April 19, 1932. F. HINTERDÖRFER 1,854,739

RULING MACHINE

Filed Aug. 17, 1925 4 Sheets-Sheet 1

Fig. 1.

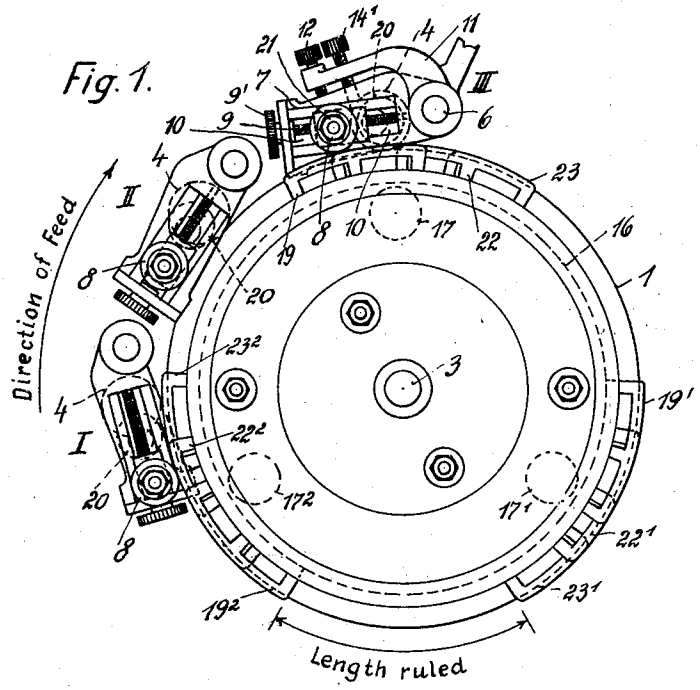
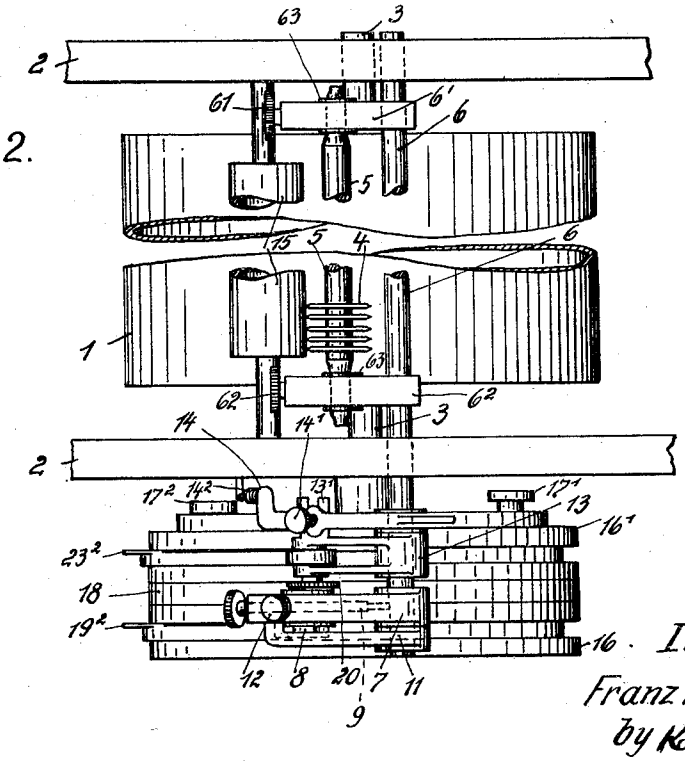


Fig. 2.



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April 19, 1932. F. HINTERDÖRFER 1,854,739

RULING MACHINE

Filed Aug. 17, 1925 4 Sheets-Sheet 2

Fig. 3.

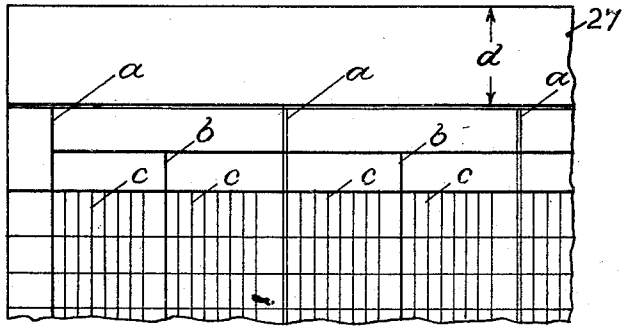


Fig. 4.

