

June 29, 1926.

1,591,005

C. H. STUIVENBERG
APPARATUS FOR THE MECHANICAL ASSEMBLING OF STATISTICAL
CARDS BEARING CORRESPONDING DATA
 Filed June 18, 1925

2 Sheets-Sheet 1

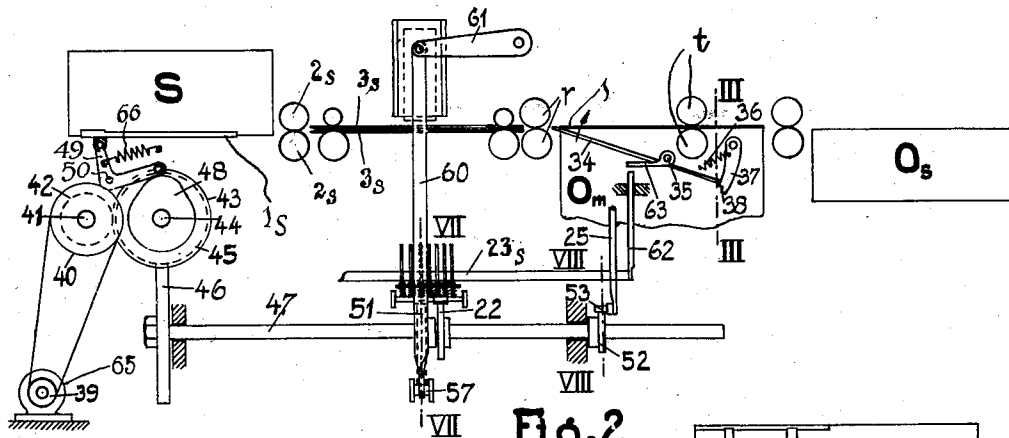


Fig. 2

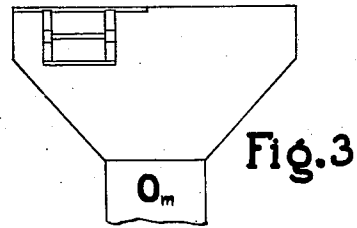


Fig. 3

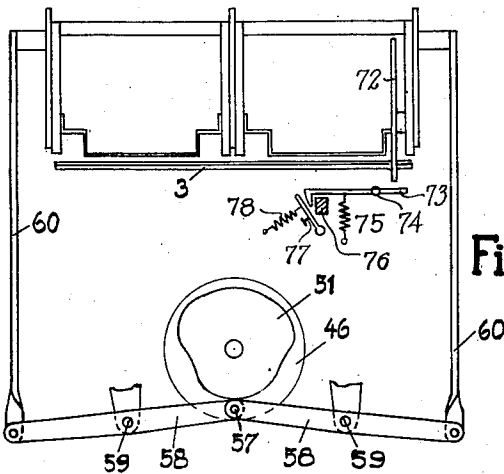


