PERFORATED WEB DRIVING MECHANISM

Filed Feb. 2, 1966

7 Sheets-Sheet 1

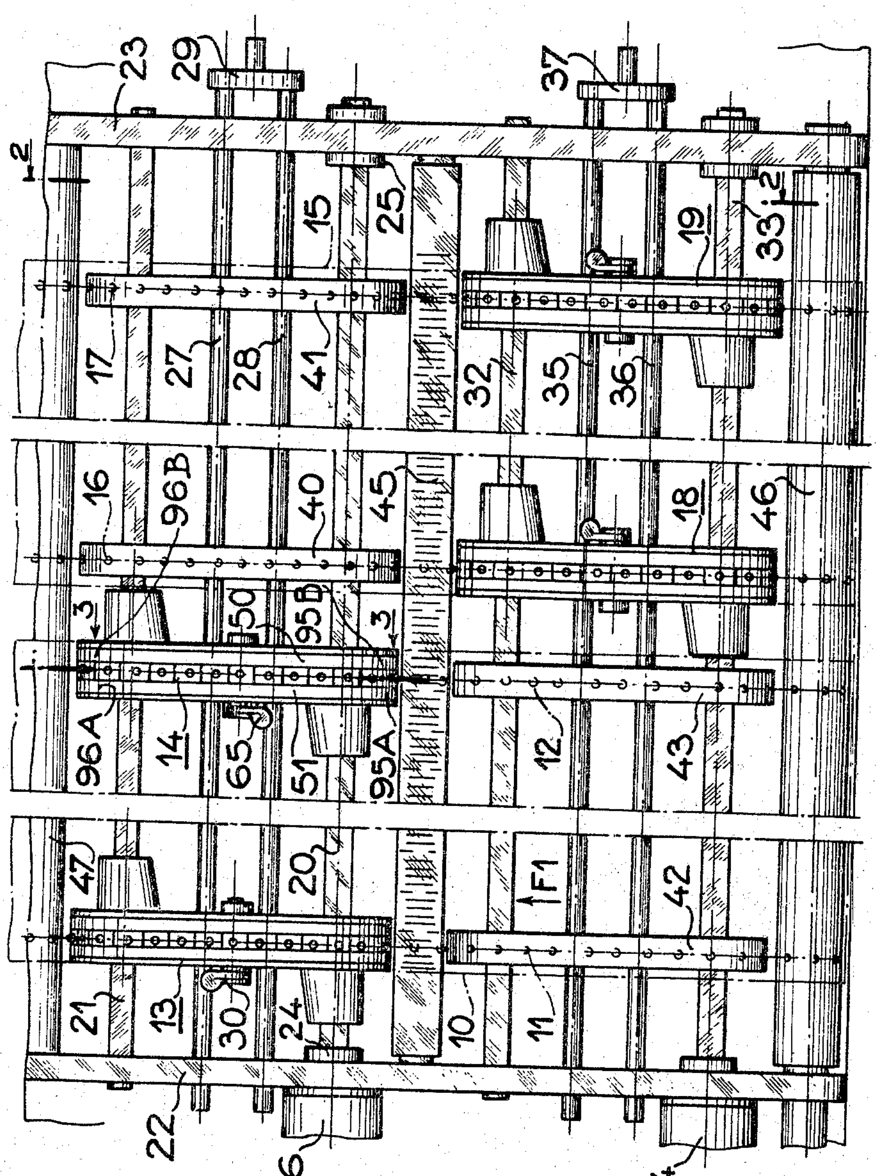

Fig. 1

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PERFORATED WEB DRIVING MECHANISM

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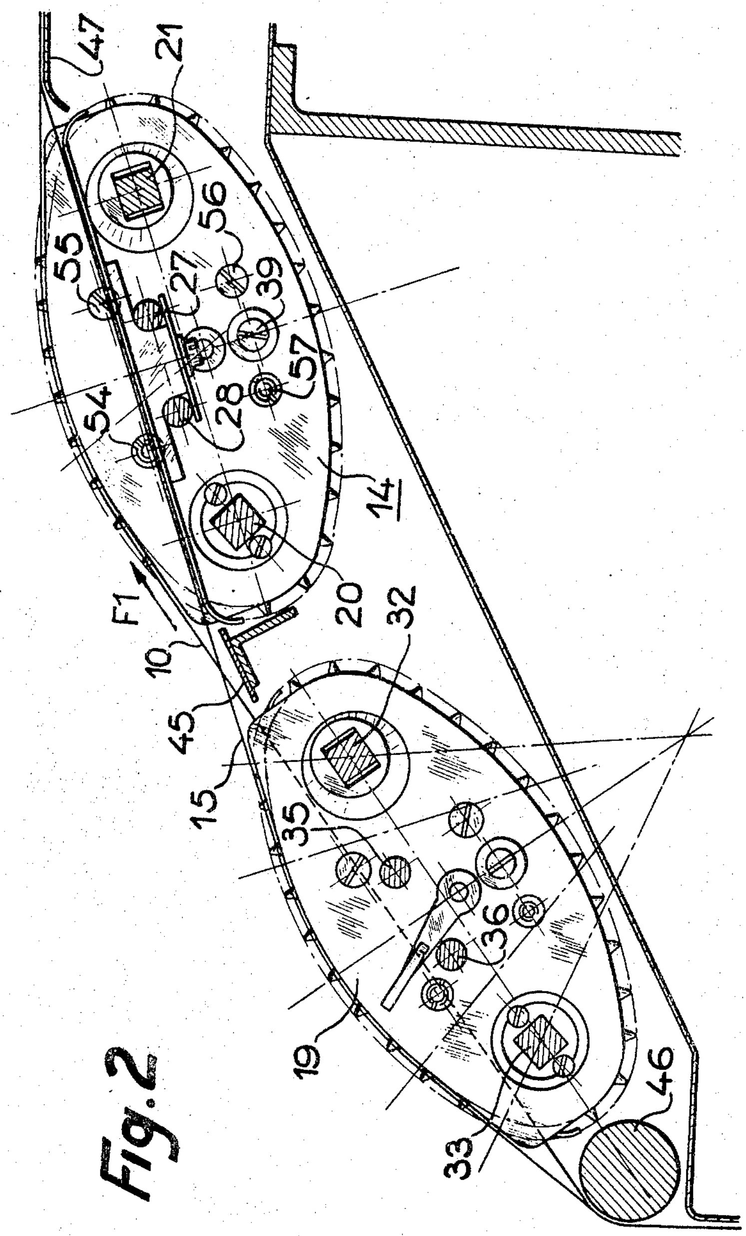

