossbars (96) extending towards said cutting line and beyond the line of incidence of said further planes. 55
18. A system as claimed in one of the foregoing Claims from 12 to 16, characterized in that each said pair of drive units is fitted to a respective separate frame (36, 36', 36''); at least one of said separate frames being movable manually on the system to permit insertion of the corresponding continuous forms into the other pairs of drive units.
19. A system as claimed in Claim 18, characterized in that the frame (36') of the bottom pair of drive units is fixed to the system; the frame (36) of the middle pair of drive units is mounted so as to move parallel to said plane through the cutting line; and the frame (36'') of the top pair of drive units is mounted on a pivot (107) adjacent to the respective metal guide (93'').
20. A system as claimed in Claim 19, characterized in that each said pair of drive units is provided with a structure (101, 105, 110) for loading the continuous forms; at least the structure (110) of the top pair of drive units being connected to the system by a pair of articulated parallelograms (112) to lift it parallel to itself when said top pair of drive units is rotated about the respective pivot (107).
21. A system as claimed in one of the foregoing Claims from 18 to 20, characterized in that said crossbars (96) are so mounted as to form a further independent frame (99) fittable to the system adjacent to said cutting unit (18).
22. A system as claimed in one of the foregoing Claims, characterized in that said cutting and trimming device (13) is fitted to a single support (20, 24) pivoting about a vertical axis (114) and rotated manually to permit access to the inside of the system.
23. A system as claimed in Claim 22, characterized in that it comprises two cutting and trimming devices (13, 13') fitted to two separate supports (20, 24) pivoting on either side of a unit (14) for assembling the cut and trimmed forms.
24. A system as claimed in Claim 24, characterized in that said assembling unit (14) comprises a single stapling unit (17).