Fig. 7

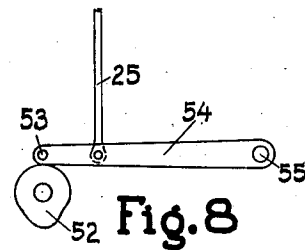


Fig. 8

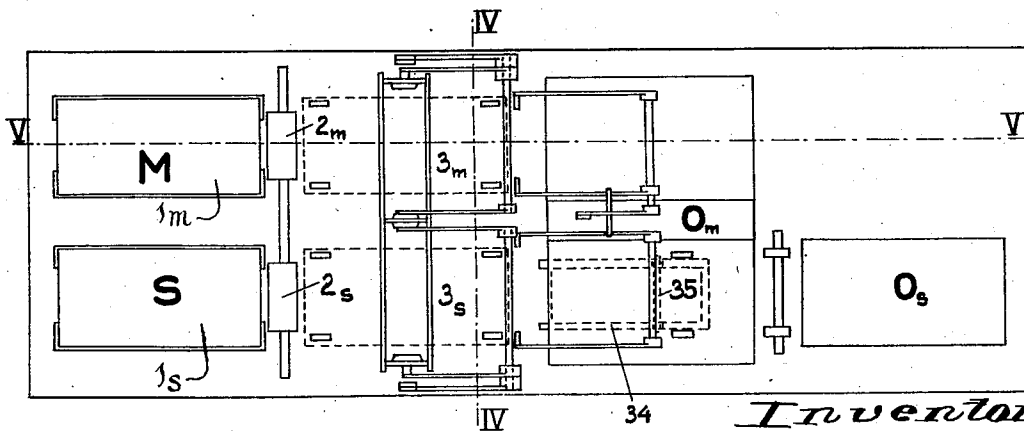


Fig. 1

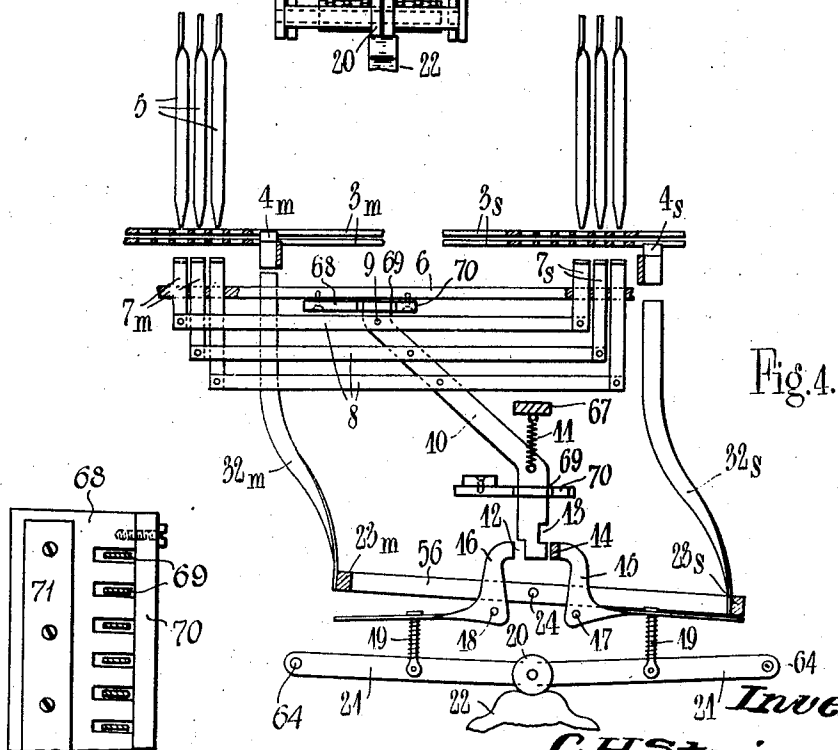
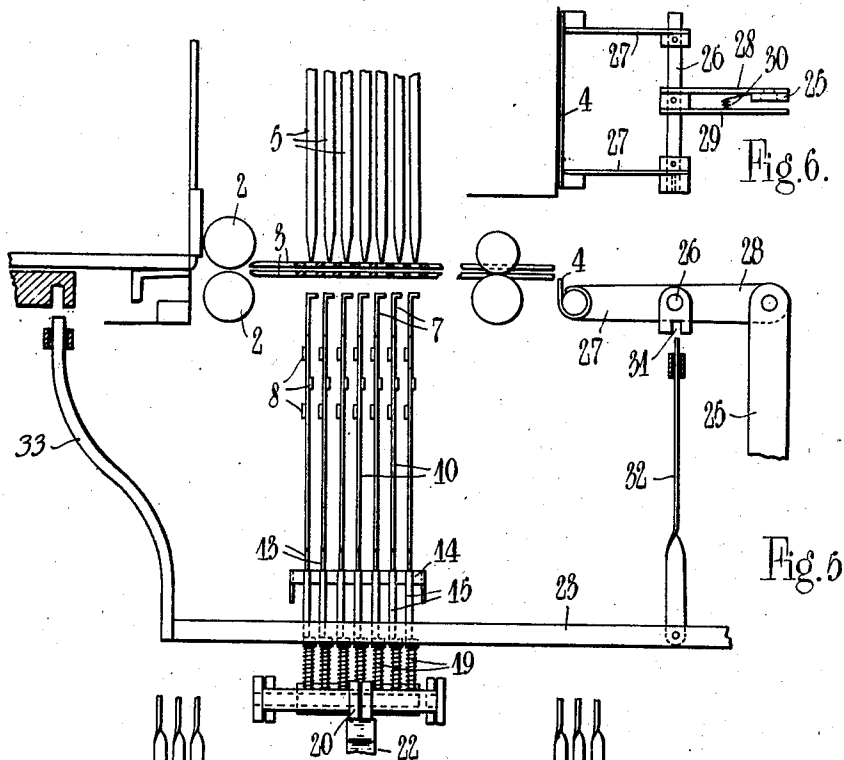
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MECHANICAL ASSEMBLING OF STATISTICAL CARDS BEARING
CORRESPONDING DATA.