Fig. 2

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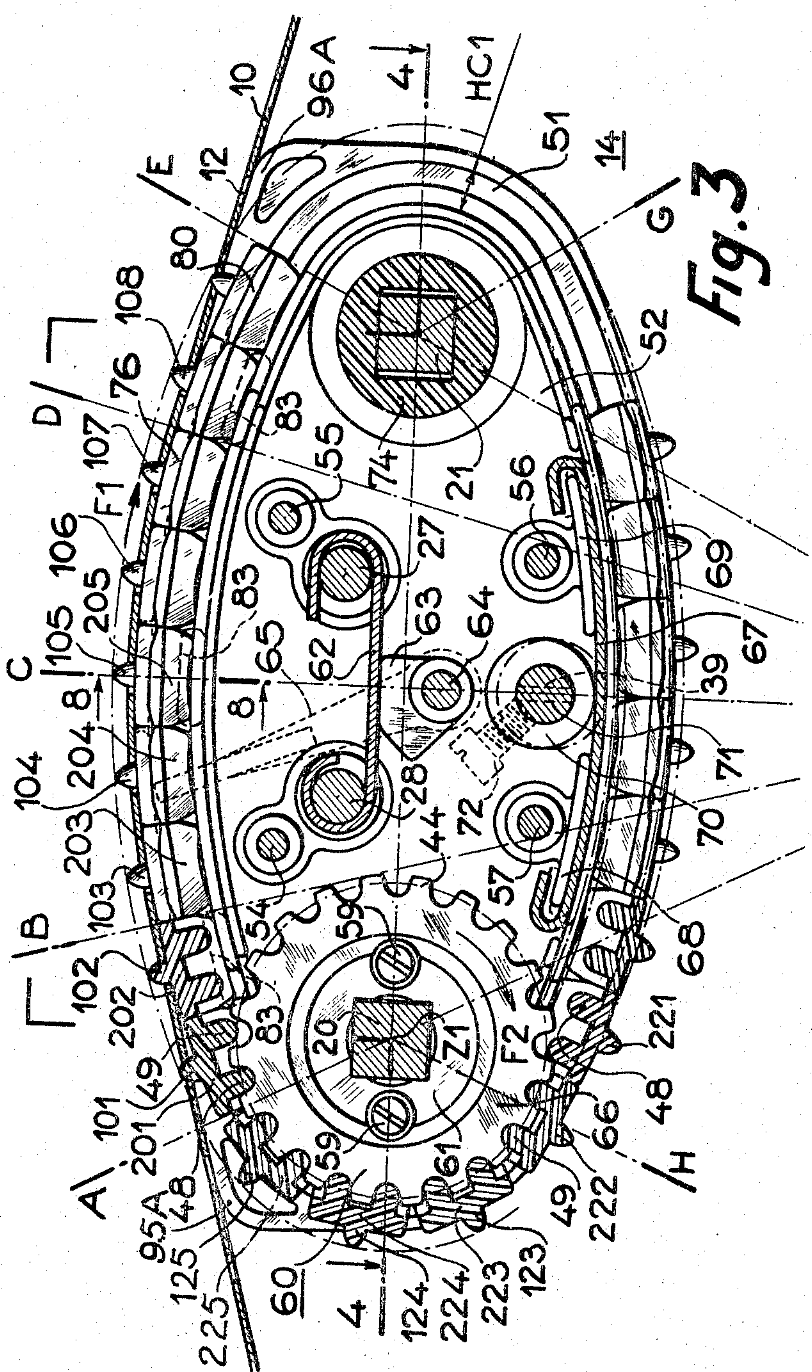

Fig. 3

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PERFORATED WEB DRIVING MECHANISM

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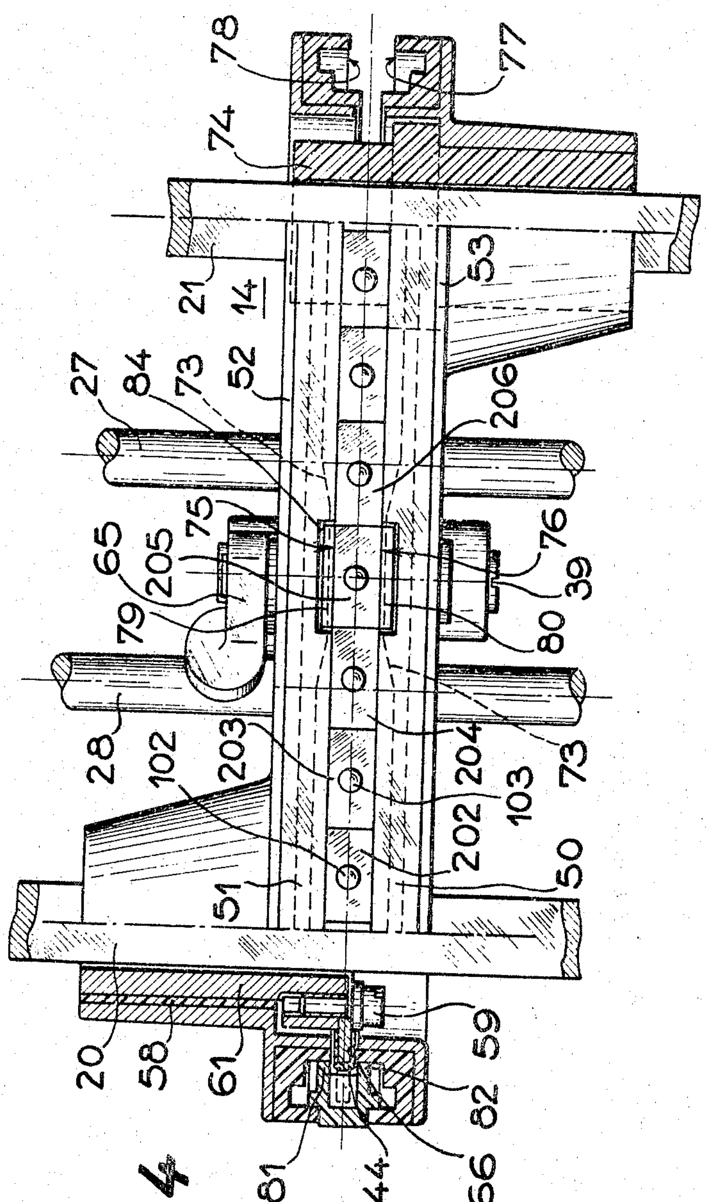

