

Sept. 22, 1936.

H. I. GOERLITZ

2,054,811

STATISTICAL CARD

Original Filed Aug. 30, 1921 3 Sheets-Sheet 1

Fig. 1.

DATE	DIV.	OBJECT	FILE	ACCOUNT NO.	WEIGHT	PRICE
00	00	00	00	00	00	00
00	00	00	00	00	00	00
11	11	11	11	11	11	11
11	11	11	11	11	11	11
22	22	22	22	22	22	22
22	22	22	22	22	22	22
33	33	33	33	33	33	33
33	33	33	33	33	33	33
44	44	44	44	44	44	44
44	44	44	44	44	44	44
55	55	55	55	55	55	55
55	55	55	55	55	55	55
66	66	66	66	66	66	66
66	66	66	66	66	66	66
77	77	77	77	77	77	77
77	77	77	77	77	77	77
88	88	88	88	88	88	88
88	88	88	88	88	88	88
99	99	99	99	99	99	99
99	99	99	99	99	99	99

Fig. 2.

DATE	DIV.	OBJECT	FILE	ACCOUNT NO.	WEIGHT	PRICE
00	00	00	00	00	00	00
00	00	00	00	00	00	00
11	11	11	11	11	11	11
11	11	11	11	11	11	11
22	22	22	22	22	22	22
22	22	22	22	22	22	22
33	33	33	33	33	33	33
33	33	33	33	33	33	33
44	44	44	44	44	44	44
44	44	44	44	44	44	44
55	55	55	55	55	55	55
55	55	55	55	55	55	55
66	66	66	66	66	66	66
66	66	66	66	66	66	66
77	77	77	77	77	77	77
77	77	77	77	77	77	77
88	88	88	88	88	88	88
88	88	88	88	88	88	88
99	99	99	99	99	99	99
99	99	99	99	99	99	99

Witnesses:

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H. D. Penney

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STATISTICAL CARD

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FIG. 3.

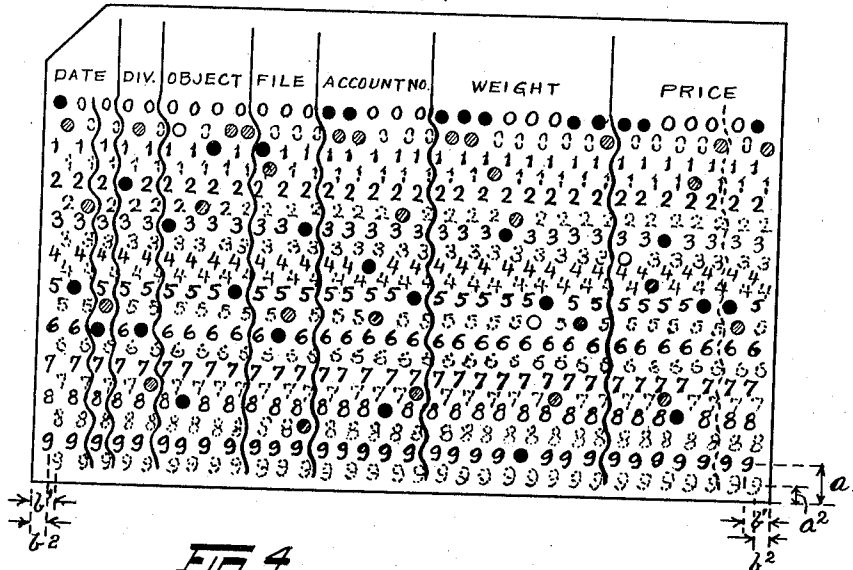
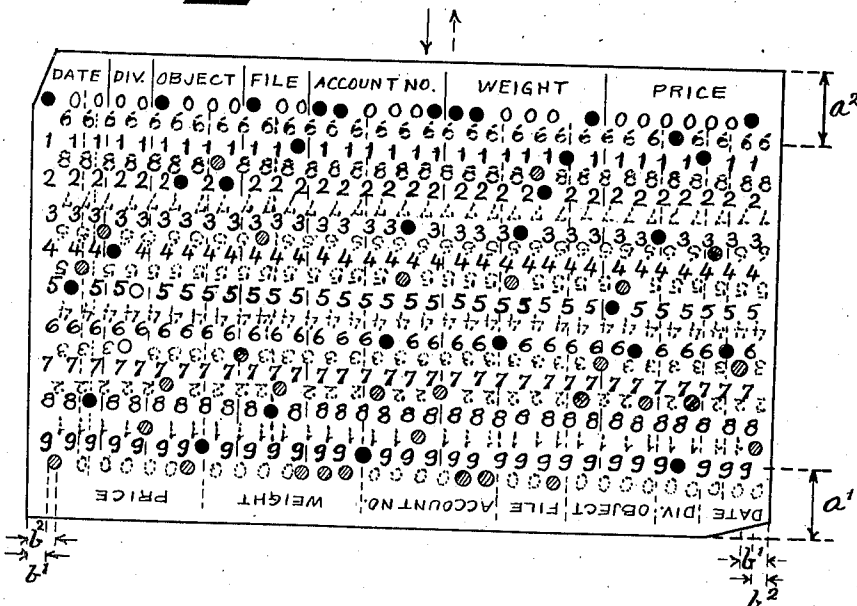


