May 12, 1931. W. W. LASKER 1,804,995

STATISTICAL CARD PRINTING AND CUTTING MACHINE

Filed July 16, 1927 3 Sheets-Sheet 1

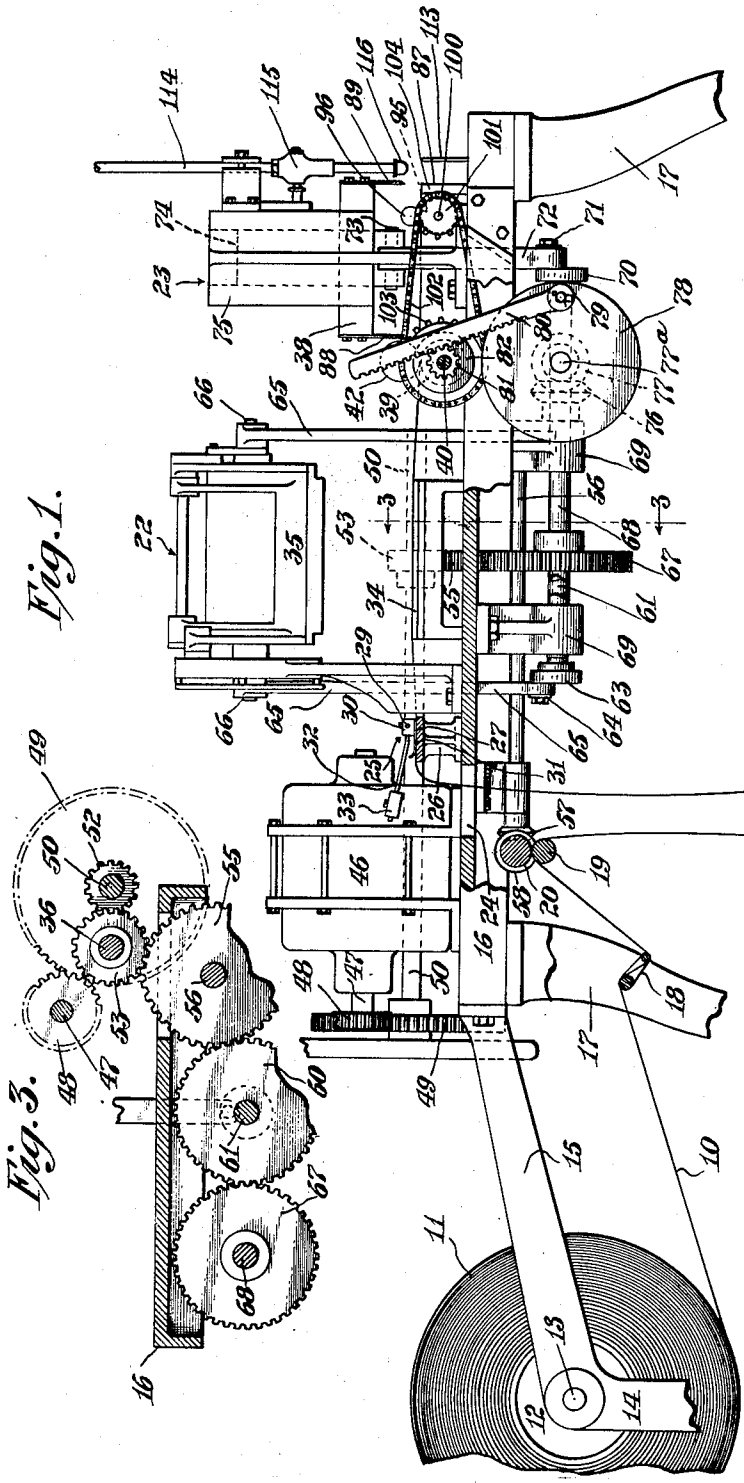


Fig. 1.

Fig. 3.

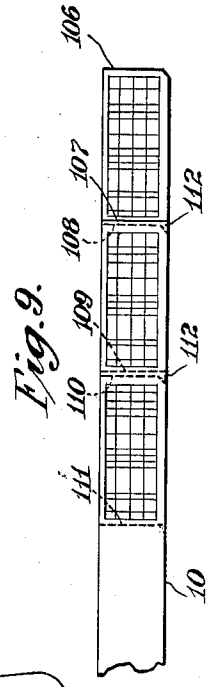


Fig. 9.