Fig. 4

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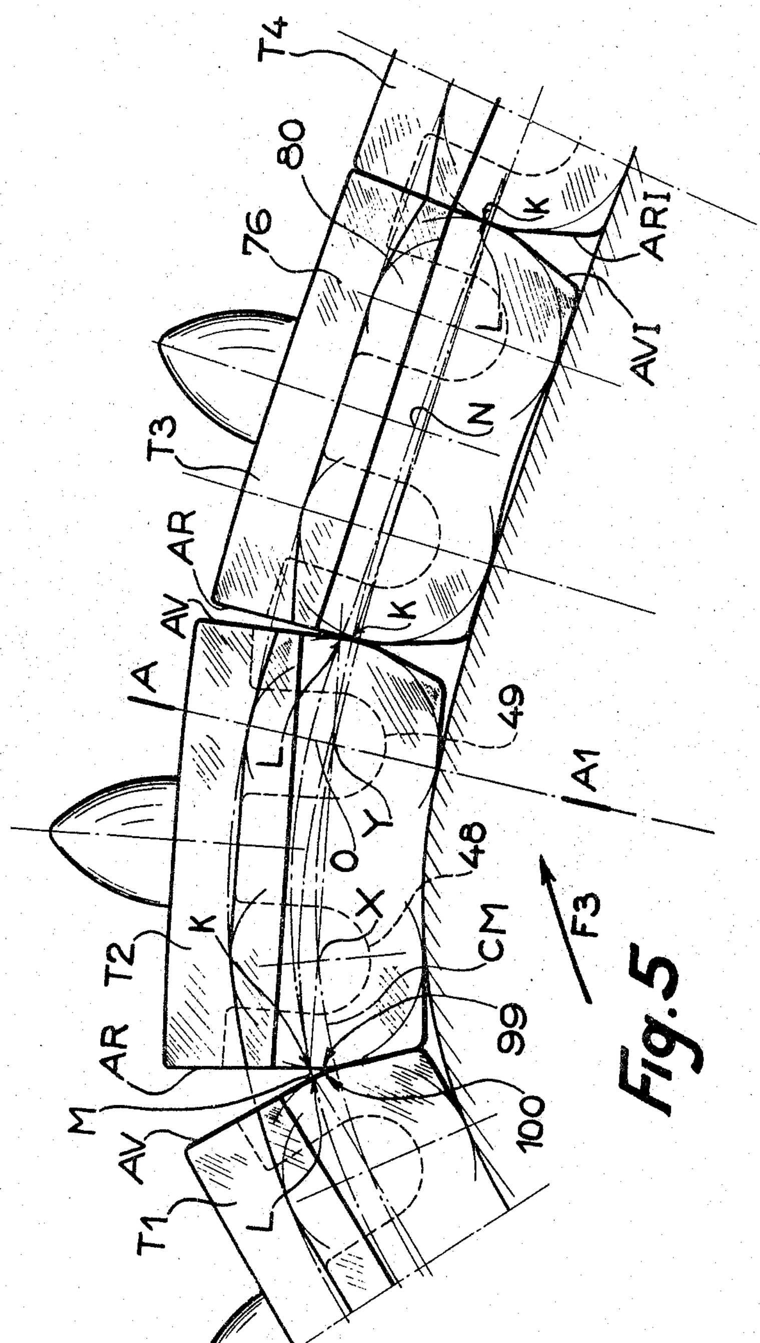

Fig. 5

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Fig.6

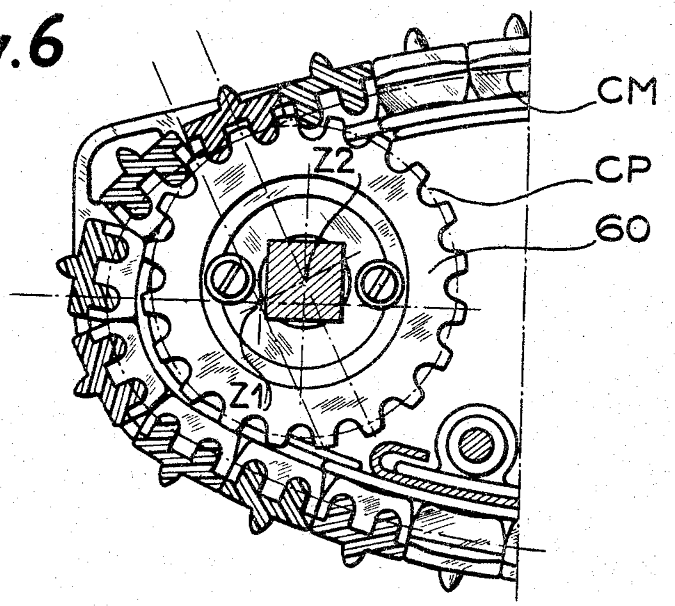
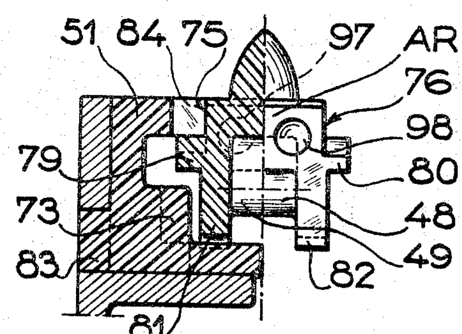


Fig.8



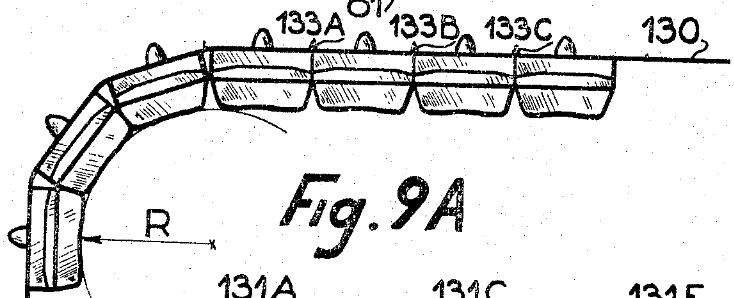
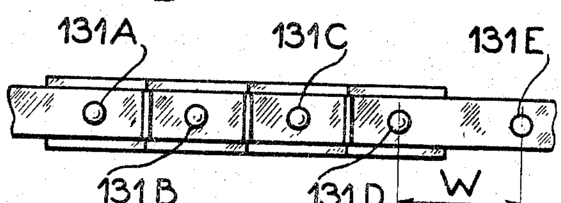