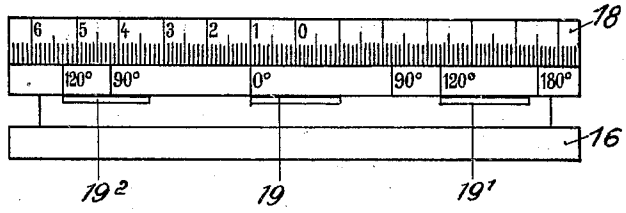
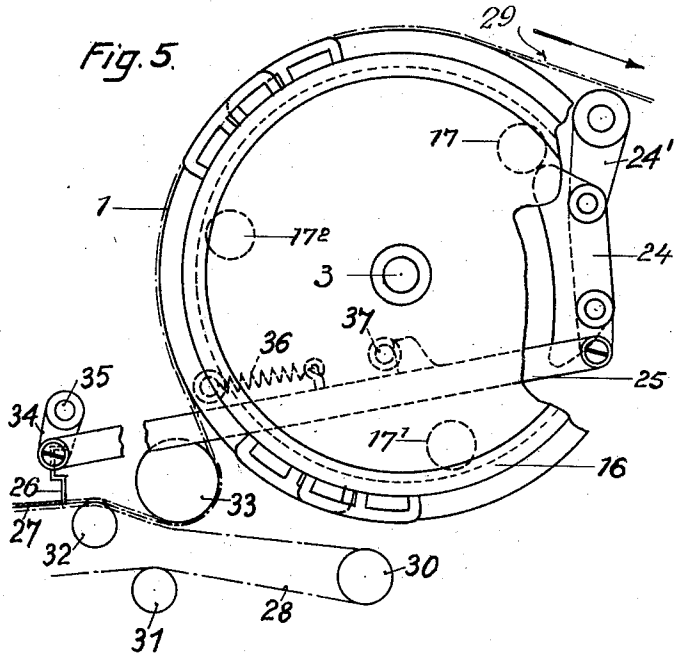


Fig. 5.



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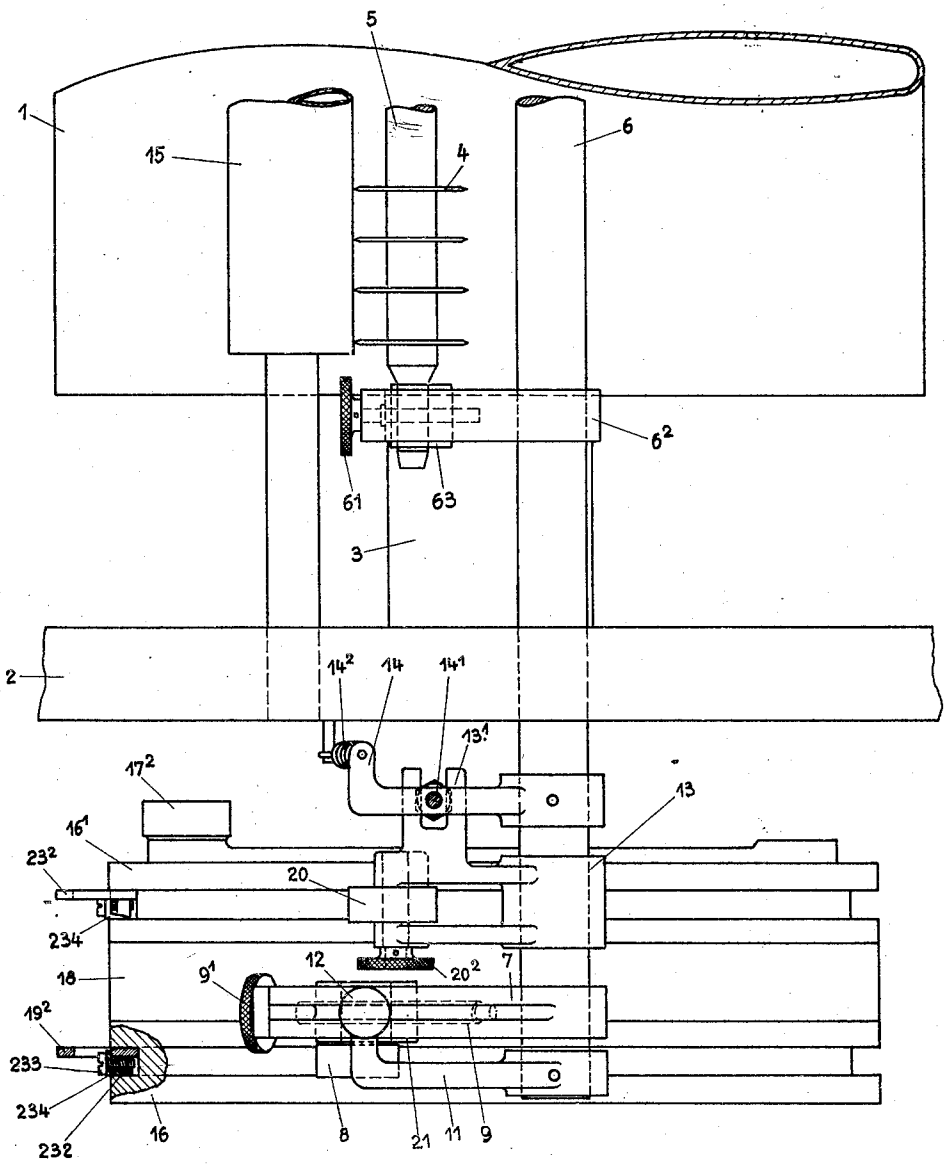
April 19, 1932. F. HINTERDÖRFER 1,854,739