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STATISTICAL CARD PRINTING AND CUTTING MACHINE

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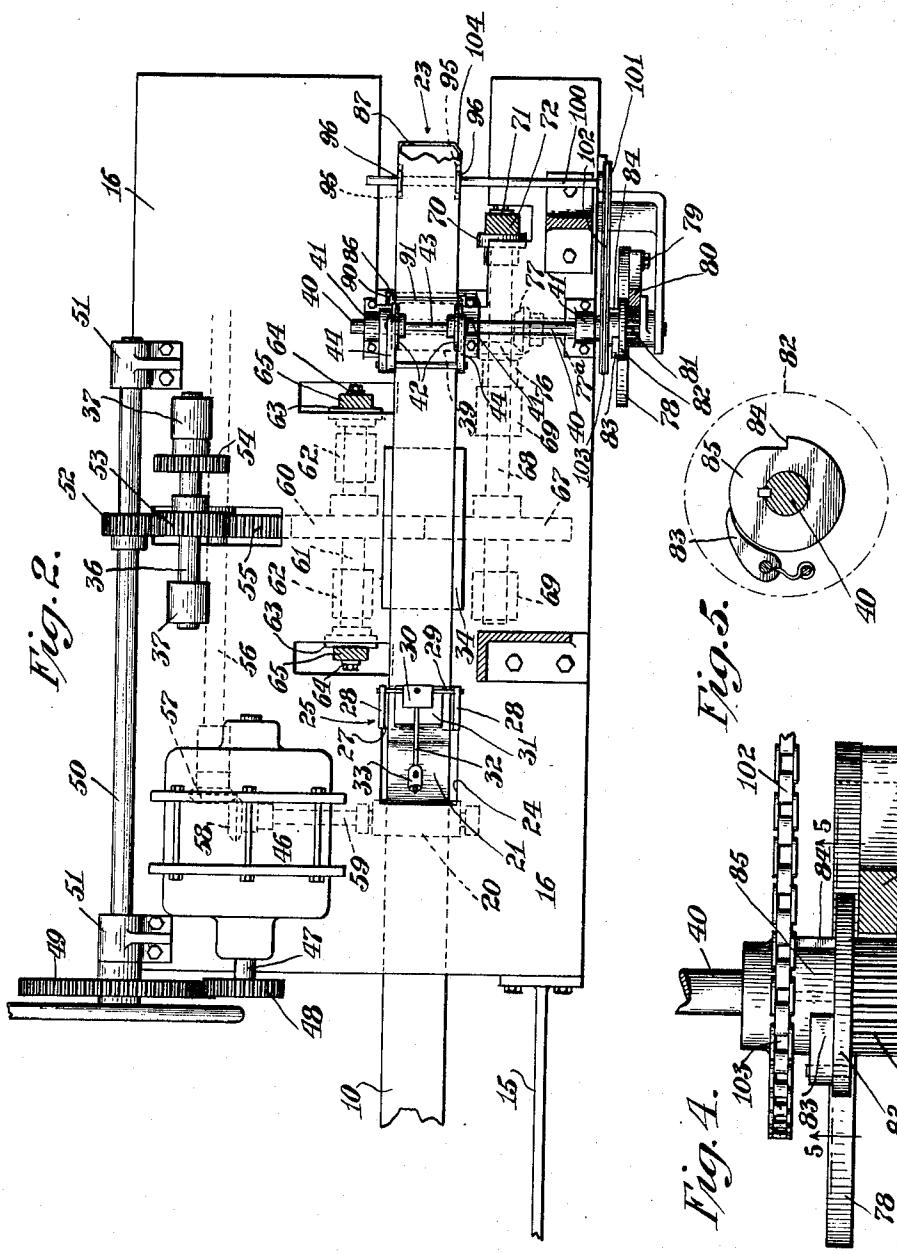


Fig. 2.

Fig. 5.

Fig. 4.

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Fig. 6.