Application filed June 18, 1925, Serial No. 38,111, and in Netherlands January 23, 1924.

This invention relates to a process and apparatus for mechanically assembling statistical cards which are provided, by means of punched holes, with specific indications, and, in particular, such cards as correspond with one another in respect of one or more indications.

As an example of the use of such an arrangement reference may be made to the perforated cards used in mechanical book keeping systems.

It is assumed that for each one of the customers there is a balance card in the records, on which the customer himself is indicated as a number by means of holes arranged in columns on the card in question. These cards together form a file.

Now during a certain length of time, for example one day, definite transactions are carried out for a number of these customers and are likewise recorded by means of holes in the corresponding columns on the cards, these cards then being at the same time provided in the appropriate columns with holes which indicate the customer's number.

In order then to be able to determine the balances afresh after this interval, the previous balances must be altered according to the transaction carried out for the customers concerned. For this purpose it is necessary for the balance cards of the customers for whom transactions have taken place to be assembled with those cards upon which these transactions have been expressed, while the remaining balance cards, which do not need to be subjected to any alteration, are kept separate.

The accomplishment of this mechanical sorting is the object of the present invention, which will now be explained in detail with reference to the accompanying drawings. In these drawings:—

Figure 1 is a diagrammatic plan view of the parts of the apparatus which relate to the conveying of the cards.

Figure 2 is a side view of Figure 1 diagrammatically showing the driving means for causing the various parts to operate in properly timed relation.

Figure 3 is a section on the line III—III in Figure 2.

Figure 4 is a partial front elevation, partly in section (on the line IV—IV in Figure

1) and drawn to a larger scale. In relation to Figure 1 this view is seen from the left.

Figure 5 is a partial section taken along the line V—V of Fig. 1 and on the same scale as Fig. 4.

Figure 6 is a plan of part of Figure 5.

Figure 7 is a section on the line VII—VII in Figure 2. Figure 8 is a section on the line VIII—VIII in Figure 2.

Figure 9 shows a detail.

The balance cards, of which, as a rule, there is one for each customer, who is indicated by a number, are conveyed like a file in which the cards are in numerical order, into a magazine S (see Fig. 1) where they are arranged one above the other. Into a magazine M are likewise brought and similarly arranged in the manner of a file in numerical order, the fresh cards upon which are indicated merely the transactions that have taken place.

On these M cards many numbers may be missing, namely those of the customers for whom no transactions have taken place, while for one number more than one card may be present, namely for those customers for whom more than one transaction has taken place.

The general operation of the device is as follows:—

All the cards from the magazine M pass in order to a receiving magazine O_m (Fig. 1). Similarly all the cards from the magazine S pass to a receiving magazine O_s , with the exception of those S-cards which contain an indication corresponding to one or more of the M-cards. These S-cards pass to the receiving magazine O_m , immediately behind the S-cards which exhibit the same indication.

The machine will now be described in detail.

With the help of feed knives 1_s and 1_m (Figures 1, 2, 4, 1_s for the magazine S and 1_m for the magazine M, which distinction will be maintained in what follows) and rollers 2_s and 2_m , one card from each of the magazines S and M is guided between sets of feeler plates 3_s and 3_m (see Fig. 4), which are provided with a number of holes equal to the number of spaces for perforations that may occur in the cards are ar-

5 ranged in the same manner. By means of the levers or stops 4_s and 4_m being raised from the position shown in Fig. 5 as hereinafter explained the cards are held in the position required for the feeling operation. When no suffix M or S is used the statement is to be understood as referring both to the apparatus relating to the magazine M and to the apparatus relating to the magazine S.