RULING MACHINE

Filed Aug. 17, 1925 4 Sheets-Sheet 3

Fig. 6



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RULING MACHINE

Filed Aug. 17, 1925 4 Sheets-Sheet 4

Fig. 7

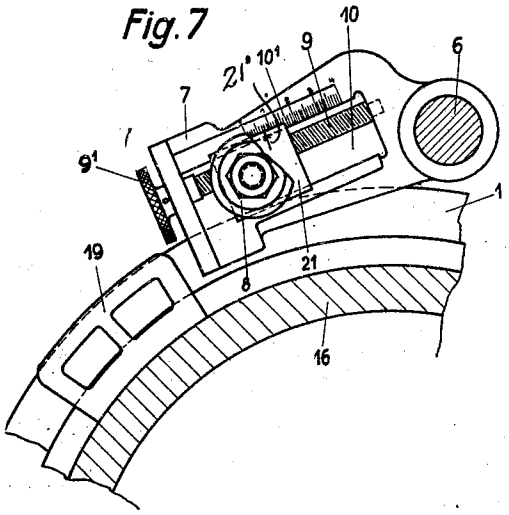


Fig. 8

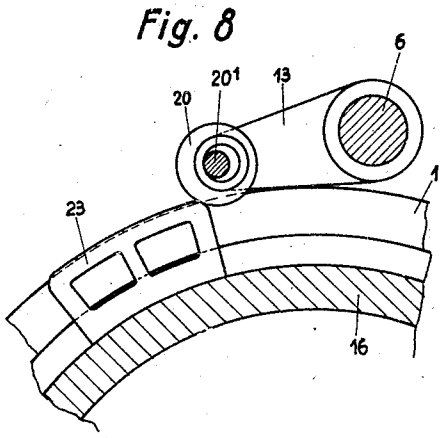


Fig. 9

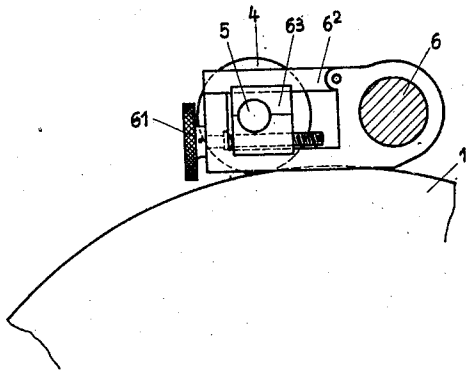
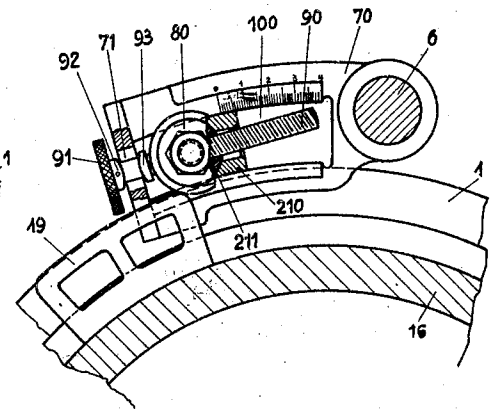


Fig. 10



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Patented Apr. 19, 1932 1,854,739

UNITED STATES PATENT OFFICE

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RULING MACHINE

Application filed August 17, 1925, Serial No. 50,657, and in Germany August 26, 1924.