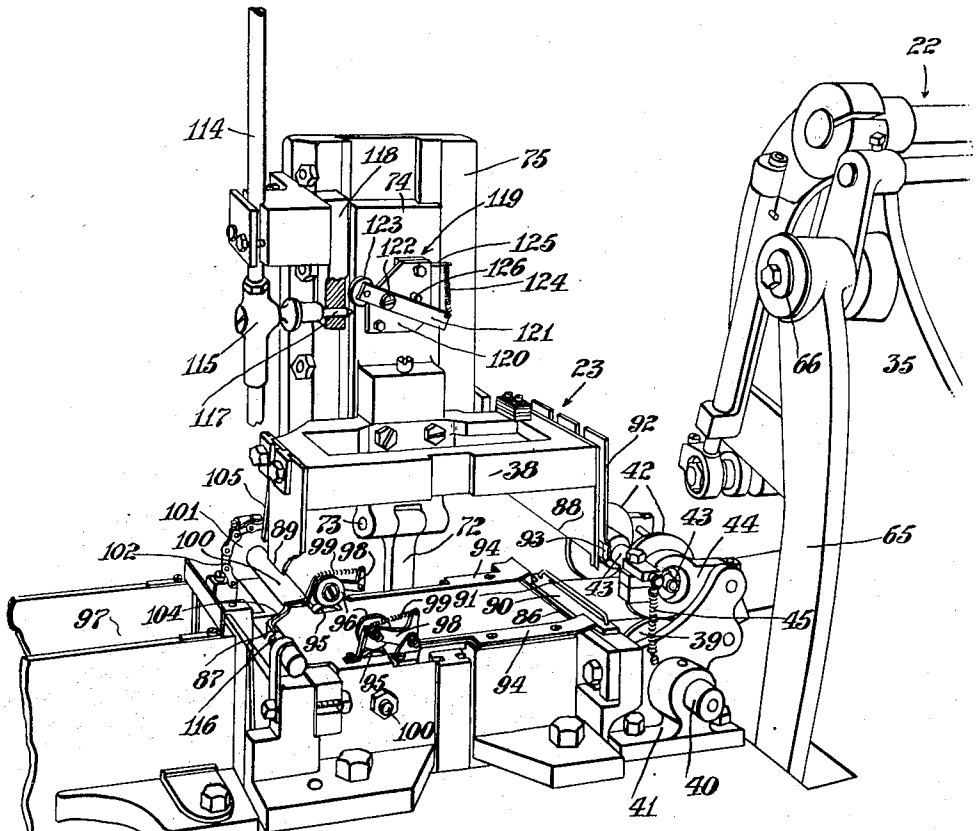


Fig. 8.

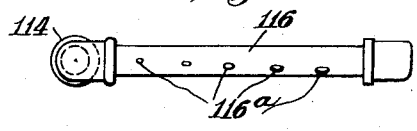
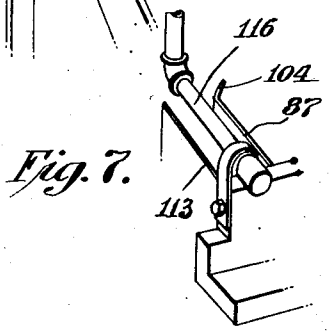


Fig. 7.



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UNITED STATES PATENT OFFICE

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STATISTICAL CARD PRINTING AND CUTTING MACHINE

Application filed July 16, 1927. Serial No. 206,740.

The present invention relates to the preparation of statistical cards and more particularly to the printing of such cards in succession on continuous strips of suitable material and the subsequent cutting of the cards from the strips. The strips are usually of a width corresponding to one dimension of the cards, preferably the width, and a plurality of such strips may be formed simultaneously as by slitting at proper intervals transversely thereof sheets of suitable material such as heavy paper.

In the printing operation the cards are subdivided into fields of numbers or other characters, each field corresponding to some predetermined class, characteristic, item, account or subject regarding which statistical data is desired. Subsequent to such printing the cards are cut from the strips.