FIG. 4.



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STATISTICAL CARD

Original Filed Aug. 30, 1921 3 Sheets-Sheet 3

FIG. 5.

↓ ↓

DATE	DIV.	OBJECT	FILE	ACCOUNT NO.	WEIGHT	PRICE
00000000	0000	0000	0000	000000	000000	000000
11111111	1111	1111	1111	111111	111111	111111
22222222	2222	2222	2222	222222	222222	222222
33333333	3333	3333	3333	333333	333333	333333
44444444	4444	4444	4444	444444	444444	444444
55555555	5555	5555	5555	555555	555555	555555
66666666	6666	6666	6666	666666	666666	666666
77777777	7777	7777	7777	777777	777777	777777
88888888	8888	8888	8888	888888	888888	888888
99999999	9999	9999	9999	999999	999999	999999

a^2
 a^1

b^1

b^2

FIG. 5^a

00000000
11111111
22222222
33333333

FIG. 5^b

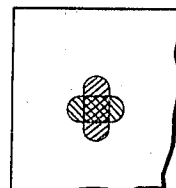
0000
1111
2222
3333

$c^1 c^2$

FIG. 6

0000
1111
2222
3333

FIG. 7



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UNITED STATES PATENT OFFICE

2,054,811

STATISTICAL CARD

Hans Goerlitz, Dusseldorf, Germany, assignor, by
mesne assignments, to Remington Rand Inc.,
Buffalo, N. Y., a corporation of Delaware

Application August 30, 1921, Serial No. 496,944.
Renewed November 24, 1931. In Germany
June 6, 1918

6 Claims. (Cl. 235-1)

(Granted under the provisions of the act of March
3, 1921, 41 Stat. L. 1313)

Perforated cards of the kind employed for sta-
tistical machines generally have index point loca-
tions thereon in horizontal lines or series of
printed numerals or ciphers from 0 to 9 located
so that vertical lines or series are formed reading
0 to 9 from top to bottom of the card. Even if
the adjacent numerals or perforations or index
points are so close together that only an ex-
tremely narrow space is left between them, the
width of the card or paper necessary for giving a
numerical value by perforations, as compared
with the height of the same numerical value by
print, is about ten times as much. This consid-
erable waste of paper is still further increased by the
fact that the distance between the single horizon-
tal lines must be greater than the corresponding
distance or space in a horizontal direction, due to
constructional requirements and with a view to
reliable working of the perforating, sorting or
summing machine. Thus the usual perforated
cards show a vertical distance between the centres
of two adjacent holes equal to the double of the
diameter of the holes. The width of the card,
therefore, is equal to twenty diameters of the
holes or perforations besides the additional space
required for the heading and inscription.