Fig. 1



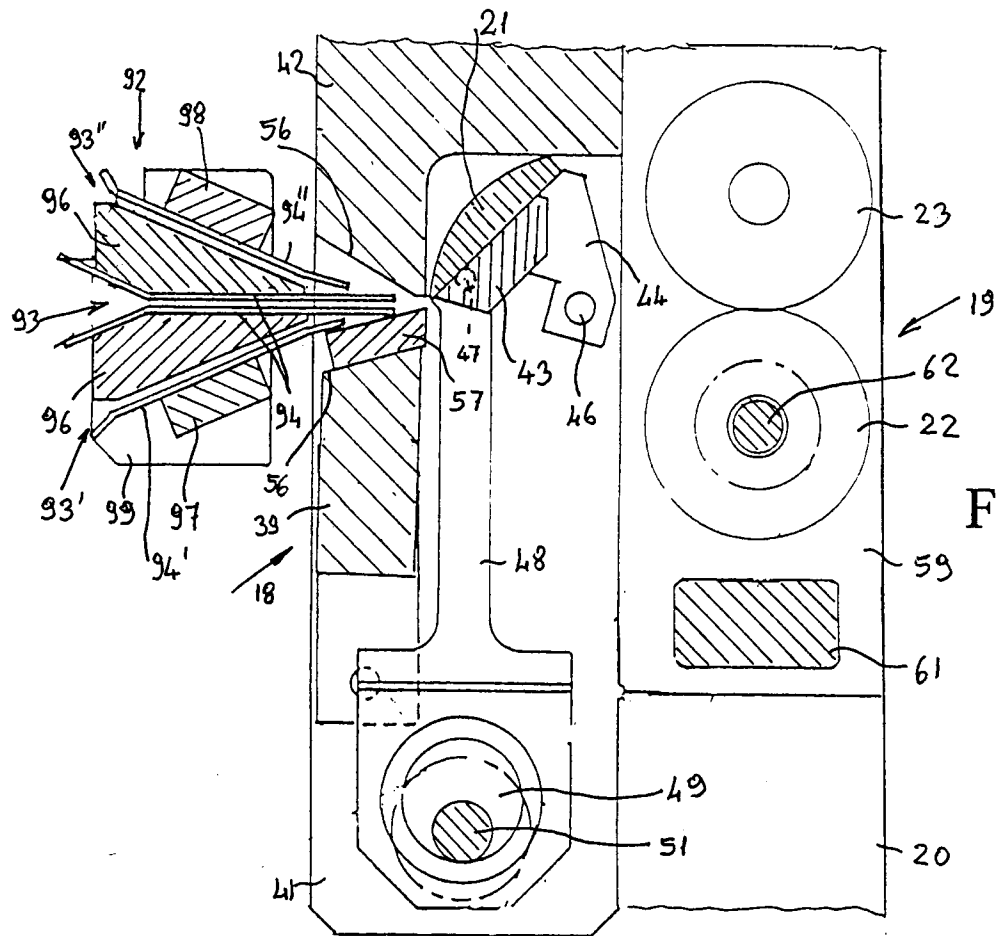


Fig. 2