When used for accounting purposes, the cards are usually perforated or punched in suitable machines in conformity with the matter to be tabulated and are later run through tabulating machines designed to function in accordance with the arrangement of such perforations. In both perforating and tabulating machines the cards are usually fed one by one transversely of their lengths into position for perforating or analyzing, the positioning for such purposes being effected by engagement of the forward side edge of each card with a suitable stop and by engagement of the end edges of the cards with parallel guides. Inasmuch as positioning in the first direction is effected by a single stop, slight variations in the width of the card may not be of great importance. Variations in the length of the cards are, however, of considerable importance. In practice the principal difficulty arises from underlength cards whose positions between the parallel guides may be varied thereby tending to cause improper card positioning in the perforating and tabulating machines and erroneous tabulation due to failure of registration between the perforations and the corresponding parts of the analyzing mechanism. Inasmuch as the most perfect tabulating machines may be caused by defective cards to give erroneous results, the importance of avoiding such defects in the cards will be evident.

Some of the objects of this invention are to assure proper positioning of statistical cards in machines such as perforating and tabulating machines, to assure correct actuation of tabulating machines in accordance with statistical data recorded by perforating cards, and to provide means for so preparing statistical cards as to avoid erroneous tabulation which might otherwise result from conditions arising in such preparation.

According to the present invention such results are attained by printing the cards with narrow spaces, therebetween and then severing each card from the strip by cuts at both ends, the cutting devices being so spaced as to give the desired length of card. The importance of proper preparation of the cards will be evident upon taking into consideration the fact that, no matter how carefully the perforating and tabulating machines are built and maintained, correct tabulation is dependent upon correct perforation of the cards and correct positioning of the perforations in the analyzer of the tabulating machine.

Other objects and advantages will hereinafter appear.

In the accompanying drawings: —

Fig. 1 is a front elevation, partially broken away, showing one form of the present invention;

Fig. 2 is a top view of the operating mechanism;

Fig. 3 is a sectional elevation of a portion of the operating mechanism;

Fig. 4 is a detail view;

Fig. 5 is a detail view taken on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view showing the cutting mechanism;

Fig. 7 is a perspective view of the clearing device;

Fig. 8 is a bottom view of the clearing device; and

Fig. 9 is a diagrammatic view of a strip indicating the manner in which cards are printed thereon and are cut therefrom.

Referring to the drawings, a strip 10 of

suitable material and of the correct width of the cards to be prepared is supplied to the machine from a roll 11 on a core 12 rotatably mounted on a pivot 13 in a support 14 having an arm 15 by which it is attached to a bed-plate or table 16 mounted on legs 17. From the roll 11 the strip extends through a tension device 18 and between two rolls 19 and 20 actuable by means to be described hereinafter to draw the strip from the roll 11 and maintain a loop 21 to avoid undue resistance to the intermittent feeding of the strip through a printing element 22 and a cutting element 23.

From the loop 21 the strip 10 passes upwardly through an opening 24 in the table 16 to a guide and tension device 25 comprising a bracket 26 having a flat upper surface 27 and ribs 28 forming side edge guides for the strip. Pivotally mounted by means of a rod 29 is a block 30 carrying a plate 31 to engage the upper surface of the strip and press it against the bracket, and a rod 32 with a weight 33 adjustable there along to vary the pressure exerted on the strip. It will be evident that by means of the tension device 25 the strip 10 may be kept flat and so tensioned as to give the best results in connection with the feeding of the strip through the printing element 22 and the cutting element 23.

The printing element comprises a platen 34 to support the strip 10 and a head 35 carrying type and inking mechanism and pivotally mounted on a shaft 36 journalled in brackets 37 on the table 16, so that it may be swung downwardly to print on the portion of the strip resting on the platen. Between successive printing operations the strip 10 is advanced to bring fresh sections to the platen 34 and to feed the printed sections of the strip one by one to the cutting element 23 which includes a reciprocable head 38 operated to cut a printed card from the strip simultaneously or concomitantly with the printing of another card. Preferably the arrangement is such that the position at which the cards are severed is separated by approximately one card length from the position in which the cards are printed.

Adjacent the cutting element 23, the strip 10 rests on a roller 39 on a shaft 40 journalled in suitable brackets 41 on the table 16, and is pressed against said roller by wheels 42 engaging the edges of the strip and mounted on a shaft 43 journalled in arms 44 pivoted on the brackets 41 and urged to effective position by springs 45. Intermittent rotation of shaft 40 and consequent intermittent feeding of the strip 10 is effected by means to be described hereinafter.