My invention relates to ruling machines of the rotary type.

It is an object of my invention to provide improved tripping means for a machine of the kind described.

In machines of this type a shaft extending in parallel to the axis about which the impression cylinder rotates, is usually mounted to rock in the frame of the machine. This shaft will be referred to as the "ruling-block shaft". It supports a block or any number of blocks which will be referred to as the "ruling blocks". Each ruling block includes a set of ruling rollers and other elements, as will be described.

According to my invention I combine with each ruling-block shaft two levers each supporting a roller adapted to cooperate with a tripping cam. One of the rollers determines the beginning of the ruling at the head of a sheet and is therefore termed the "beginning roller". The other roller determines the end of the ruling at or near the bottom of a sheet and is therefore termed the "end roller". The rollers are adapted to be adjusted on their respective levers so as to vary the radial distance of the centres from the ruling-block shaft about which the levers rock. It will be understood that, two levers, with the beginning and the end rollers, and a set of ruling rollers between the two levers, make up the unit which has been defined above as the "ruling block". Tripping cams are operatively connected to the impression cylinder so as to partake in rotation and operate the rollers of the ruling blocks when they are engaged by the cams.

In machines of this kind as heretofore designed a single lever is secured on one end of the ruling-block shaft and the beginning and end rollers are supported on this single lever to rotate about a common pivot. Separate cams are provided for controlling the beginning and end rollers. The cams are adjustable in grooves of a support and partake in the rotation of the impression cylinder. This old system has the drawback that every cam must be adjusted separately which not only is slow and laborious, but also uncertain as the proper positions of the cams must be found by cut-and-try methods and must be tested on sheets which are wasted until the operator has succeeded in properly adjusting the cams. Conditions obviously become particularly difficult if several sheets are ruled at the same time on a single impression cylinder, for each sheet requires separate adjustment of the set of cams by which its ruling blocks are controlled. For instance, if it is desired to rule three sheets on a single impression cylinder, and each sheet has three headings so that each sheet requires three sets of lines of various lengths, not less than nine cams require adjustment for the headings alone and, unless all lines extend to the same distance from the bottom of the sheets, a corresponding number of cams must be adjusted for the ends of the lines.

These drawbacks of the old system and the waste of labour, time and material entailed are avoided in my machine in which only two cams per sheet require adjustment, one cam for the beginning, and the other for the end of the longest line so that the first ruling block is in the proper position for the longest line, while in the other ruling blocks the rollers are only adjusted in conformity with the lengths of the shorter lines which these blocks print. In this manner, per sheet, only a set comprising two cams and the rollers of the ruling blocks for the shorter lines, require adjustment, and for each additional sheet one more set of cams and rollers must be adjusted. Obviously the adjusting operation is much facilitated and accelerated by these means.

In the drawings affixed to this specification and forming part thereof a machine embodying my invention is illustrated diagrammatically by way of example.

In the drawings

Fig. 1 is an end elevation,

Fig. 2 is a plan view, showing those parts of a ruling machine having three ruling blocks which are important for the understanding of my invention,

Fig. 3 illustrates a ruled sheet,

Fig. 4 is a developed illustration of the graduation for adjusting the tripping cams,

Fig. 5 is a diagrammatic elevation of the feeding apparatus,

Figs. 6 to 10 illustrate details of the machine on a larger scale.

Fig. 6 is a plan view showing the parts below and at the right of the ruling-block shaft, while

Fig. 7 is an elevation of a lever for a beginning roller having a straight guiding slot for the block on which the beginning roller is carried,

Fig. 8 is a similar view of a lever for an end roller,

Fig. 9 is an elevation of means for adjusting the ruling block radially with regard to its shaft and

Fig. 10 is a similar view of a lever similar to that shown in Fig. 7 but having a curved slot.