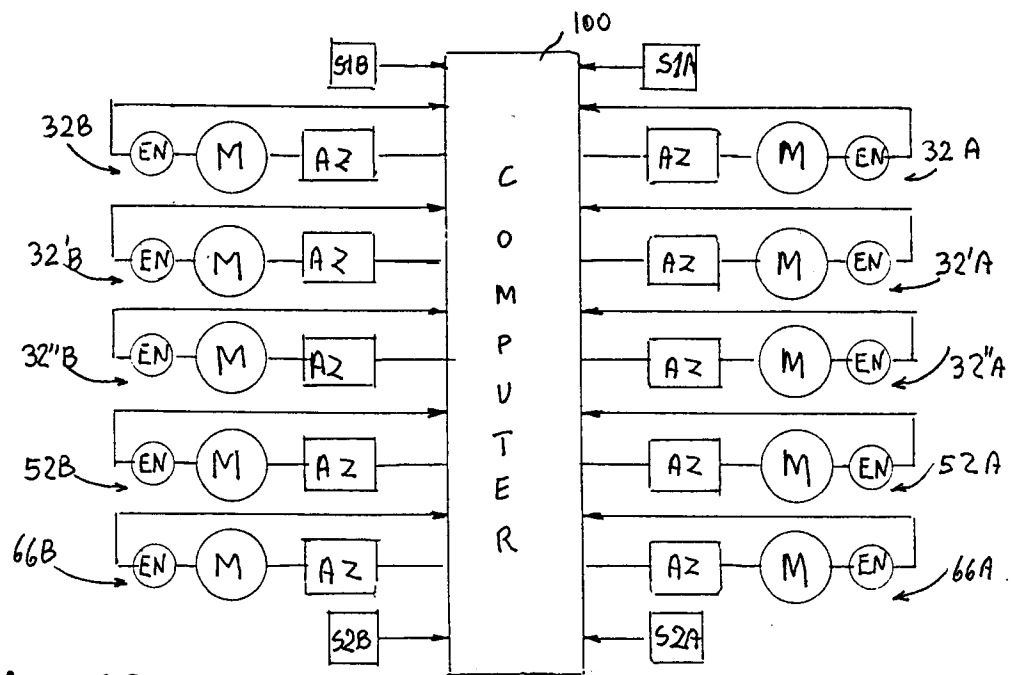


Fig. 12

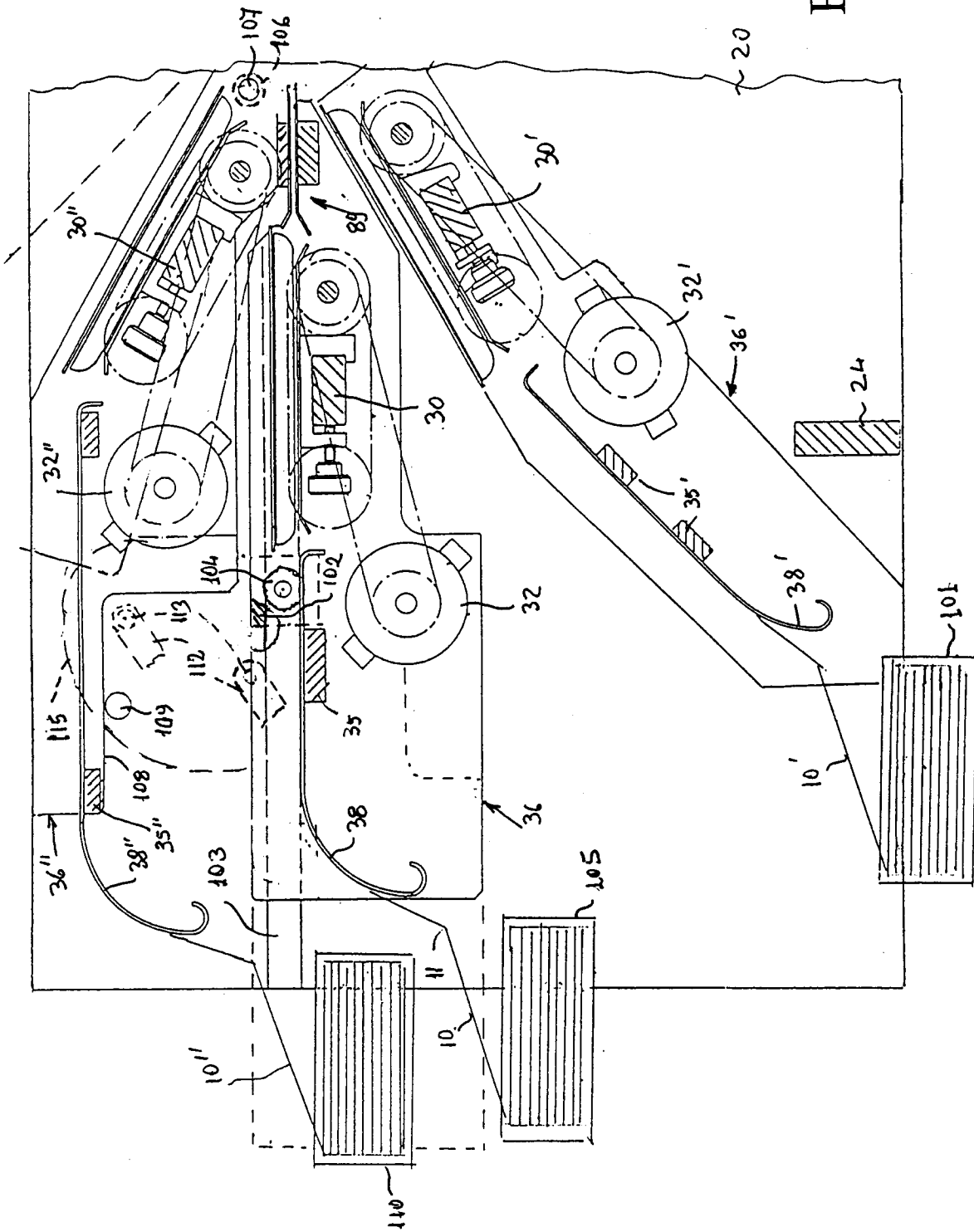