The invention relates to a new statistical card
and utilization of the available space of the paper
or card to the double of the use as heretofore,
without involving any essential modifications in
the construction of the statistical machines hith-
erto employed for the purpose. This object of the
present invention is realized by utilizing one and
the same card subsequently for two different rec-
ords and tabulations. To this end the card is
provided with different systems of perforations
which are used in succession for the tabulating
action, one of the two systems occupying those
spaces or interstices which, either for the re-
quired distance between the perforating punches—
in mechanically operating machines—or for the
required interval between two subsequent perfora-
tions—in electrically operating machines—, nec-
essarily must remain free from holes or perfora-
tions. The machines, however, are provided with
devices for controlling the same, as desired, for
action in connection with the one or the other
one of the two systems of perforations.

The invention allows of being realized in quite
a variety of embodiments. It consists of a statis-
tical card comprising novel structural features
which are herein described and specified in claims
following the description. In the annexed draw-
ings in which several embodiments are illustrated
by way of example:

Figs. 1, 2, 3, 3^a, 4, 5, 5^a, 6 and 7 are face-views
of cards and portions of cards that exemplify
those embodiments.

Figure 1 represents a perforated card which, in
lieu of the usual ten horizontal lines or series of
numerals, is provided with twenty lines or series,
the numerals of the one set or system of lines
being shown in full lines and the numerals of
the other set or system being shown in dotted
lines. The numerals or perforations of the one
system are located in the spaces between the nu-
merals of the vertical lines of the other system.
In both systems the numerical order from 0 to 9
goes from top to bottom. The vertical lines divid-
ing the card into a number of separate columnar
fields and also the headings or inscriptions at the
top are common to both systems, a^1 and a^2 denot-
ing the distances of the two lines comprising the
numeral 9 only, from the adjacent edge or margin
of the card. The distances b^1 and b^2 of the two
outer vertical lines of numerals from the edges of
the card are equal.

Figure 2 represents a card likewise with two
systems of numeral lines as before. The numerals
and perforations of the one system are also lo-
cated in the spaces between the numerals of the
vertical lines of the other system. But while in
the one system the numerical order from 0 to 9
goes from top to bottom, in the other system the
card must be turned for 180° to read from top
to bottom. In each system separate vertical di-
viding lines and separate headings or inscrip-
tions on top of the columns thus obtained are nec-
essary. The distances a^1 and a^2 are equal to each
other but are not the same in extent as the dis-
tances a^1 and a^2 of Fig. 1. The distances b^1 and b^2
are also equal just as in Figure 1. In order to
prevent perforations of a card that is not in prop-
er position in the pile to operate the machine, two
diagonally opposed corners of the card are cut
off differently so that it is easily found on in-
spection whether or not the cards are properly
piled to avoid improper actuation of the machine.

Figure 3 shows a card similar to that in Fig-
ure 1 with the exception that the numerals and
perforations of the lines of the one system are
arranged vertically above or below the interme-
diate spaces of adjacent perforations of the other
system. This arrangement affords a more ad-
vantageous utilization of the paper than in Fig-
ure 1. The proportions of the card in general
use are such that a maximum advantage is ob-
tained by keeping the distance c^1 , Figure 3^a, equal
to the distance c^2 . The distance c^1 is a stand-
ard distance in these cards and is such as to leave

a suitable amount of card stock between two perforations. If the distance c^2 were greater than this, it would place the 9 perforation unnecessarily close to the lower edge of the card. a^1 and a^2 denote the distances of the line 9 from the adjacent edge or margin of the card, and b^1 and b^2 denote the distances of the vertical outer or end lines of numerals from their adjacent edges of the card.

Figure 4 represents a card which is a combination of the cards shown in Figures 2 and 3. The perforations of the same characters in the one system are located vertically below or above the interstices between adjacent holes of the other system. The numerical order of the characters or perforations from 0 to 9 increases, in the one system, from top to bottom and in the other system likewise from top to bottom upon turning the card for 180°. The distances a^1 , a^2 , b^1 , b^2 are of like nature as in Figures 2 and 3.