Fig.9A

Fig.9B



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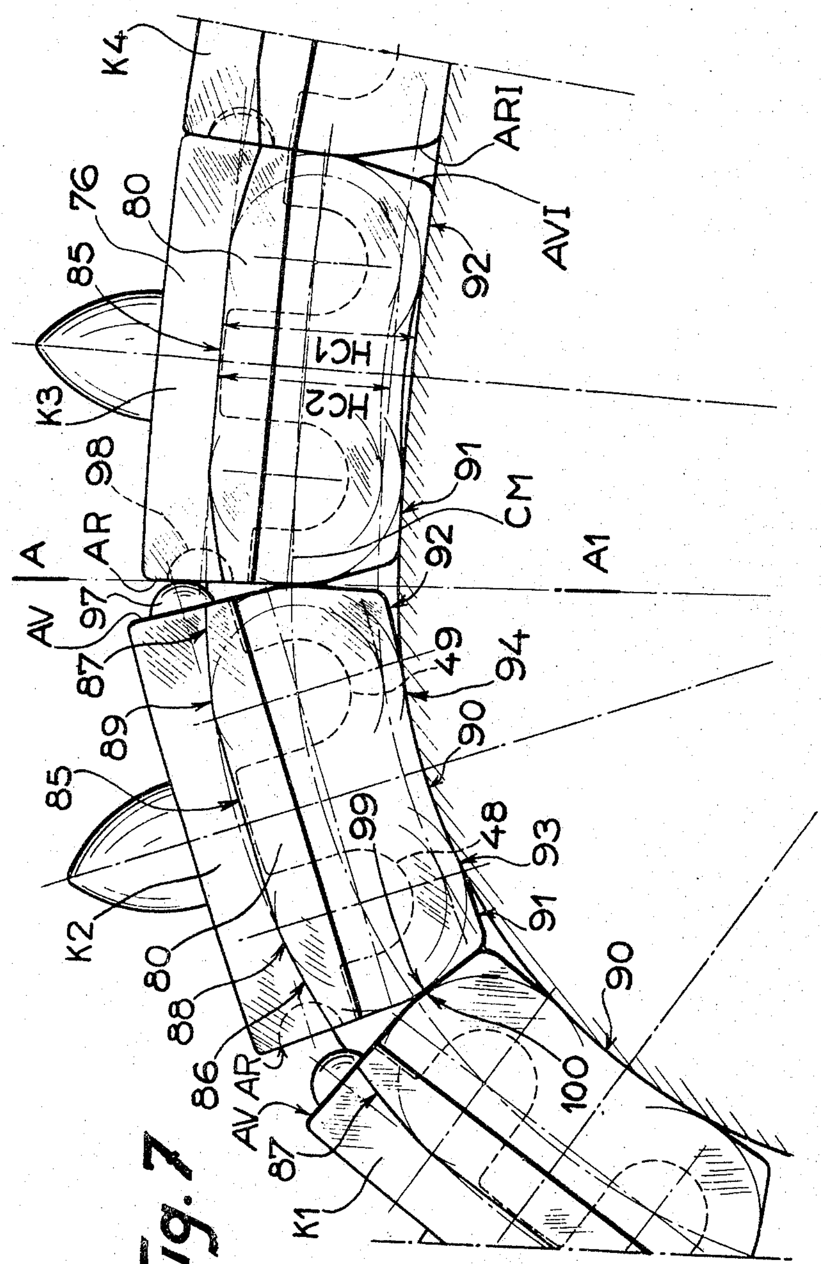

Fig. 7

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United States Patent Office

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Patented Oct. 17, 1967

3,347,433

PERFORATED WEB DRIVING MECHANISM

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Claims priority, application France, Feb. 15, 1965, 5,547

5 Claims. (Cl. 226—52)

The present invention relates to improvements in mechanisms for driving the paper in printing machines or other registering machines in which one or more paper webs having marginal perforations can be fed forward continuously or step-by-step and accurately positioned in a printing or registering mechanism.

The invention concerns more particularly improvements in the paper driving mechanisms employed in high-speed printing machines used in electronic data-processing equipment.

Devices for the feed advance of paper webs having edge perforations by means of wheels or drums provided along their periphery with teeth or sprockets engaging in the said perforations are known. It is acknowledged that in these devices the paper drive and the engagement and disengagement of the sprockets are effected very satisfactorily, even for advancing a number of superimposed webs, by means of sprocket wheels of large diameter. Unfortunately, these wheels have excessively large dimension and their inertia is too high for them to be used with advantage in high-speed printing machines. In these machines, there are generally employed driving mechanisms known as "sprocket chain drivers," in which the paper is driven by means of sprockets fast with the links of an endless chain driven by a toothed wheel of small diameter. However, these mechanisms, which are in practical use and are of small dimensions, are costly to construct and their use in machines of ever increasing rapidity considerably reduces their useful life, owing to the elongation of the chains which results from the wear on the pin joints. Since the sprockets no longer register exactly with the perforations in the paper, they cannot drive the latter without damaging the said perforations. In order to avoid excessively rapid wear on the chains, it is sometimes necessary in such mechanisms to provide for lubrication of the pin joints, which often has the disadvantage of producing oil stains on the paper webs. In addition, in the majority of machines, the replacement of worn endless chains necessitates considerable demounting said remounting of mechanisms, which involve more or less prolonged stoppage of the machines. Mechanisms comprising sprocket chains having links consisting of plastics material have also been employed. However, these chains, which are very light, have very fragile pin joints. The present invention relates to improvements having the object of obviating the aforesaid disadvantages and making it possible to produce driving mechanisms of small overall dimensions which have a long useful life, even in machines operating at very high speed, and which can be manufactured at substantially reduced cost owing to the wide use of moulded metal parts and moulded plastics parts produced with a small number of different patterns. Moreover, it is possible by an appropriate choice of the materials employed for the manufacture of the said parts to eliminate completely the lubrication of the mechanisms, with its disadvantages. Arrangements of particularly simple design make it possible to compensate to a large extent for any play which may occur as a result of the wear on parts after long use and to prolong considerably the useful life of the mechanisms. Other arrangements also make it possible to replace readily and rapidly, without mechanical demount-

ing, the parts which are likely to be most rapidly worn.