Fig. 3

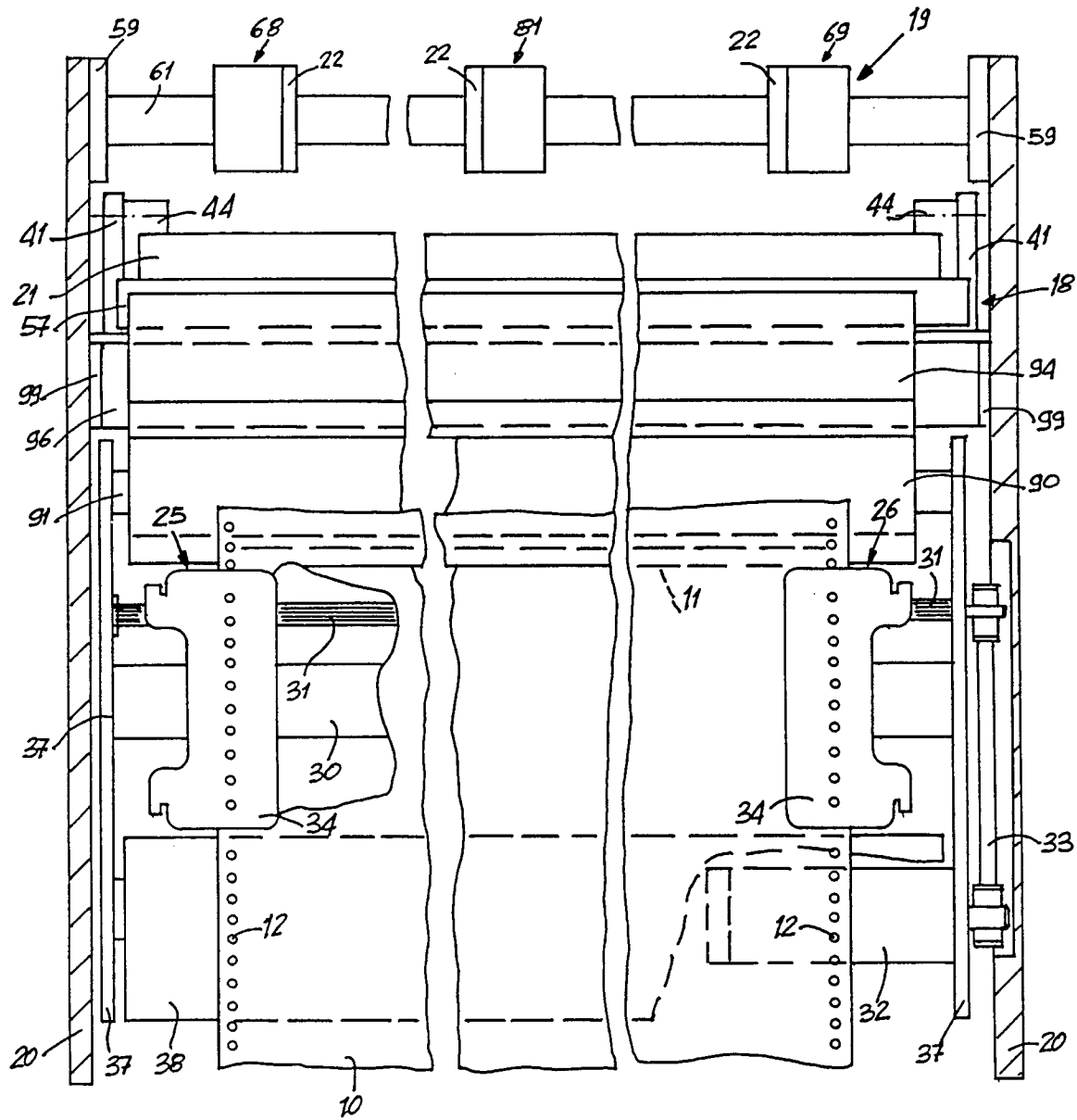


Fig. 4