10 Above the feeler plates is located the feeler apparatus subsequently further described by means of which sets of feeler pins 5 are moved up and down and can thus pass through the holes in the cards.

15 Underneath the feeler plates 3 (i. e. referring both to 3_m and also to 3_s) there is a fixed plate 6 acting as a guide for rods 7. The number of rods 7 provided is the same as the number of possibilities of holes in the cards in the columns examined. In general there will be room for ten holes in each column, so that for each column twenty rods 7 are present, namely ten under the feeler plate 3_m and ten under the feeler plate 3_s . The corresponding rods 7 are all coupled together in pairs (for example the rod for the hole 2 under the feeler plate 3_m with the rod for the hole 2 under the feeler plate 3_s , and so on for all the columns) by means of double-armed levers 8, which are so arranged upon a rod 10 as to be rotatable about shafts 9, one such rod 10 being provided for each column of the cards for which the feeling operation takes place. The connection of the rods 7 to the levers 8 is hingedly arranged.

The rods 10 are slidably mounted in upper and lower fixed guides 68 so as to be capable of sliding vertically and are maintained in the upper position shown by means of springs 11 attached to a cross beam 67 itself secured to the frame of the apparatus, and are each provided at the lower end with two notches 12 and 13. As shown in Figures 4 and 9 each of the guides 68 is formed with a plurality of notches 69 for guiding the rods 10, the open ends of these notches being closed by a retaining bar 70. The upper guide 68 is fixed to the plate 6, while the lower guide 68 is fastened to a cross-beam 71 itself secured to the frame of the machine. Into the notches 13 a single beam 14, which is secured to the heads of bell crank levers 15, can move when all the rods 10 are depressed, while in the depressed condition of any one rod 10 the head of one of a set of bell crank levers 16 cannot enter the notch 12, which it is quite able to do when its corresponding rod 10 is in the position illustrated.

65 The bell crank levers 15 and 16, of which the number present is equal to the number of columns to be tested (seven for the example illustrated in Fig. 5) are rotatably arranged on fixed shafts 17 and 18. By the

tail pieces of the bell crank levers are actuated pins 19, which are rotatably secured to levers 21 fitted to loosely engage on both sides of a roller 20, the said levers 21 being rotatably connected at 64 with the frame of the apparatus. Around the pins 19 are arranged springs, and at the end projecting beyond the bell crank levers 15 and 16 the pins 19 are provided with collars or heads. Below the roller 20 is a cam disc or plate 22 by means of which the roller 20 is pushed up at the required instant. Above the ends of the tail pieces of the bell crank levers 15 and 16 are located beams 23_s and 23_m , which are connected with one another by means of a lever 56 rotatable about a fixed shaft 24. The beam 23_s is provided with a rod 32_s , which can be brought into such a position that the periodic movement of the lever 4_s is eliminated thereby as hereinafter explained, and likewise for the beam 23_m and rod 32_m in relation to the lever 4_m .

In connection herewith reference is made to Figures 5 and 6. It will be seen therefrom that the lever 4 (that is either 4_m or 4_s) receives its periodic movement from a rod 25 which is connected with the main drive of the machine so that it always moves up and down periodically. The lever 4 is attached to two levers 27 secured to a shaft 26. On the shaft 26 rotatable in fixed bearings there are furthermore a lever 28, which can rotate loosely about the shaft and a lever 29, which is rigidly connected to the shaft. The levers 28 and 29 are coupled together by means of a spring 30, while the lever 28 is connected with the rod 25. On the shaft 26 is also fitted a piece provided with a slot 31, into which the previously mentioned rod 32 (that is 32_m or 32_s) connected with the beam 23 can be pushed. It will be seen from Fig. 5 that the upper end of the rod 32 slides in a fixed guide in order to provide sufficient strength for locking the shaft 26.

On the other side of the beam 23 is secured a rod 33, which, when the beam 23 is moving upwards, is pushed into a slot in the feed knife 1, as a result of which the latter can no longer make the periodical reciprocating movement for the feeding of each card. Consequently the feeding of cards ceases on that side where also the traversing of the cards between the feeler plates is shut off by means of the lever 4 in question.