In a mechanism according to the invention, the paper-driving sprockets are fast with independent movable blocks which are advanced successively along a guide path in a closed circuit comprising various curvatures in a common plane. The blocks are pushed through the said guide path under the action of a driving wheel provided with teeth in engagement with bosses formed inside the said blocks. The latter are also provided with sliding surfaces adapted to ensure good guiding thereof along the various curvatures of the guide path and to ensure correct engagement of the blocks which are in engagement with the driving wheel. Further advantages and features of the invention will become more readily apparent in the course of the following description and with reference to the accompanying drawings, in which:

FIGURE 1 is a diagrammatic plan view of an arrangement of the paper-driving mechanisms in a high-speed printing machine;

FIGURE 2 is a sectional view along the line **2—2** of the mechanism of FIGURE 1;

FIGURE 3 is a sectional view along the line **3—3** of a driver of FIGURE 1;

FIGURE 4 is a fragmentary plan view partly in section along the line **4—4** of the driver illustrated in FIGURE 3;

FIGURE 5 is a diagrammatic view showing the relative movements of blocks advanced through the guide path of a driver;

FIGURE 6 is a diagrammatic view of a portion of FIGURE 3 modified to show another arrangement of the wheel for driving the sprocket blocks in a driver;

FIGURE 7 illustrates the mode of engagement of the centering projections of the blocks passing through a change of curvature in the guide path of a driver;

FIGURE 8 is a fragmentary section along the line **8—8** of FIGURE 3; and

FIGURES 9A and 9B illustrate an arrangement for the mounting of blocks in a driver.

Since the invention relates more particularly to improvements applicable to driving mechanisms for driving the paper in high-speed printing machines, the known arrangements employed in these machines in combination with these mechanisms will not be described.

FIGURE 1 diagrammatically illustrates an arrangement of the drivers intended to advance two paper webs independently of one another in a high-speed printing machine. In this arrangement, a first paper web **10** formed with two rows of perforations **11** and **12** along its edges in any known disposition is so positioned as to be driven by the sprockets of two upper drivers **13** and **14**. A second paper web **15** also formed with rows of perforations **16** and **17** along its edges is engaged on the driving sprockets of two lower drivers **18** and **19**. Each web shown may consist of a number of superimposed webs with or without interposition of carbon papers for the production of duplicates, in known manner. For the sake of clarity of the drawings, the paper webs are assumed (FIGURE 1) to be transparent and their contours have been shown in dash-dotted lines. For the same reason, the drivers have not been shown with downwardly hingeable covers, the use of which is well known, but is not essential with the described devices for maintaining the paper webs in position on the said drivers.

The upper drivers **13** and **14** (FIGURES 1, 2 and 3) are mounted on an upper driving bar **20** and an upper guide bar **21**. The guide bar **21** is secured to side pieces **22** and **23** fast with the frame of the machine, while the driving bar **20** is adapted to rotate in journals **24** and **25** under the action of a mechanism **26** which controls the drive of the paper in known manner. The upper drivers **13** and **14** are traversed by positioning and locking bars **27** and **28** (FIGURES 1, 2 and 3), on which they may slide or be held fast by the operation of levers **30** and **65** respectively. These bars are connected together by a strap **29** which is adapted to be shifted with precision by manual control either to the right or to the left in order to position the drivers accurately by means of a known mechanism (not shown). The lower drivers **18** and **19** are mounted in the same manner as the upper drivers on a lower guide bar **32** and on a lower driving bar **33** driven by a mechanism **34**. Lower positioning bars **35** and **36** are connected together by a strap **37** which is also adapted to be manually positioned with precision by known means. The paper web **15**, of which the movements are controlled by means of the lower drivers **18** and **19**, is guided above the upper bars and rests on upper slide blocks **40** and **41** adapted to slide with friction on the bars **27** and **28**. The paper web **10** passes below the lower bars supported by lower slide blocks **42** and **43**, which are adapted to slide on the bars **35** and **36**. The drivers and the slide blocks are adapted to be displaced along a fixed straight-edge **45** connected to the frame of the machine and provided with graduations corresponding to the positions of the printing columns of the printing mechanism.

It is well known that the drivers may be mounted in various ways in a machine Thus, arrangements are possible in which the upper slide blocks are mounted with friction on the bar **21**, while the lower slide blocks are mounted with friction on the bar **32**. Likewise, arrangements have been constructed in which the bars **32** and **21** are driving bars, while the bars **20** and **33** are fixed, depending upon the position of the wheel driving the sprockets in the drivers. Other arrangements could also be envisaged.

On leaving the printing mechanism, the paper webs pass over a roller **46** (FIGURES 1 and 2), over the slide blocks and the drivers and then over a fixed plate **47** which guides them towards devices for the reception of the printed paper, which are generally arranged behind the machine. It will be observed that in the arrangement of FIGURES 1 and 2 the drivers may be brought towards one another so as to permit the advance of two paper webs edge-to-edge, i.e. so that, at the level of the graduated straight-edge **45**, paper webs may, where necessary, be advanced in lateral contact with one another. This arrangement corresponds to a possibility of optimum utilisation of the printing columns of the machine, which advantage is not afforded by any of the driving systems at present in use in high-speed printing machines. For greater details regarding the means affecting the feed advance of the paper in printing machines, reference may be made to a patent application of the present applicant filed in the United States on the May 3, 1965, under No. 452,588 and owned in common with the present application.

In the driving mechanism illustrated in section in FIGURE 3 and partly in plan view in FIGURE 4, the paper-driving sprockets **101** and **125** are each integrally moulded with one of the plastic blocks **201** to **225**, which are adapted to slide along a guide path comprising (FIGURES 3 and 4) two moulded plastics half-shells **50** and **51** mounted opposite to one another on two moulded metal supports **52** and **53** respectively, which are connected together. In a simplified constructional form of the guide paths of a driver, the said guide paths may be moulded and welded directly to their metal supports. In the construction illustrated in FIGURES 3, 4 and 8, the guide paths are formed of moulded parts fitted on to their supports. Key projections **83** (FIGURES 3 and 8) are engaged in cavities in the supports to prevent the guide paths from sliding on the said supports, which are assembled (FIGURES 2 and 3) by four screws **54**, **55**, **56** and **57**. The blocks **201** to **205** are each provided internally (FIGURES 3, 5, 6, 7 and 8) with bosses **48** and **49** of partly cylindrical form, which are adapted to mesh with the teeth **44** of a driving wheel **60** mounted (FIGURE 3) by means of screws **59** on a hub **61** which is adapted to turn in a self-lubricating lining **58** within the support **52** (FIGURE 4) The hub **61** is adapted to rotate integrally with the driving bar **20** and may slide longitudinally thereon. In FIGURES 3 and 4, the driving wheel **60** consists of a metal disc **66** secured to the hub **61** and having moulded (locked or welded) thereon teeth **44** of plastics material. By way of indication, it may be mentioned that good results have been obtained in the construction of drivers designed in accordance with the invention by using moulded materials for the paper-driving blocks **201** to **225**; half-shells **50** and **51** of the guide path for the blocks, supports **52** and **53** of the half-shells of the guide path; and teeth **44** on the wheel **60** for driving the blocks. It is obvious that other powder or alloy materials also adapted according to their use, with or without incorporation of metallic or mineral particles, may be used to make the parts without departing from the invention.