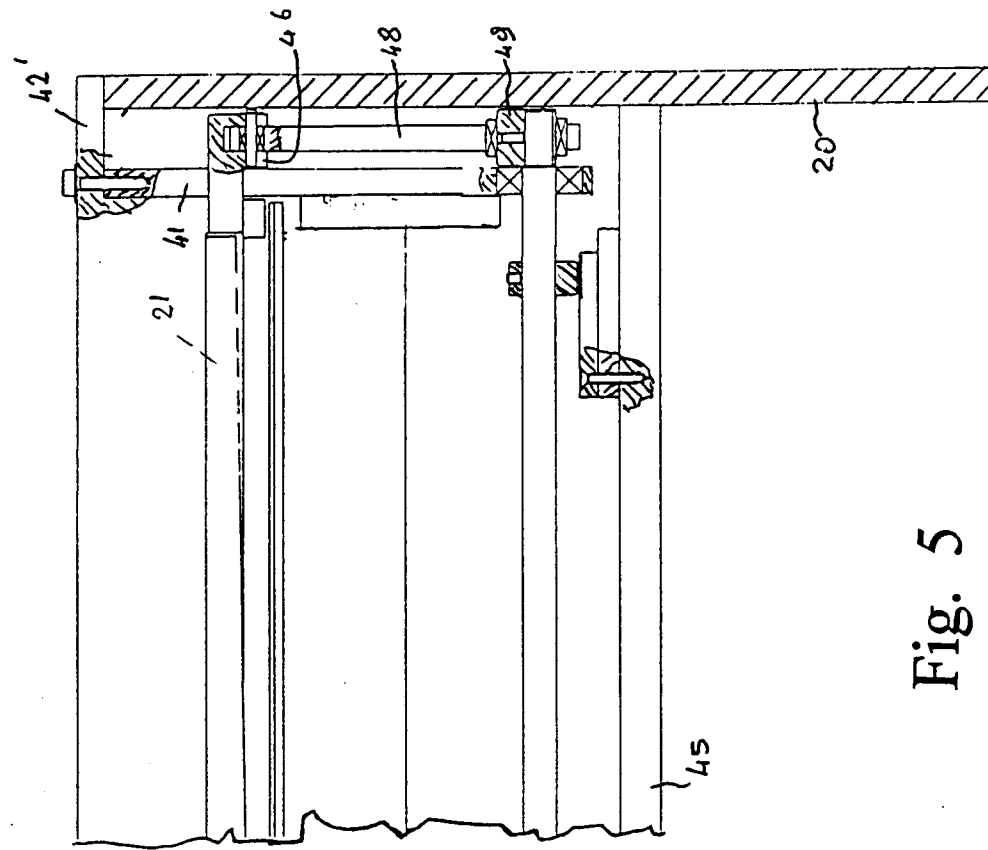
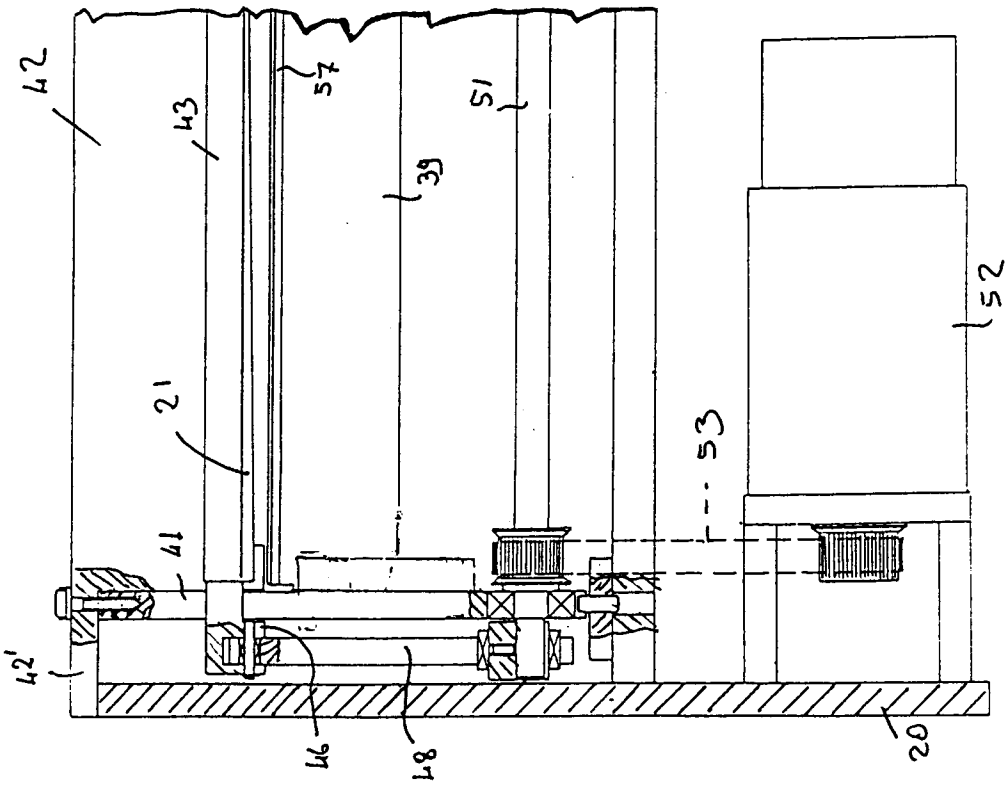