When the apparatus is working the following periodical movements take place:—

- (1) Movement of the feed knives 1, and 1_m , in so far as this movement is not locked, whereby one card from each of the magazines is guided between the feelers plates 3_s and 3_m ;
- (2) Downward movement and upward return movement of the feeling pins 5;
- (3) Movement of the roller 20 upwards

and down again by means of the cam disc 22;

(4) Movement of the two levers 4, and 4_m, in so far as this movement is not locked, whereby the cards, by the aid of rollers *r* (Figure 2) are pushed out of the spaces between the feeler plates towards the collecting magazines.

All these movements are obtained from one single motor, and are derived from cam discs in a simple way.

The motor 65 drives a shaft 41 by means of pulleys 39, 40. A pinion 42 is fixed on this shaft 41 and engages with a tooth-wheel 43 mounted on a shaft 44. On the latter shaft also a helical gear wheel 45 is fixed, gearing with a similar helical gear wheel 46 which is fixed on a countershaft 47, which also carries cam discs or plates 51, 22, 52. From the shafts 44 and 47 the four above mentioned movements are derived, namely:—

(1) On the shaft 44 a cam disc 48 is mounted, which causes a bell crank lever 49 to pivot about a fixed axle 50. This causes the said knives 1_m and 1, to guide the cards from each of the magazines S and M between the sets of feeler plates 3_m and 3.

The bell crank lever 49 is pressed against the cam disc 48 by means of a spring 66.

(2) The downward movement and the upward return movement (as shown in Figures 2 and 7) of the feeling pins 5 are derived from the cam disc 51 acting on a roller 57 and causing beams 58 to pivot about axles 59 mounted in the frame of the apparatus. This double movement gives rise to an upward and downward movement of levers 60, which themselves are pivotally connected both to the said beams 58 and also to levers 61 pivoted to the frame. In this way it is clear how the pins 5 are caused to move up and down through the feeler plates 3. Spring means must be provided for each of the pins 5 so as to allow the pins to be stopped by a card which is not provided with a corresponding hole.

(3) The movement of the roller 20 by means of the cam disc 22 can be clearly understood in connection with Figures 2 and 4.

(4) The movement of the levers 4 by the lever 25 as set forth in Figs. 5 and 6 is clearly shown in Figs. 2 and 8. The cam disc 52 causes a roller 53 and thus the lever 25 to move upward and downward, because the roller 53 is mounted on a lever 54 which pivots about an axle 55, connected to the frame of the apparatus.

The rollers 2 and *r* are continuously rotated.

For setting the apparatus in operation the feeler pins, with the rods 10 and the further accessories, all of which are displaceable together in the longitudinal direction of the card, are first so placed by hand that they

fulfill their functions for the columns on the cards for which agreement is to be sought. Since cases may occur wherein there are not so many columns on the card to be tested as there are column feeler pins in the apparatus (in the example dealt with three columns must be tested, while seven column feeler pins are shown, see Figure 5), the operation of the feeler pins must, in these cases, be eliminated for the superfluous columns. For these columns this is done by hand, the corresponding rods 10 being depressed against the action of their springs 11 and locked in this position, for example by means of a pin on the apparatus.

Furthermore the lever 56 rotatable about the shaft 24 is moved by hand into the mid position, in which case neither the knives 1, and 1_m nor the levers 4, and 4_m are locked against movement. The levers 4, and 4_m are likewise placed in the closing position, whereby the discharge of cards both on the S-side and on the M-side is prevented, the locking however not being so placed that the removal of an obstruction is impossible.

Upon the apparatus being set in operation the knife 1, brings a card out of the magazine S between the feeler plates 3_s, and the knife 1_m brings a card out of the magazine M between the feeler plates 3_m. We will now assume for the sake of simplicity that where testing is to be effected for three columns (it may be more, as for example, in the drawing, seven in some cases) the first S-card carries, in the column concerned, by means of three holes, the indication 001. If on the other hand the M-card has by means of three holes the indication 007, the resulting action is as follows:—

For the first two columns both on the left and on the right (that is, at 3_s and 3_m) the feeler pin passes at O through the card and thus comes into contact on both sides with a rod 7, (Fig. 4) which are connected with one another by means of a transverse arm 8, so that for both columns the rod 10 is moved downwards. For the third column, however, the feeler pin comes down at 3_s for the numeral 1 and at 3_m for the numeral 7. This merely has the result that two of the transverse arms 8 are to some extent rotated so that the rod 10 belonging to this column does not come down.