In the sectional view (FIGURE 3), a strip **62** is arranged to slide with the driver on the bars **27** and **28**. A two-stage cam **63** is disposed below the strip **62** and keyed on a pin **64** fast with a lever **65** accessible from the outside (FIGURES 1, 3 and 4). In the position of the lever indicated in FIGURES 1, 3 and 4, the cam **63** does not exert an appreciable pressure on the strip **62** and the driver **14** can slide freely on the bars **27**, **28**. When the lever **65** is pushed manually towards the bar **27**, for example in the manner of the lever **30** of the driver **13** (FIGURE 1), the second stage of the cam **63** is brought below the strip **62** and strongly urges the latter against the bars **27**, **28**. Under these conditions, the driver is substantially held fast on the said bars, but the position of the said driver in the machine may be accurately adjusted in the manner previously indicated. The driver **14** is also supported by the fixed bar **21** through a sleeve **74** which is connected to the support **53** and is adapted to slide on the said bar **21**. The said sleeve may also be made of a plastics material adapted for this use. In the drawing of FIGURE 3, the plastics half-shells which form the guide path for the blocks rest partly on a flexible strip **67** which is centered in the driver on bosses **68** and **69** forming part of the supports. An eccentric cam **70** keyed on a pin **71** is adapted to turn with the said pin so as to displace the strip **67** and to deform the guide path for the blocks by extending it to an extreme position indicated in dash-dotted lines (FIGURE 3). A screw **72** is provided to lock the pin **71** and to hold the cam **70** fast in a chosen position, as will hereinafter be described.

In order to drive the paper web **10** in the direction of the arrow F1 (FIGURES 1, 2 and 3) by means of the sprockets engaged in perforations in the said paper web, the blocks of the drivers **13** and **14** (FIGURE 1) are driven by the rotation of the shaft **20**. In the driver **14** (FIGURE 3), the wheel **60** is rotated in the direction of the arrow F2 and the blocks **222** to **225** and **201**, of which the internal bosses are engaged with the teeth of the wheel, push before them along the guide path the blocks whose sprockets are engaged in perforations **12** in the paper and drive the latter. The guide path is a closed circuit and, mainly for reasons of space as will hereinafter be indicated, is not circular and comprises various curvatures. In the driver illustrated in FIGURE 3, the guide path has a number of curvatures which may be regarded as being, in principle, of only two different types: a curvature of large radius and a curvature of small radius. In the following description, there will be regarded as the mean radius of curvature of a part of the guide path the radius of a curve CM (FIGURES 5, 6 and 7) extending through the axes of the cylindrical portions of the internal bosses **48** and **49** of the blocks advanced through the said portion of the guide path. The teeth **44** of the wheel **60** are formed (FIGURE 3) with a profile which is partly similar to that currently employed for driving a so-called roller link chain. The bosses **48** and **49** (FIGURES 3, 5, 7 and 8) which are disposed inside the blocks are partly in the form of a cylinder whose diameter corresponds to that of the chain rollers and whose inter-axial spacing in each block is determined by the circumferential pitch of the wheel.

It is obvious that, in order to ensure correct driving of the blocks, the pitch circle CP of the teeth of the wheel **60** (FIGURE 6) must necessarily be partly coincidental, or at least tangential at one point, with the mean curve CM of the guide path of the blocks.

The upper part of the guide path of the blocks (FIGURE 3) comprises a first portion extending from A to E and having the large radius of curvature, while a second portion extending from G to H and situated in the lower part also has the large radius of curvature. In the described example, this second portion is partly deformable and may have a smaller radius of curvature. A portion extending from H to A has a small radius of curvature, the centre of which is coincidental (FIGURE 3) with the axis of the wheel **60** and a second part extending from E to G which closes the guide path and also has the small radius of curvature. In the upper part of large radius of curvature, the sprockets of the blocks are, from A to B, brought progressively into engagement with the perforations in the paper, which tangentially contacts the driver. Since sprockets are engaged in perforations, the paper is driven by the said sprockets from B to D, whereafter these sprockets are disengaged from the perforations along the path from D to E, the paper thereafter leaving the driver tangentially. The half-shells of the guide path comprise, at the inlet to the driver and at its outlet, extensions **96A** and **95B** at its inlet and **96A** and **96B** at the outlet, respectively, which control the engagement of the sprockets in the perforations in the paper and their disengagement therefrom. It will be noted (FIGURE 3) that the engagement of the sprockets, the driving of the paper and the disengagement of the said sprockets are formed in a portion of the guide path which is of large radius of curvature, thus satisfying the conditions for the drive of a sprocket wheel of large diameter.

For guiding the blocks in the guide path, they are provided with sliding surfaces adapted to guide them along the curvatures of the various parts of the said guide path. The lateral guiding of the blocks is effected by means of lateral surfaces **75** and **76** (FIGURES 3, 4, 5, 7 and 8) which slide between the parts **77** and **78** (FIGURE 4) of the two half-shells of the guide path. Shoulders **79** and **80** (FIGURES 4, 5, 7 and 8) prevent the blocks from leaving the guide path and two parts **81** and **82** (FIGURES 4 and 8) form slide shoes. The blocks are provided at the front and at the rear (FIGURES 5 and 7) respectively with cylindrical surfaces **99** and **100** coaxial with the cylindrical parts of the bosses **48** and **49** which are disposed inside the blocks to mesh with the teeth of the wheel. The similar parts of the various blocks will be denoted in the text by the same references, but wherever necessary the block concerned and the number of the figure will be made clear by another indication. The radius of the surfaces **99** and **100**, like the spacing between the bosses **48** and **49**, is determined in accordance with the circumferential pitch of the wheel in order to ensure correct engagement of the teeth with the internal bosses of successive blocks. The height HC1 of the guide path (FIGURES 3 and 7) is uniform and is so chosen as to ensure a good vertical guiding of the blocks, but the distance between the upper sliding surfaces and the lower sliding surfaces of the blocks could equally well be determined, in the manner described, for a different height, for example HC2, of the guide path (FIGURE 7). The shoulders and the shoes of the blocks are provided with cylindrical guide surfaces **88**, **89**, **93** and **94** coaxial with the cylindrical part of the corresponding bosses **48** and **49**. FIGURE 7 shows that such surfaces would