Referring now to the drawings, 1 is the impression cylinder to which sheets 27 are fed by a feeding appliance to be described below with reference to Fig. 5, and 2, 2 are frame members in which the shaft 3 of the impression cylinder 1 is mounted to rotate.

The number of sheets which can be printed on an impression cylinder at the same time, obviously is a function of their lengths and of the diameter of the cylinder. In the present instance, it has been assumed that the impression cylinder is able to receive three sheets at a time and therefore three ruling blocks indicated generally by I, II and III in Fig. 1, have been provided. As all the ruling blocks are identical, only one of them, to wit, No. III, will be described. 6 is the ruling-block shaft referred to in the introduction which is mounted to rotate in the frame members 2, as best seen in Fig. 6. 7 and 13 are the levers on which the beginning rollers 8 and the end rollers 20, respectively, are mounted. These levers are free to rock about the ruling-block shaft 6. Their rocking motion is limited by brackets 11 and 14 which are keyed on the shaft 6 and provided with adjustable checks in the shape of screws 12 and 14′. The screw 14′ engages a fork-shaped extension 13′ at the inner side of the lever 13 and its bracket 14 is connected with the frame 2 by a spring 14^2. 6′ and 6^2, Fig. 2, are arms which are keyed to the ruling-block shaft 6, 63 (Fig. 6) are blocks which are fitted to slide in the slotted ends of the arms 6′ and 6^2, as illustrated for the arm 6^2 in Fig. 6, 61 is the hand wheel of a screw spindle by which the block 63 is displaced in the arm 6^2, 5 is a shaft which is rotatably supported at either end in the block 63 of the corresponding arm 6′ or 6^2, and 4 are the ruling rollers which are secured on the shaft 5. It will be understood that the spring 14^2 tends to hold the rollers 4 engaged with the sheet or sheets on the impression cylinder 1. The arms 6′ and 6^2, with the blocks 63, the screw spindles and the hand wheels 61, the shaft 5 and the ruling rollers 4, make up one of the units which have been termed "ruling blocks".

The beginning roller 8 is mounted to rotate on a slide 21 in a slot 10 of its lever 7, 9 being a threaded spindle with a knurled handle 9′, 10′ being a graduation extending along one edge of the slot 10, and a mark is made on the slide 21 for indicating its position in the slot 10. The pin 20′ about which the end roller 20 rotates is supported in an eye of its lever 13 by means of an eccentric bearing (Fig. 8) and a knurled handle 20^2 is secured on the end of the pin, as will appear from Fig. 6.

It will be understood that the means for adjusting the rollers 8 and 20 in their respective levers may be modified in various ways. An example of such modification is illustrated in Fig. 10 where the slot 100 for the block 210 in the lever 70 is curved on an arc of a circle about the axis of the impression cylinder 1. The nut 211 of the spindle 90 is spherical and the block 210 is recessed so as to make room for the required rocking motion of the spindle 90. The end of the spindle 90 is guided in a slot 71 at the free end of the lever 70 and curved checks 92 and 93 are formed on the spindle 90 to abut against the slotted end of the lever 70 from both sides.

The ruling blocks are controlled by tripping cams 19, 19′ and 19^2 which cooperate with the beginning rollers 8, by tripping cams 23, 23′ and 23^2 which cooperate with the end rollers 20, and by cams 22, 22′ and 22^2 which bridge the gap between two beginning and end cams.

The cams are adjustably held in a cam support 18 which is keyed on the shaft 3 of the impression cylinder 1. Two grooved rings 16 and 16′ are secured at the front and rear ends of the cam support 18, the cams 19, 19′ and 19^2 being inserted in the groove of the ring 16, and the cams 22, 22′ and 22^2, and 23, 23′ and 23^2 being inserted in the groove of the ring 16′. Each cam is provided with a sector-shaped base which is adapted to be inserted in the groove of the corresponding ring, as shown in Fig. 6 at the lower left-hand corner, where the groove of the ring 16 is partly broken open. As will appear from this figure a bracket of L-section is inserted in the groove of the ring 16, and enters a recess in the base of the cam with the web which is parallel to the axis of the ring, while the other web abuts on one of the faces of the groove. A wedge 232 is inserted between the base of the cam and an inclined face on the inside of the adjacent web of the bracket. A screw 233 is inserted in a threaded hole of the wedge 232 so that the base of the cam is clamped firmly between the wedge and the wall of the groove. The active portion of each cam is a curved rib projecting from its base. The cam support 18 is provided with graduations for adjusting the grooved rings