Figure 5 illustrates a card similar to that in Figure 1 except that the perforations are not juxtaposed but eccentrically superposed, and the numerals need not be printed except in single lines or rows. The distances a^1 , a^2 , b^1 , b^2 are of the same nature as in Figure 1. The above described arrangement of the perforations in eccentric superposition is also applicable in the cards shown in Figures 2 to 4.

Figure 5^a. If in the card shown in Figure 5 a third perforation is applied in eccentric superposition, the card is utilizable for three systems.

The numerals of the single systems may be printed on one side of the card only, or one side thereof may be used for the print of the one system and the other side for the second system. As the printed numerals are only an auxiliary means for the eye of the reader and as the known automatic summing machines with printing mechanisms may be so constructed as to perforate holes in the shape of numerals, also cards without any printed numerals may be used.

According to whether the cards are to be worked in machines having a pin-box or in an electrically driven machine having a brush to wipe over the card or any other appropriate feeling member, in the use of some of the above described cards controlling arrangements are necessary for ensuring that, as desired, only the perforations of the one or those of the other system actuate the controlling members of the machine. Arrangements or devices for the purpose are described in Letters Patent of the United States No. 1,769,022, dated July 1, 1930, in connection with a mechanical machine and with an electrically operated machine. The manner in which punching or perforating machines are constructed and applicable for perforations of the one or the other numeral system is also described in said patent.

In the following description two further solutions of the problem of utilizing one and the same card several times are given. To this end punches and pins of different shape are employed for the first use and for a second or third use of the card.

Figure 6 shows a card with circular, concentric perforations or holes of different diameter. For the first use perforations or holes of a smaller diameter are punched or stamped out, for a subsequent use of the card larger punches are inserted into the perforating machine and for working on the cards corresponding larger pins or stamps are to be inserted into the pin-boxes of the sorting and summing machines.

Figure 7 illustrates a card having elongated

perforations or holes of oblong shape which, for the one use, are located horizontally and, for a second use, are located vertically. In connection with these crossed perforations differently shaped pins for the pin-box are to be employed to successively work on the two systems.

It is further obvious that in any of the systems above described, the holes or perforations will be so restricted in size that the perforations in one horizontal row will not overlap or extend into the digit spaces of adjacent rows.

As regards the economical advantages the invention affords a saving of paper amounting to about 50% which is of importance particularly in statistic or similar cases where large masses of cards are consumed. The above percentage still further increases considerably in case that cards having three systems of perforations or holes, as indicated in Figure 5^a, are employed.

A perforated card in which the invention is embodied has a mechanical function. It is essentially a component of a machine. It comprises appropriately arranged digit-spaces forming digit-columns. There are two (or, in Figure 5^a, three) separate sets or aggroupments of digit-columns on the card, viz., one set or aggroupment for the first use of the card and another set or aggroupment for the second use of the card; and in each aggroupment of columns the perforations denote digits of said columns. In Figures 1, 2, 5, 5^a, 6 and 7, a column of one aggroupment covers the same area on the card as the corresponding column of another aggroupment, and these columns may, therefore, be called composite columns, as distinguished from the columns of Figs. 3 and 4, which may be traced by sinuous vertical lines as covering separate areas of the card.

The perforations of each of these aggroupments are spaced as are like perforations of each other aggroupment and as they would be in an ordinary Powers control card, i. e., their spacing in each digit-column of the aggroupment and the spacing in the aggroupment of the Digit-columns thereof (the first and succeeding series of digits severally indicated by the numerals 0 etc., to 9 inclusive) are the same respectively as the spacings (between digits of a column and between digit-columns) that characterize the control cards commonly used in Powers tabulating machines. An ordinary control card comprises columnar fields each composed of a digit-column, or a plurality of digit-columns, which columnar fields are commonly indicated by lines extending nearly across the card between digit-columns of different columnar fields, and each of the cards shown herein also comprises such columnar fields. The lines are, of course, merely for convenience; the fields would exist without them.

The perforations of each of the aforesaid aggroupments are made with punching machines, such as are commonly used and the punches of which are spaced as they have been for many years, and the perforations of each aggroupment are utilized in tabulating as are those of a common control card, which when a card is fed into a common tabulating machine, register with correspondingly spaced devices that are comprised in the machine and are movable when it is operated to and through the perforations of the card.