effect a correct guiding of the blocks in the various curvatures of the guide path, but it is to be noted that in this case the blocks would bear only on lines of contact and that such small friction surfaces would rapidly become worn. In order to obviate this disadvantage, the aforesaid guide surfaces are extended by sliding surfaces whose radius of curvature and disposition are adapted either to the largest curvature of the guide path or to the smallest curvature thereof. A surface **85** comprises (FIGURE 7) between the surfaces **88** and **89** and tangential thereto have a form corresponding to the curvature of the guide path in the largest radius of curvature, while two surfaces **86** and **87** (block K2, FIGURE 7), also tangential to the surfaces **88** and **89**, each correspond to the curvature of the guide path in the smallest radius of curvature, for the two shoulders **79** and **80** disposed on either side of each block (FIGURE 8). Similarly, the shoes of each block are provided with a surface **90** tangential to the surfaces **93** and **94** and corresponding to the form of the guide path in a small radius of curvature, while two surfaces **91** and **92** disposed on either side of the surfaces **93** and **94** have a form corresponding to that of the guide path in the large radius of curvature. It will readily be appreciated from the foregoing that the surfaces **88**, **89**, **93** and **94** are in fact used only in those parts of the guide path which have curvatures intermediate between the large and small radii of curvature and for the changes of curvature. This also shows that, for a good utilisation of the sliding surfaces thus designed, it is particularly advantageous to employ a guide path which has in principle only two different curvatures. The arrangement of the sliding surfaces co-operating to guide blocks in a given curvature is particularly well adapted to prevent backward rocking of the blocks or vice versa, in the guide path. For example, the block K3 to the right of the line A–A1 (FIGURE 7), which is in a part of the guide path which has a large radius of curvature, is guided in its upper part by the surfaces **85** of the shoulders which apply the said block to the surfaces **91** and **92** of its shoes and which ensure a good seating in the said guide path, while the blocks K1 and K2 to the left of the line A–A1 (FIGURE 7) which are in a part of the guide path having a small radius of curvature, rest on the surfaces **90** of the shoes which co-operate with the surfaces **86** and **97** of the shoulders, which are sufficiently spaced apart to ensure good stability of the said blocks. However, it has been observed that, in order to ensure good wear on the drivers, it is advantageous to provide, at the time when they are put into service in a machine, optimum clearance of the blocks in their guide path or at least optimum gripping which is substantially a function of the relative resilience of the plastics materials employed to make the blocks and the guide path, but this clearance would have the disadvantage of permitting rocking of the blocks which are engaged with the paper and this rocking, which would cause the sliding surfaces of the blocks to work under bad conditions, would also create friction between the front and rear faces of the successive blocks, which would tend to rock in the same direction under the action of the paper. This disadvantage is obviated by providing the front and rear faces of the blocks with projections and corresponding cavities adapted to inter-engage and to prevent the longitudinal rocking of the blocks when they are brought into engagement. FIGURES 7 and 8 show a practical example of projections **97** and cavities **98** adapted to inter-engage under conditions which will be specified. These projections and cavities may be given any shapes which are considered suitable for satisfying these conditions. The blocks T1, T2, T3 and T4 (FIGURE 5) advanced in the direction of the arrow F3 in a guide path will be considered as they pass through a change of radius of curvature situated on the line A–A1 as in FIGURE 7. That part of the guide path which is situated to the left of the line A–A1 (FIGURE 5) is of small radius of curvature, while that part of the guide path which is situated to the right of this line in the drawing is of large radius of curvature. Let us consider a straight line passing through the axes X and Y of the internal bosses **48** and **49** of the block **T2**, and encountering (FIGURE 5) the surfaces **99** and **100** at the points K and L respectively. Points K and L are similarly determined on the blocks **T1**, **T3** and **T4**. It will thus be noted (FIGURE 5) that the points K and L of the blocks **T1** and **T2** are situated opposite to one another at M, while both of the said blocks are advanced and entirely guided in a portion of the guide path having like curvature, but these points move away from one another to a maximum distance A on the line A–**A1** of the change of curvature and then again become opposite to one another at N when the two blocks are guided in a like radius of curvature. In a driver comprising blocks of the form illustrated in FIGURE 5, but having an effective length of about 12.5 mm., the spacing at O may reach 0.5 mm. When blocks are provided with centering projections and cavities, the latter must be adapted to permit this relative movement of the blocks. In FIGURES 7 and 8, the blocks are shown provided with projections **97** and cavities **98** of hemispherical form adapted to this purpose, but it would equally well be possible to employ projections of conical, pyramidal, partly cylindrical or any other form which may satisfy the same conditions, i.e. be engaged as shown by the blocks K3 and K4 (FIGURE 7), when the latter are advanced through a curvature of large radius, in order to prevent any rocking of the blocks in relation to one another under the action of the driven paper. The front and upper faces AV and the rear and upper faces AR of the blocks (FIGURES 5 and 7) are tangential to the cylindrical surfaces **100** and **99** respectively and are preferably so designed as to come into contact and good alignment when the blocks are advanced through a guide path of large radius of curvature, in order to distribute over a large surface the thrust effort transmitted between the blocks. Likewise, the front and lower surfaces AVI and the rear and lower surfaces ARI, tangential to the cylindrical surfaces **100** and **99** respectively, are preferably designed to come into contact and to transmit a thrust effort when the said blocks are advanced through a guide path of small radius of curvature.