Subsequently the upward movement of the roller 20, occurs as a result of which both on the left and on the right the pins 19 rise, so that the springs arranged thereon will tend to move the bell crank levers 15 and 16 inwards. For the bell crank levers 15, which are provided on their heads with a single beam 14, this movement cannot take place, because not all the rods 10 have come down, and thus the beam 14 is maintained in position.

Of the bell crank levers 16 there are two, in which an inward movement, owing to the descent of the rods 10, is not possible. One of the levers 16, however, is located opposite to a notch 12 so that this lever can rotate, as a result of which its tail piece strikes against the beam 23 and raises it. The result of this is that the beams 23 come into the position shown in Figure 4, wherein, on one side (that is on the side of the magazine M) the rods 32 and 33 (see Figures 4 and 5) move upwards, and on the other side (magazine S) downwards.

For the magazine M a condition is thus produced wherein the upward and downward movement of the rod 25 stresses and relaxes the spring 30 (Figure 6), but it does not cause any rotation of the shaft 26 or any movement of the lever 4_m because the rod 32 is pushed into the slot 31. The discharge of the first card from the magazine M therefore cannot take place, so that the latter remains in place for the next feeling operation, while owing to the ascent of the rods 33 the feed knife 1_m is also locked, so that consequently no fresh card from the magazine M is guided between the feeler plates 3_m.

For the magazine S on the other hand the movement of the lever 4_s and of the knife 1_s is completely free, so that the first card from the magazine S is guided out of the space between the feeler plates, and, after the lever 4_s is returned into the closing condition again, the knife 1_s can bring the second card out of the magazine S between the feeler plates 3_s.

This second card contains by means of three holes the indication 002, so that now during the feeling for one of the columns (the third) no coincident feeling pins descend. Upon the ascent of the roller 20 only one of the bell crank levers 16 can now execute a rotation, which now, however, has no result, because on this side the beam 23_m is already raised. Thus the M-card for the subsequent feeling operation is already in position, while the second S-card is replaced by the third.

This now progresses in the case of this example in this way until on the S-side also the card with the indication 007 has come between the feeler plates. Since the feeling operation now discloses complete agreement between the S-side and the M-side, corresponding pins pass through the cards, so that now, for all the columns, the rods 10 move downwards.

Upon the subsequent upward movement of the roller 20 not one of the individual bell crank levers 16 can execute a rotary movement, but on the other hand there is room for the movement of the beam 14, so that all the bell crank levers 15 rotate together, and by means of their tail pieces

throw the beams 23 round relatively to the fulcrum 24.

The result of this is that the rod 32_s is pushed up to engage in the slot 31_s and so movement of the lever 4_s and of the knife 1_s is made impossible, owing to which this S-card is not replaced but is held fast between the feeler plates 3_s, while on the M-side the removal of the card through the rollers *r* takes place and the supplying of a fresh card between the feeler plates.

If this next M-card contains the same numerical indication 007 no change occurs again because now there is again complete agreement in the feeling operation on both sides. Thus all the following M-cards are replaced one after the other while the S-card is held fast, until an M-card comes which contains some other numerical indication, for example 016. Then again there is an absence of agreement, as a result of which the beams 23_m and 23_s, in the manner already described, come back into the position illustrated, and consequently this M-card is held fast while the S-cards are successively removed and replaced until the S-card with the indication 016 comes between the feeler plates, after which the same procedure is repeated.

Finally care is taken that the first S-card which is allowed to pass after the state of agreement between the S-card and the M-card has ceased to exist is not guided to the receiving magazine of the S-cards but to the receiving magazine of the M-cards. Thus this S-card is assembled with the M-cards that have just preceded it, that is to say, the M-cards which bear the same numbers as this S-card. The remaining S-cards pass in turn to the receiving magazine of the S-cards, so that in this way, at the conclusion of the operation of this apparatus, all the S-cards for which no fresh transaction has taken place are to be found there, while in the other receiving magazine are to be found one behind the other the M-cards together with the associated S-cards.