Hence, each aggroupment of perforations is so located with respect to the leading edge or edges of the card that when the card is fed into the tabulating machine until the leading edge of the

card is brought to the stop that arrests the card the perforations of the record to be tabulated, whichever of the two or three records that may be, shall register with the devices of the machine which must pass through the perforations of that record.

I claim as my invention:

1. A perforated card which controls the action of tabulating machines and which comprises columnar fields and appropriately arranged digit-spaces forming digit-columns and the perforations of which denote digits of said columns, there being separate aggroupments of digit-columns, and a digit-column of each of said aggroupments being comprised in a single columnar field, and the perforations of each aggroupment being relatively spaced as are like perforations of each other aggroupment, each perforation of any of which aggroupments denotes the numerical value that is denoted by another perforation when the latter is punched in the same columnar field and in the equivalent digit space contained in a digit-column of another aggroupment.
2. A perforated card which controls the action of tabulating machines and which comprises columnar fields and appropriately arranged digit-spaces forming digit-columns and the perforations of which denote digits of said columns, there being separate aggroupments of digit-columns, and a digit-column of each of said aggroupments being comprised in a single columnar field of the card, and the perforations of each aggroupment being relatively spaced as are like perforations of each other aggroupment, and the digit-spaces of any column of each of which aggroupments form with the digit-spaces of a column of each other aggroupment a composite digit-column, each perforation of any of which aggroupments denotes the numerical value that is denoted by another perforation when the latter is punched in the equivalent digit-space contained in the same composite digit-column and in another aggroupment.
3. A perforated card which controls the action of tabulating machines and which comprises columnar fields and appropriately arranged digit-spaces forming digit-columns and the perforations of which denote digits of said columns, there being two separate aggroupments of digit-columns, and a digit-column of each of said aggroupments being comprised in a single columnar field of the card, and the perforations of each aggroupment being relatively spaced as are like perforations of the other aggroupment, and each perforation of either of which aggroupments denotes the numerical value that is denoted by another perforation when the latter is punched in the same columnar field and in the equivalent

digit-space contained in a digit-column of the other aggroupment, and the distances of equivalent perforations from the edges of the card adapting perforations of either aggroupment and equivalent perforations of the other aggroupment alternately to be located at the same spots respectively when the card lies on a bed and within a space the width of which is that of the card plus a small fraction thereof and the length of which is the same as that of the card.

4. A perforated card which controls the action of tabulating machines and which comprises columnar fields and appropriately arranged digit-spaces forming digit-columns, and the perforations of which denote digits of said columns, there being two separate aggroupments of digit-columns, and a digit-column of each of said aggroupments being comprised in a single columnar field of the card, and the perforations of each aggroupment being relatively spaced as are like perforations of the other aggroupment, each perforation of either of which aggroupments denotes the numerical value that is denoted by another perforation when the latter is punched in the same columnar field and in the equivalent digit-space contained in a digit-column of the other aggroupment, and the distances of equivalent perforations from the edges of the card adapting perforations of either aggroupment and equivalent perforations of the other aggroupment alternately to be located at the same spots respectively when the card lies on a bed and within a space the width of which is the same as that of the card.

5. A perforated card which controls the action of tabulating machines and which comprises columnar fields and appropriately arranged digit-spaces forming digit-columns and the perforations of which denote digits of said columns, there being two separate aggroupments of digit-columns, and a digit-column of each of said aggroupments being comprised in a single columnar field of the card, and each of these digit-columns being adjacent to the other, and the perforations of each aggroupment being relatively spaced as are like perforations of the other aggroupment, each perforation of either of which aggroupments denotes the numerical value that is denoted by another perforation when the latter is punched in the equivalent digit-space in an adjacent digit-column of the other aggroupment.

6. A tabulating card having control apertures arranged in vertical columns and horizontal lines and representing data, one set of data being represented by oblong holes, each having its greater dimension vertical, and another set of data being represented by oblong holes, each having its greater dimension horizontal.

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