16, 16'. Fig. 4 shows the graduation for the ring 16, and also diagrammatically the cams 19, 19' and 19^2. The positions of the cams with respect to the graduation are indicated by marks on the ring 16 which indicate degrees. Similar means, not shown, are provided for indicating the positions of the cams 23, 23' and 23^2 on the ring 16'.

The feeding apparatus is shown diagrammatically in Fig. 5. 27 is a sheet which is supplied to the impression cylinder 1 by two endless conveyers 28 and 29. The conveyer belt 28 is supported on rollers 30, 31 and 32. The conveyer belt 29 is partly supported on the impression cylinder 1, and partly on a roller 33 which holds it engaged with the belt 28 between the rollers 30 and 32. 26 is a check for controlling the feeding of the sheets 27. The check is secured to the end of an arm 34 which is fulcrumed at 35 and is reciprocated by a link 25. The link is equipped with a pull-back spring 36 tending to hold it against a fixed check 37 on the frame of the machine. The other end of the link 25 is pivoted to a cam 24 which in turn is pivoted to a suspension link 24'. Dogs 17, 17' and 17^2 are arranged at the rear face of the cam support 18, the dog 17^2 appearing in Fig. 6. The number of dogs is equal to the number of ruling blocks, in the present instance three. The dogs engage the cam 24 at regular intervals, operating the link 25 and retracting the check 26. It will be understood that the check 26 retains the sheets 27 while the belts 28 and 29 move on. When the check is retracted, the belts deliver the sheet to the impression cylinder.

The operation of my improved machine is as follows:

The direction in which the sheets are fed into the machine and the length of the ruled spaces are indicated in Fig. 1. Assume that three sheets are to be ruled during one rotation of the impression cylinder 1. Each sheet is fed to the impression cylinder as determined by the operation of the check 26 in Fig. 5. Each ruling block then performs on each sheet a predetermined ruling operation, for instance, the first block I draws the lines a as shown in Fig. 3, the second block II draws the lines b, and the third block III draws the lines c. Assume further that the beginning of the ruled space on each sheet is at a distance d from the top of the sheet and that this distance is equal to one inch. The cams 19, 19' and 19^2 are now secured in the grooved ring 16 so that their ends are opposite the marks "0°" at the centre, "120°" at the left and "120°" at the right, Fig. 4, the cams being thus equally distributed over the circumference of the ring 16. The cams 23, 23' and 23^2 are adjusted similarly on their grooved ring 16'.

Further adjustment is effected by means of the spindles 9 for the beginning roller 8 and by means of the shaft 20' for the end rollers 20.

In the position of parts illustrated in Fig. 1 the ruling block 1 has drawn the lines a on a sheet and has been lifted off that sheet by the cam 23^2 and the end roller 20 and is retained upon further rotation of the impression cylinder by the cam 22^2 acting as a bridge, and the cam 19^2 until the cam 19^2 has moved past the roller 8 of the ruling block I, whereupon the block starts ruling the next sheet.

The ruling block II draws the lines b on the sheet on which the block I has drawn the lines a and the operation of the block II will be arrested when the cam 23 reaches its end roller 20, raising the ruling rollers 4 from the sheet and maintaining the block II in inactive position until its beginning roller 8 has been released by the cam 19^2 when its ruling rollers begin on a new sheet.

When the beginning roller 8 of a given shaft 6 has been released by one of the cams 19, 19' and 19^2, the spring 14^2 rotates the shaft 6 and moves the ruling rollers 4 into contact with the sheet on the impression cylinder 1. At the end of the ruling operation the end roller 20 is engaged by one of the cams 23, 23' and 23^2, the shaft 6 is rotated against the action of the spring 14^2, and the ruling rollers 4 are raised from the sheet. Independent rollers and independent means for regulating the position of the rollers in their respective levers 7 and 13, are provided for determining exactly the beginning and the end of a line without such rollers and regulating means interfering with each other.