For the explanation of this last step—reference is made to Figures 1, 2 and 3, wherein a constructional example of a device is illustrated wherewith this result can be obtained. It is evident from this that the S-cards are removed by the rollers *r* (Figure 2) from the feeler plates 3 and are normally brought to continuously rotating rollers *t* which deliver them to the receiving magazine for S-cards O_s. In a similar manner the M-cards pass to the magazine O_m, which is located underneath a space that extends over the entire breadth of the feeler plates 3_s and 3_m (Figures 2 and 3).

In this space are arranged beyond the feeler plate 3_s two levers 34. These levers 34 are secured to a common shaft 35, while by means of springs 36, two-pawls 37, which

are each provided with a notch 38, are drawn towards the levers.

Upon the discontinuance of the movement for the S-cards, by means of one or the other of the motion transmitting means, that is, simultaneously with the ascent of the beam 23 on the S-side, the shaft 35 is rotated in the direction of the arrow in Figure 2. In this figure it is shown that upon the beam 23, which is fixed to the lever 56 rotating about a shaft 24 there is mounted a vertical rod 62, which pushes a lever 63 upwards. As this lever 63 is fixed to the shaft 35, it causes the levers 34 to rotate in the direction of the arrow. As a result of this the levers 34 shoot behind the notches 38 of the pawls 37, which consequently retain the levers 34 in this position, and so the levers 34 come so far upwards that the S-card subsequently released is guided along under the levers 34 out of its path and therefore is no longer pushed between the following rollers t . Thus instead of being brought to the magazine O_s , this card runs along the under side of the levers 34, as a result of which it is deflected into the space above the magazine O_m . This card then however strikes against the end of the pawls 37, which are thus pressed away for a moment against the action of the springs 36, as a result of which the levers 34, owing for example to their excess weight, are caused to rotate back in the opposite direction relatively to the shaft 35. Immediately after this first S-card has fallen into the magazine O_m , the pawls 37 again hold the levers 34 fast in the position shown, so that all the following S-cards are again guided by the rollers r to the magazine O_s . Simultaneously with the M-cards ceasing to show complete agreement with the S-card supplied, the plate 34 moves upwards again and brings this, but only this S-card into the magazine O_m .

The apparatus is also provided with a device by means of which it is automatically stopped when during the feeling operation there is a card between the feeler plates on one side only. Merely one set of mechanism with one electric switch is needed; apparently on the M side. All the S cards have to pass through the machine successively in numerical order without interruption, for example where there are only a few M cards to be tested, and it is obvious that as soon as there are no M cards in the M magazine, there is no reason for the rest of the S cards which have not passed through the feeler plates as yet to be acted upon. At this moment the machine is stopped, and the remaining pile of S cards is taken out of the magazine S.

For this purpose as shown in Fig. 7 an extra feeler pin 72 is employed on the M side and is moved downwards by the lever 61 (Fig. 2) together with the common feeler

pins. If there is a card between the feeler plates the extra feeler pin 72, which must be spring mounted, cannot pass and remains above the feeler plates. If there is no card between the feeler plates, the extra feeler pin 72 passes through the plate and causes the pawl 73 to turn, thereby permitting the spring 78 to unlock the lever 77 out of contact, and so stop the apparatus.

To make contact again the contact lever 77 is pushed backward by hand to the contact plate 76. The pawl 73 then pivots about the axis 74 and catches the contact lever 77, the spring 75 pulling the pawl to the contact plate 76 again and thus stretching the spring 78.