FIGURE 6 illustrates an arrangement of the driving wheel of the blocks which is a variant of the arrangement illustrated in FIGURE 3. In this variant, the axis **Z1** of the wheel **60** is offset from **Z1** (FIGURE 3) to **Z2** (FIGURE 6) so that the driving effort transmitted by the said wheel is transmitted by the latter to blocks which are entirely engaged in that portion of the guide path of large radius of curvature which is utilised for driving the paper, i.e. transmitted to blocks which do not have to undergo friction with one another during the transmission of this effort to the paper which is being advanced. This arrangement makes it possible further to reduce the causes of friction and wear between blocks. It is obvious that by design, the axis of the wheel **60** could equally well be located in any position intermediate between **Z1** and **Z2** which might be considered more appropriate for transmitting the advancing effort to the blocks.

Despite any constructional precautions which may be taken, there always arrives a time when moving parts, and more particularly the driving blocks, must be replaced. FIGURES 3, 4 and 5 show an arrangement by means of which it is possible to replace the blocks of a driver one by one without undertaking any demounting of the mechanism, even in the case of blocks provided with centering projections and cavities, by the following procedure: after slackening of the screw **72** (FIGURE 3), the pin **71** is turned by means of a blade engaged in a slot **39** in the said pin (FIGURES 2, 3 and 4) so as to lower the strip **67** by means of the eccentric **70**, whereby the guide path (of plastics material) is deformed and lengthened. Since the blocks are no longer gripped at the end in the guide path, they can be replaced one by one without difficulty through the aperture **84** (FIGURES 4 and 8) and brought successively in front of the said aperture by action on the mechanism driving the shaft **20**. On either side of the aperture **84**, the guide path is internally provided with projections **73** (FIGURES 4 and 8) which prevent locking of the mechanism by shifting a block laterally in the said guide path. In a modified construction, for the use of blocks having no centering projections, the aperture **84** (FIGURES 4 and 8) is reduced in width so that the outer edge of the guide path overlaps, for example, one-half of the width of the shoulders of the blocks in order to prevent them from spontaneously leaving the said path. In this case, it is sufficient partly to unscrew the screws **54**, **55**, **56** and **57** (FIGURE 2) so as to widen the said aperture and to be able to proceed with the replacement of the blocks as indicated in the foregoing, whereafter the said screws are screwed tight again and the blocks can no longer leave the guide path.

FIGURES 9A and 9B show a part of an arrangement by means of which it is possible to fit a series of blocks in a driver whether or not it is provided with a device for lengthening the guide path. In this arrangement, the blocks of a series of blocks of a driver are temporarily assembled together by means of an adhesive tape **130** stuck to the upper face of each of the said blocks. This tape is formed with perforations **131A**, **131B** . . . serving to position the blocks on the said tape, the perforations in the tape being spaced apart at a distance W (FIGURE 9B) sufficient to enable blocks to be placed on the smallest radius R of the guide path (FIGURE 9A) without separating them from the said tape. For transport, and with a view to the fitting of the blocks, the latter are brought close together and the surplus portion of the adhesive tape between two blocks is folded over on itself and stuck to form folds **133A**, **133B**, **133C**. For replacing the blocks of a driver by a fresh set of blocks prepared by means of this arrangement, it is sufficient to slacken the screws **54**, **55**, **56** and **57** of the driver (FIGURES 2 and 3) and to move the supports **52** and **53** apart by sliding them along the bars **20**, **21**, **27** and **28**, the hub **61** of the wheel **60** being slid into its bearing so as to disengage the blocks engaged in the said wheel. After removal of the worn blocks, fresh blocks can be positioned on the wheel and then in one of the half-shells of the guide path (FIGURE 8). The ends of the adhesive tape are then assembled to maintain the blocks in position, whereafter the two half-shells of the driver are brought together and then re-assembled by means of the screws **54**, **55**, **56** and **57**. The adhesive tape is thereafter withdrawn to permit free movement of the blocks in the driver. In another arrangement, the blocks are moulded with a material containing a high percentage of magnetisable metallic particles. After appropriate magnetisation of the blocks, they may be assembled end-to-end to form an endless chain and mounted in a driver in which they are maintained in position on their support merely by the magnetic attraction.

It is obvious that the arrangements which have been described to illustrate various aspects of the invention have no limiting character and that any omissions, adaptations and substitutions may be made, according to circumstances and applications, without departing from the invention.

I claim:

1. A mechanism for driving a web having perforations regularly spaced along its length, which perforations are adapted to be engaged with sprockets displaceable in a plane perpendicular to the web, comprising two guide members situated on either side of said plane, said members being so formed that each of them provides a guide path which comprises two curved portions of large radius, which are joined to two curved portions of small radius in a common plane, a plurality of driving elements inserted in the guide paths formed between the said two members, each driving element being provided on one side with a sprocket and on the other side with engagement projections, the driving elements having a uniform length and ends of suitable shape to enable two neighbouring elements to remain in contact regardless of the curvature at the point of the guide path at which they are situated, and a driving pinion situated towards one of said portions of small radius and arranged to advance the driving elements by propulsion on the engagement projections of said elements.

2. A mechanism for driving a web according to claim **1**, wherein the web is advanced along a guide path so disposed in relation to the guide path for the driving elements that the engagement of sprockets in perforations in said web, the driving of the latter and the disengagement of the sprockets from the perforations are effected by sprockets fast with driving elements which are advanced in a common portion of the guide path which has the large radius of curvature.

3. A mechanism for driving a web according to claim **2**, wherein the driving members are each provided on either side with sliding surfaces arranged to guide said members in the various portions of the guide path with minimum play, a first group of sliding surfaces being arranged to guide the driving members in those portions of the guide path which have the large radius of curvature, and a second group of sliding surfaces being arranged to guide the said members in those portions of the guide path which have the small radius of curvature, the said driving elements being in addition provided, at their ends, with surfaces arranged to transmit, by contact, a propulsive effort between driving members advanced

along those portions of the guide path which have the large radius of curvature and with surfaces arranged to transmit, by contact, a propulsive effort between driving members which are advanced along those portions of the guide path which have the small radius of curvature.

4. A mechanism for driving a web according to claim **3**, wherein the surfaces arranged at the ends of the driving members to transmit, by contact, a propulsive effort between members advanced in those portions of the guide path which have the large radius of curvature are provided respectively with projections and cavities so positioned as to be brought into engagement with one another when the said driving members are introduced into a portion of the guide path which has the large radius of curvature and to be disengaged from one another when the said members are introduced into a portion of the guide path which has the small radius of curvature.

5. A mechanism for driving a web according to claim **1**, wherein the members comprising the grooves forming the guide path for the feed members are each formed of a moulded plastics member fast with a rigid support and are maintained opposite to one another by securing means engaged in the said rigid supports to form the said guide path.

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