Fig. 5



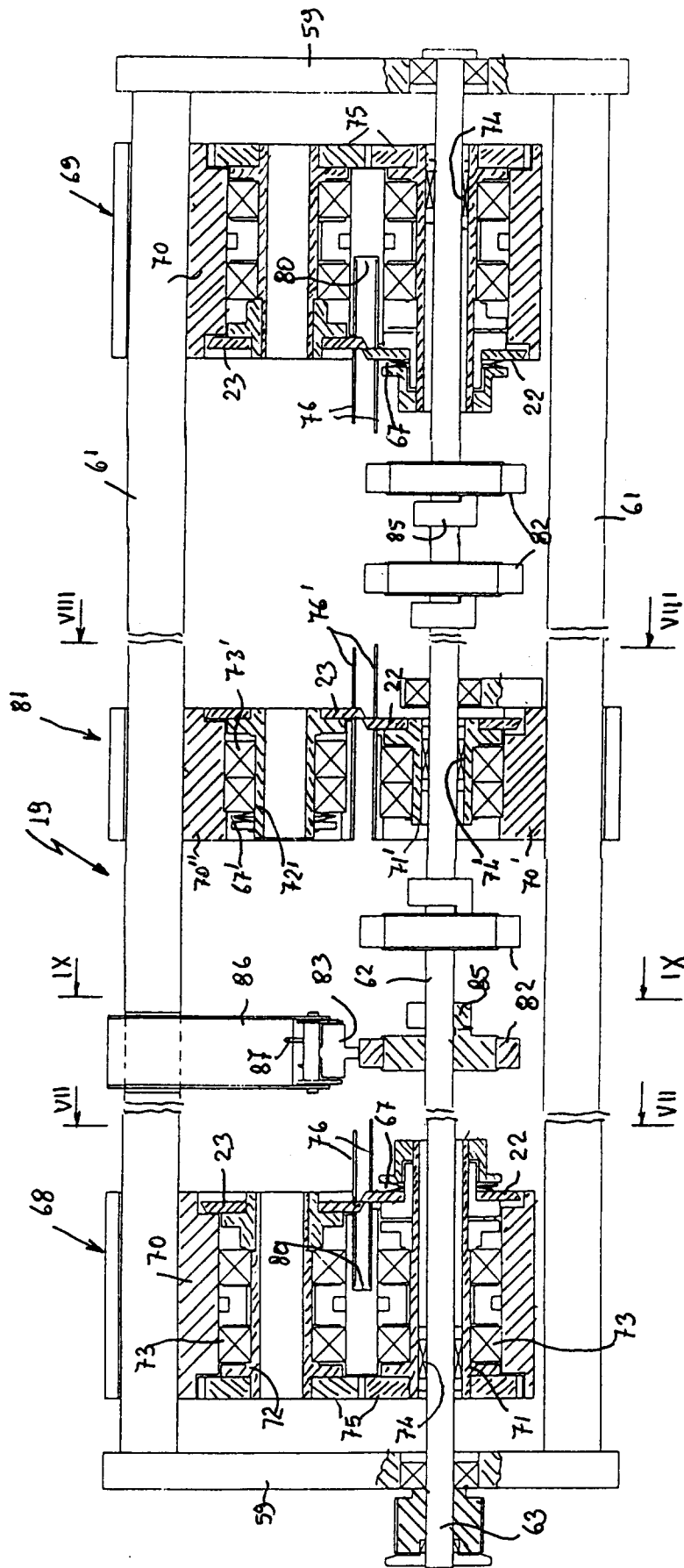


Fig. 6

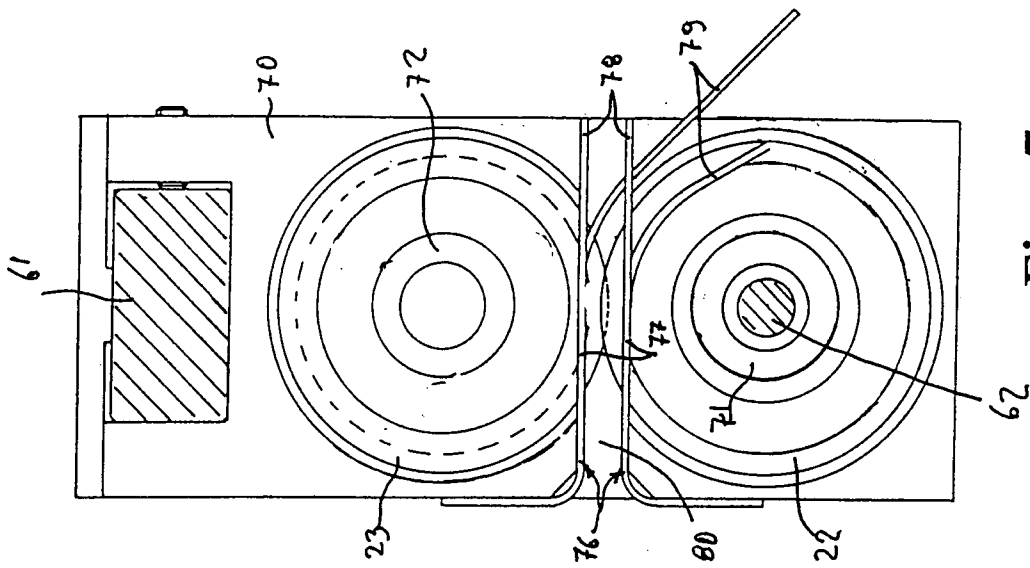


Fig. 7

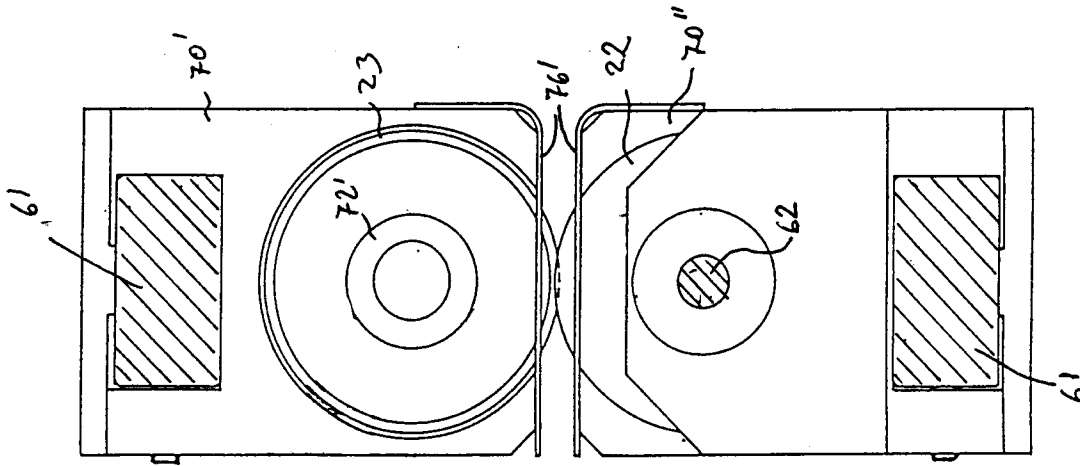


Fig. 8

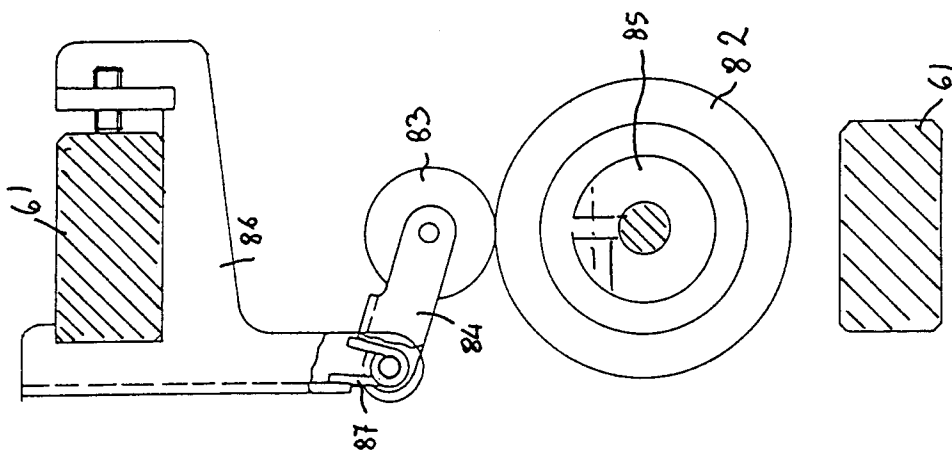


Fig. 9