Power is furnished by a motor 46 having on its shaft 47 a gear 48 meshing with a gear 49 on a main driving shaft 50 mounted in brackets 51 on the table 16. Fixed on the shaft 50 is a gear 52 meshing with a gear 53 fixed on the shaft 36 which also carries a gear 54 for actuating parts on the printing head 35. The gear 53 also meshes with a gear 55 on a shaft 56 which by means of bevel gears 57 and 58 actuates shaft 59 on which the roll 20 is mounted and thereby effects a continuous feed of the strip 10 from the roll 11 at such a rate as to maintain the loop 21 notwithstanding the intermittent feed of the strip through the printing element 22.

The gear 55 also meshes with a gear 60 on a shaft 61 journalled in brackets 62 and having on its ends disks 63 with eccentric pins 64 serving as pivots for the lower ends of links 65 connected at their upper ends by means of pivots 66 to the printing head 35 to actuate the same to effect printing. Meshing with the gear 60 is a gear 67 of the same size mounted on a shaft 68 journaled in brackets 69 and having at one end a disk 70 with an eccentric pin 71 in operative engagement with the lower end of a link 72 connected at its upper end by means of a pivot 73 with a slide 74 carrying the cutter head 38 and slidably mounted in a bracket 75. It will be seen that by making the gears 60 and 67 the same size and arranging the eccentric pins in proper relative positions concomitant actuation of the printing and cutting elements is assured.

The shaft 68 is also utilized to rotate the shaft 40 and to this end is provided with a bevel gear 76 meshing with a bevel gear 77 on a shaft 77A having at its forward end a disk 78 connected by a pin 79 eccentrically positioned thereon with the lower end of a rack 80 meshing with a gear 81 loosely mounted on the shaft 40 but fixed to a disk 82. Pivoted on the disk 82 is a pawl 83 which on the down stroke of the rack engages a shoulder 84 on a disk 85 fixed on the shaft 41 and rotates the latter to advance the strip 10 after each printing and cutting operation. It will be evident that during the up stroke of the rack 79 the pawl 83 has an idle movement.

According to the present invention the printed cards fed to the cutting head are cut at both ends and, in the preferred embodiment herein disclosed, provision is made of fixed knives 86 and 87 arranged to support both ends of each card during the cutting operation and to cooperate at their outer edges with knives 88 and 89 respectively, on the cutting head 38. By cutting the cards in this manner, not only is the liability of obtaining overlength cards avoided but, inasmuch as both ends of each card are supported, uniformity in the condition of the ends of the cards is obtained. Obviously, if cards are cut successively from a strip, only one end of each card is supported during the execution of the two cuts necessary to sever it from the strip and the end not supported is likely

to be bent thereby injecting another element of uncertainty as to the correctness of the lengths of the cards.

At each cutting operation the strip 10 is supported at one side of the knife 88 by the fixed knife 86 and at the other side of the knife 88 support for the strip is provided by a spring-supported member 90 normally positioned with its upper surface at such a height as to direct the strip over the top of the blade 86 and having a guide 91 to prevent displacement of the leading end of the strip. Mounted on the cutting head 38 outside of the knife 88 is a plate 92 provided with fingers 93 which, substantially at the time of the cutting action, engage the member 90 and move it downwardly, thereby avoiding injury to the leading end of the strip. Upon the upward stroke of the cutting head, the member 90 returns to its normal position to guide the end of the strip over the knife 86.

The leading end of the strip is then advanced beneath guides 94 and between lower and upper rollers 95 and 96 respectively, by which the cards after cutting are ejected into a receiver 97. The rollers 96 are mounted on pivoted bell-cranks 98 to which are attached springs 99 which serve to press the rollers 96 against the rollers 95 which are mounted on a shaft 100. At its forward end the shaft 100 is provided with a sprocket wheel 101 over which extends a sprocket chain 102 cooperating with a sprocket wheel 103 fixed on the shaft 40. It should be understood that the parts are so proportioned and arranged as to effect rapid ejectment of the cards.

For certain kinds of work it is desired to have one corner (preferably the upper left hand corner) of each card removed. To this end the fixed knife 87 is provided with an inclined portion 104 with which cooperates a knife 105 secured to the cutting head, the width of the knife 89 being varied to conform with the requirements.