The sheet on which the block II has drawn the lines b now passes on to the block III which will start drawing the lines c as soon as the cam 19 will have released its beginning roller 18.

It will be understood that the distances from the top of the sheet at which the various ruling operations start, is a function of relative position of the ruling blocks I, II and III and the adjustment of the tripping cams, and it will also be understood that when the cams and the beginning and end rollers have been adjusted once and for all—an operation which is performed readily, exactly and to the elimination of all cut-and-try methods by the means described—the machine can be started and will rule correctly the first as well as the last sheet of its pile and waste is entirely eliminated.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feed-

ing sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, and tripping cams connected to said impression cylinder so as to partake in its rotation and adapted to co-operate respectively with said beginning and end rollers.

2. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, an adjustable beginning and an end roller operatively connected with said shaft, means for adjusting said beginning roller on said ruling block, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, and tripping cams connected to said impression cylinder so as to partake in its rotation and adapted to co-operate respectively with said beginning and end rollers.

3. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an adjustable end roller operatively connected with said shaft, means for adjusting said end roller on said ruling block, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, and tripping cams connected to said impression cylinder so as to partake in its rotation and adapted to cooperate respectively with said beginning and end rollers.

4. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft including two levers mounted on and free to rock about said shaft, a beginning roller on one of said levers, an end roller on the other lever, and ruling rollers supported by said shaft, means for restricting the rocking motion of said levers with respect to said ruling-block shaft, whereby upon continued rocking motion of anyone of said levers said shaft is rotated, and tripping cams connected to said impression cylinder so as to partake in its rotation, one of said cams being adapted to cooperate with said beginning roller, and the other cam being adapted to cooperate with said end roller.

5. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft including two levers mounted on and free to rock about said shaft, an adjustable beginning roller on one of said levers, means for adjusting said beginning roller on its lever, an end roller on the other lever, and ruling rollers supported by said shaft, means for restricting the rocking motion of said levers with respect to said ruling-block shaft, whereby upon continued rocking motion of anyone of said levers said shaft is rotated, and tripping cams connected to said impression cylinder so as to partake in its rotation, one of said cams being adapted to cooperate with said beginning roller, and the other cam being adapted to cooperate with said end roller.

6. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft including two levers mounted on and free to rock about said shaft, a beginning roller on one of said levers, an adjustable end roller on the other lever, means for adjusting said end roller on its lever, and ruling rollers supported by said shaft, means for restricting the rocking motion of said levers with respect to said ruling-block shaft, whereby upon continued rocking motion of anyone of said levers said shaft is rotated, and tripping cams connected to said impression cylinder so as to partake in its rotation, one of said cams being adapted to cooperate with said beginning roller, and the other cam being adapted to cooperate with said end roller.

7. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets

on said impression cylinder, a support connected to said impression cylinder, a ring adjustably mounted on said support, and tripping cams on said ring adapted to cooperate respectively with said beginning and end rollers.

8. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, divided tripping cams connected to said impression cylinder so as to partake in its rotation and adapted to cooperate respectively with said beginning and end rollers, and means for holding the parts of said divided cams in adjusted position with respect to each other.

9. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, divided tripping cams connected to said impression cylinder so as to partake in its rotation and adapted to cooperate respectively with said beginning and end rollers, and means for holding the parts of said divided cams in adjusted position with respect to each other, said cams also including a part adapted to bridge an interstice between two parts of said divided cam.

10. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, a support connected to said impression cylinder, a plurality of rings adjustably mounted on said support, and a cam part on each ring, said parts on said rings being adapted to make up complete cams upon relative adjustment of said rings.

11. A ruling machine of the rotary type comprising a frame, a rotary impression cylinder mounted in said frame, means for feeding sheets to said cylinder, a ruling-block shaft mounted to rock in said frame and extending in parallel relation with respect to the axis of said impression cylinder, a ruling block on said shaft, said ruling block including ruling rollers, a beginning and an end roller operatively connected with said shaft, means for yieldably holding said ruling rollers on said block in contact with the sheets on said impression cylinder, a support connected to said impression cylinder, a graduated disc on said support, marked rings mounted to rotate on said support and adapted to be fixed with respect to said disc, and a cam part on each ring, said parts being adapted to make up complete cams upon relative adjustment of said rings.

In testimony whereof I affix my signature.

FRANZ HINTERDÖRFER.