What I claim is:—

1. Apparatus for the mechanical assembling of statistical cards bearing corresponding data in the form of perforations arranged in columns comprising separate storage receptacles for cards of two sorts, a pair of perforated feeler plates associated with each of said receptacles, means for withdrawing one card at a time from each of said receptacles and passing it in between the corresponding pair of feeler plates, separate magazines for the reception of cards discharged from the feeler plates, a set of feeler pins associated with each of said pairs of feeler plates, means for passing each pin through a pair of registering perforations in one of said pairs of feeler plates when not stopped by the absence of a corresponding perforation in a card interposed between said feeler plates, a set of rods on the side of each pair of feeler plates remote from the feeler pins, each of said rods being adapted to be pushed away by a corresponding feeler pin when said feeler pin passes through the feeler plates and a card interposed between them, a plurality of transverse levers, each pivoted at one end to one of said rods and at the other end to a corresponding rod of the other set, a plurality of resiliently mounted movable bars, one for each column of perforations on the cards, all the transverse levers pivoted to the rods associated with any one column being pivoted to one and the same bar, and the said movable bars each being formed with two notches, a set of levers adapted to engage with one of said notches and a second set of levers adapted to engage with the other of said notches, one of said sets only permitting movement upon all the movable bars being displaced by the action of the feeler pins on the rods, means for positively initiating movement of a movable lever, each time the feeler pins are actuated, so as to prevent discharge of the card located between one pair of feeler plates and its replacement by a fresh card and to permit discharge and replacement of the card located between the other pair of feeler plates upon all the movable bars be-

ing displaced by the action of the feeler pins on the rods, and to permit discharge and replacement of the first-mentioned card and prevent discharge and replacement of the other upon complete agreement not being found by the feeler pins, and means for deflecting a card discharge from one pair of feeler plates to the magazine intended for the cards discharged from the other pair of feeler plates.

2. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, further comprising a common beam secured to one extremity of all the levers adapted to engage in one of the notches in each of the movable bars, two discharge rods, one for each pair of feeler plates for preventing and permitting the discharge of cards from between said feeler plates, two supply rods, one for each pair of feeler plates, for preventing and permitting the supply of fresh cards to replace those discharged from between said plates, a beam connecting the supply and discharge rods of one pair of plates, a beam connecting the supply and discharge rods of the other pair of plates, a rocking lever connecting two beams, all the levers that are adapted to engage by one of their ends in the second notches of the aforementioned movable bars being also adapted by their other ends to raise one of said beams when said movable bars have not been displaced through the medium of the feeler pins.

3. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, said means for preventing discharge of the card located between one pair of feeler plates and permitting discharge of the card located between the other pair of feeler plates, comprising for each pair of feeler plates a rockable shaft, a rocking lever radially secured to said shaft, a reciprocating driving member, and a resilient connection between said rocking lever and said reciprocating driving member adapted to transmit movement from said reciprocating driving member to said rockable shaft whenever said rockable shaft is not prevented from moving, and further comprising discharge rods for preventing and permitting movement of the rockable shafts, and a rocking lever connecting said discharge rods and adapted to be rocked by the levers that engage with the notches in the movable bars.

4. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, the means

for preventing the insertion of a fresh card between one pair of feeler plates and permitting the insertion of a fresh card between the other pair of feeler plates comprising, for each pair of feeler plates, a rockable shaft, a reciprocating driving member, and a resilient connection between said rocking lever and said driving member adapted to transmit movement from said driving member to said rockable shaft whenever said rockable shaft is not prevented from moving, the apparatus further comprising supply rods for preventing and permitting movement of the rockable shafts, and a rockable lever connecting said supply rods and adapted to be rocked by the levers that engage with the notches in the movable bars.

5. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, comprising a discharge rod and a supply rod for each pair of feeler plates, a beam connecting the supply and discharge rods of one pair of feeler plates, a transverse shaft fitted into the magazine for receiving cards discharged from the same pair of feeler plates, means for rocking said transverse shaft when said beam rises, a double armed lever secured to said shaft, one end of said lever being adapted to be moved into the path of the cards passing from the feeler plates to the magazine, a resiliently mounted pawl adapted to retain said lever with one end in the path of the cards, and a projection on said pawl adapted to be struck by a card passing along under said lever so as to cause the pawl to release said lever.

6. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, comprising means for displacing the feeler pins and the means for preventing and permitting the supply and discharge of cards between the feeler plates for the purposes of adjustment.

7. Apparatus for the mechanical assembling of statistical cards bearing corresponding data as claimed in claim 1, further comprising an extra feeler pin so located as not to correspond with any possible perforations on the cards and therefore so as not to be able to pass through the feeler plates when there is any card at all between them, and means for stopping the driving mechanism when the said extra feeler pin passes through.

In testimony whereof I have signed my name to this specification.

CORNELIS HENDRICUS STUIVENBERG.