The manner in which the cards are cut from the strip is illustrated diagrammatically in Figure 9, the ends of a completed card at the right being shown in full lines 106 and 107 and the ends or cuts for subsequent cards being indicated by dotted lines 108, 109, 110 and 111. As indicated in this figure, there are pieces 112 of waste material between successive cards. By proper arrangement of the intermittent feed devices, however, these pieces may be made so small that the waste due thereto will be comparatively small.

Unless provision is made for disposing of the pieces 112 they will be carried into the receiver 97 with the finished cards and must be removed to assure proper feeding of the cards when placed in the perforating machines. With this end in view, the receiver 97 is arranged with its inner wall 113 spaced sufficiently from the knife 87 to permit such waste pieces to drop through the opening thus formed. In practice, however, it is found that due to static conditions arising from the cutting operations the waste pieces 112 adhere to the knife 89 and gradually collect thereon. To keep the knife 89 clear use is made of a clearing device wherein compressed air from any suitable source of supply is furnished to a pipe 114 provided with a controlling valve 115 and a tip or nozzle 116 consisting of a piece of pipe extending parallel to the fixed knife 87 and having a series of perforations 116*a* gradually increasing in size toward the closed end of the nozzle and arranged as shown in Figure 8.

The valve 115 which is normally closed has a reciprocable stem 117 guided in a member 118 fixed on the bracket 75. Actuation of the stem 117 is effected by means of a trip device 119 mounted on the slide 74 and consisting of a plate 120, a lever 121, a pivot 122 about which the lever swings, a roller 123 pivoted on one end of the lever 121 to engage the stem 117, a spring 124 attached at one end to the lever 121, a pin 125 to which the other end of the spring 124 is attached and a stop 126 to limit the movement of the lever by the spring 124. The arrangement of the parts is such that in the downward movement of the cutting head the roller 123 rides idly over the end of the stem 117 without actuating the same and that in the upward movement of the head the roller is rigidly supported and forces back the stem 117 to cause a jet of air from the nozzle 116 to drive the last severed piece 112 downwardly from the knife 89.

It will be seen that the present invention provides card preparing means wherein the formation of the underlength cards is avoided by giving a slight overfeed to the strip and then severing the foremost card from the strip by cutting at both ends of the card simultaneously. The feeding means may be so designed that the waste strips between successive cards will be very narrow thereby avoiding waste of material.

Having thus described my invention, I claim:

1. In a device of the character described, the combination with means for severing cards from a strip by simultaneously cutting the same along two transverse lines spaced in accordance with a predetermined length of card, of intermittent feeding means to advance the strip between cutting operations a distance slightly greater than the length of a card.

2. In a device of the character described, the combination with means for severing cards from a strip by simultaneously cutting the same along two transverse lines spaced in accordance with a predetermined length of card, of intermittent feeding means to advance the strip between cutting operations a

distance slightly greater than the length of a card, a receiver for said cards spaced from the severing means to permit the waste portion of the cards to pass down therebetween, and means for ejecting the said waste portion.

3. In a device of the character described, in combination, means for severing cards from strips comprising two fixed blades having their outer faces spaced from each other in accordance with a predetermined length of card and two blades actuable simultaneously to coact with said fixed blades at the outer faces thereof, and intermittent feeding means to advance the strip between cutting operations a distance slightly greater than the length of a card.

4. In a device for preparing statistical cards from strips, in combination, card severing means comprising cutting devices actuable simultaneously and spaced in accordance with a predetermined length of card, means to support both ends of each card during the severing operation, and intermittent feeding means to advance the strip between cutting operations a distance slightly greater than the length of a card.

5. In a machine of the character stated, a reciprocable head, two cutting knives carried by said head and spaced apart a distance corresponding to the desired length of a card to be cut from a strip of material, means to intermittently feed said strip across the path of said knives a distance slightly greater than the length of a card, and means for reciprocating said head, said means being timed to cause said knives to engage said strip at a rest period whereby a card of predetermined length is cut from said material.

Signed at New York, county of New York, State of New York, this 14th day of June, 1927.

WILLIAM W. LASKER.