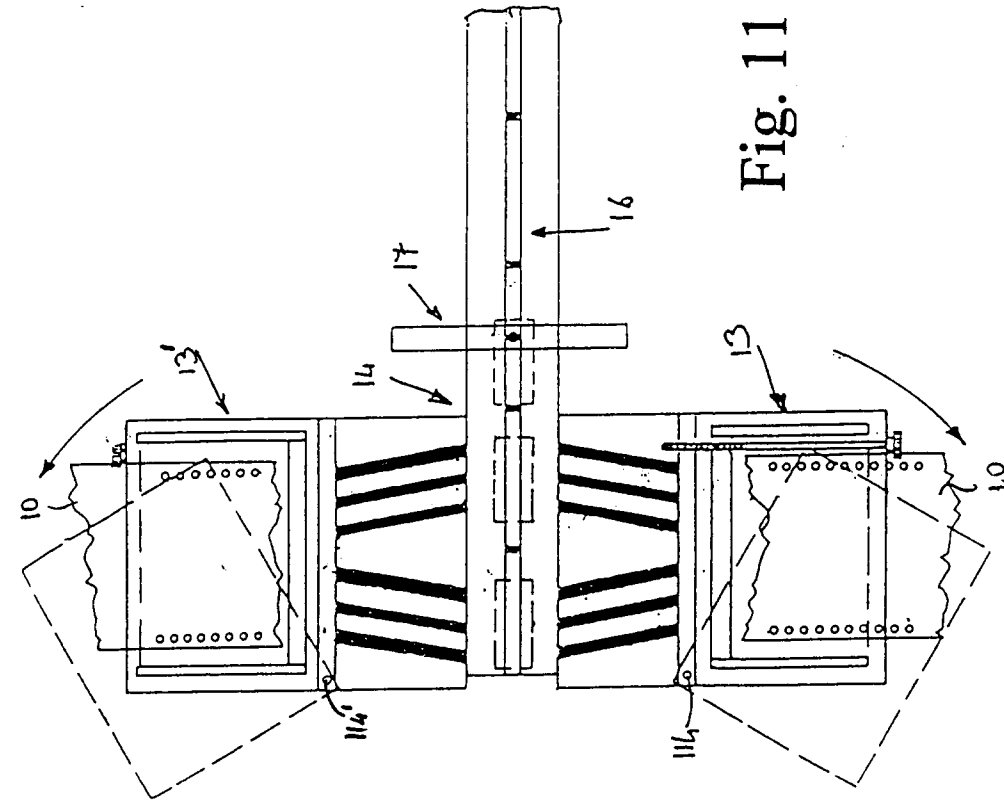


Fig. 11

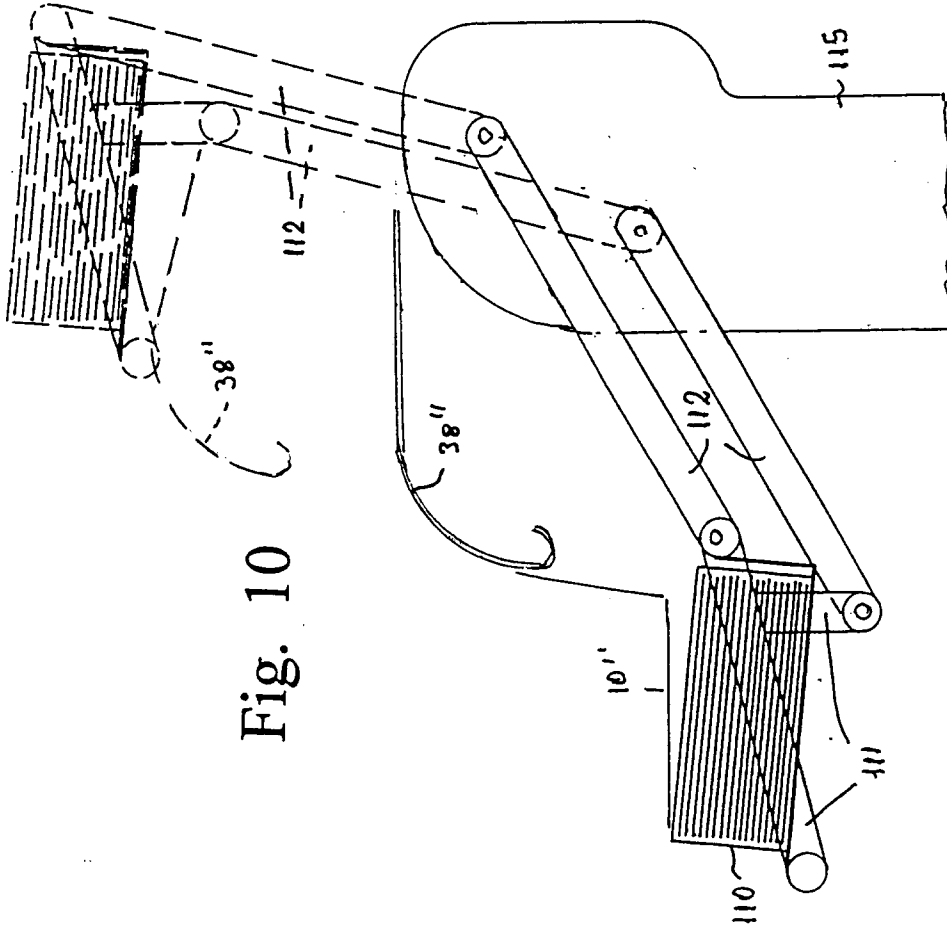


Fig. 10



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 2688

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.6)
X	EP-A-0 236 275 (O.BAY AG)	1,2	B41J11/66
Y	* the whole document *	3	B26D11/00
A	---	4,6,8	B65H39/16
Y	EP-A-0 362 976 (KLÜSSENDORF AKTIENGESELLSCHAFT)	3	
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