

E. EHRHARDT.
 APPARATUS FOR PRODUCING COMBINATIONS OF HOLES IN PAPER BANDS.
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Patented Jan. 11, 1910.

Fig. 1.

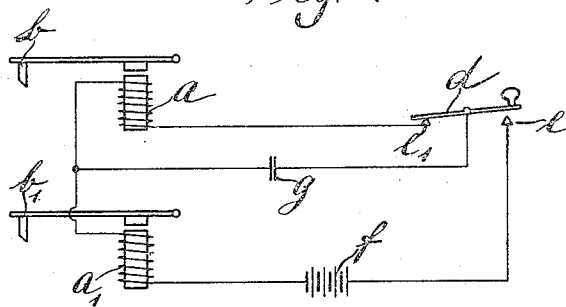
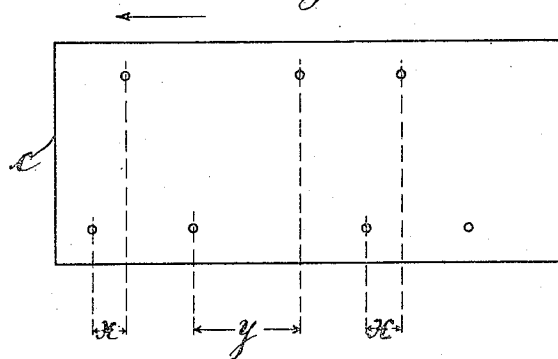


Fig. 2.



Witnesses:
 W. Alfred Faulk
 Octavius Knight.

Inventor:
 E. Ehrhardt
 by *[Signature]*
[Signature]

UNITED STATES PATENT OFFICE.

ERWIN EHRHARDT, OF PANKOW, NEAR BERLIN, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, A. G., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

APPARATUS FOR PRODUCING COMBINATIONS OF HOLES IN PAPER BANDS.

946,024.

Specification of Letters Patent.

Patented Jan. 11, 1910.

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To all whom it may concern:

Be it known that I, ERWIN EHRHARDT, a subject of the German Emperor, and residing at Pankow, near Berlin, Germany, have invented a certain new and useful Improved Apparatus for Producing Combinations of Holes in Paper Bands, of which the following is a specification.

The subject-matter of the present invention is an improved method of making combinations of holes in paper bands by means of punches which are operated electromagnetically.

When making combinations of holes in paper bands moving at a certain speed, it is necessary to press the punches which produce the holes through the paper bands as abruptly as possible and at the same time powerfully, in order to produce sharply defined holes and to prevent the band from being torn.

Now an important object of the present invention is to provide a method which meets these requirements. In accordance with the invention short, powerful rushes of current, which are produced when one or more condensers are charged and discharged, are used for producing holes in the paper band which is unrolled from a device at a uniform velocity. The employment of condensers proves so suitable that combinations of holes which are free from objection are obtained at a high velocity of the paper band.

As compared with the possibility of producing the holes directly by means of punches moved by hand, the present method has the advantage that the hand only determines the interval of time between the individual rushes of current, whereas on account of the condensers these rushes of current take place at a velocity which cannot be obtained by means of the hand.

A special case of the invention would be given by the mentioned method being used for producing Morse characters. As a particular instance where this method may be used to advantage, the producing of Morse characters on paper strips may be mentioned. Every operator acquainted with the Morse alphabet can therefore produce perforated bands on an apparatus constructed according to the above method, and these bands can then be transmitted farther in the

sender at a high speed. By arranging a recording device, a control in the Morse text can be obtained in addition on the perforated band. Even an inexperienced staff of operators is able to produce perforated bands which can be employed for high speed telegraphy.

In order that the invention may be clearly understood, reference is made to the accompanying drawing in which apparatus for executing the method is represented diagrammatically by way of example, and in which:

Figure 1 is a diagram showing one arrangement of apparatus suitable for the above mentioned special case, whereas Fig. 2 shows part of a paper band which has been perforated by such apparatus.

Referring to the drawing, a and a^1 represent the two punching magnets which press holes by means of punches b , b^1 in the paper band c which is passed at a uniform speed between the punches and their magnets, which holes are at different distances from one another according to the difference in time between the movements of the two punches. These distances measured in the direction in which the band is moved correspond to the dot and dash of the Morse code, so that, for example, the combination x shown in Fig. 2 denotes a point, whereas the combination y denotes a dash. The punches are operated preferably by means of a Morse key d in the following manner: When the key is depressed to close the contact e , the condenser g is charged by battery f . The charging impulse instantaneously energizes magnet a^1 and thus punch b^1 is instantaneously operated. When the key is released, it will close the contact at e^1 and the condenser will be discharged, the discharging impulse energizing magnet a and thus instantaneously operating punch b . Inasmuch as the characters of the charging and discharging currents are impulses of very short duration, the electromagnets will be instantaneously energized and again be deenergized and thus the punches will be only instantaneously operated, whereafter they will return to their normal position. As the paper band c is moved uniformly in the direction of the arrow between the magnets and their punches, the holes are produced at the different distances x and y ac-

according to the interval of time in each case between the contacts c and c^1 being contacted by the key d .

What I claim as my invention and desire to secure by Letters Patent is:

1. Means for producing perforations in moving paper strips or the like, comprising a plurality of electromagnets, each having independent perforating means operated by it, means for energizing and deenergizing the magnets successively at predetermined time intervals, the deenergizing of each magnet following instantaneously its energizing independently of the action of the operator.

2. Means for producing perforations in moving paper strips or the like, comprising two electromagnets, each having independent perforating means operated by it, means for energizing and deenergizing the magnets successively at predetermined time intervals, the deenergizing of each magnet following instantaneously its energizing independently of the action of the operator.

3. Means for producing perforations in moving paper strips or the like, comprising two electromagnets, each having independent perforating means operated by it, a condenser suitably connected with said magnets to be alternately in circuit with either magnet and means for charging said condenser, said magnets being energized successively at predetermined time intervals by the charging or discharging current of the condenser, the deenergizing of each magnet following instantaneously its energizing independently of the action of the operator.

4. Means for producing perforations in moving paper strips or the like, comprising a condenser, a direct current charging- and a discharging circuit for said condenser, an electromagnet in each of said circuits having perforating means operated by it, and means for alternately connecting said condenser with either circuit at predetermined time intervals, the deenergizing of said magnets following instantaneously the energizing by the charging and discharging cur-

rent impulse of said condenser independently of the operation of said connecting means.

5. Means for producing perforations in moving paper strips or the like, comprising a condenser, a direct current charging- and a discharging circuit for said condenser, an electromagnet in each of said circuits having perforating means operated by it, and hand-operated means for alternately connecting said condenser with either circuit at predetermined time intervals, the deenergizing of said magnets following instantaneously the energizing by the charging and discharging current impulse of said condenser independently of the operation of said connecting means.

6. Means for producing perforations in moving paper strips or the like, comprising an electromagnet having perforating means operated by it, a condenser, a direct current source for charging said condenser, and means for connecting said magnet, said condenser and said source in series for energizing and deenergizing said magnet, the deenergizing following instantaneously the energizing independently of the time interval said magnet remains in circuit.

7. Means for producing perforations in moving paper strips or the like, comprising an electromagnet having perforating means operated by it, a condenser, a direct current source for charging said condenser and means for alternately connecting said source and said condenser in series and for connecting said magnet and said condenser in series for energizing and deenergizing said magnet, the deenergizing following instantaneously the energizing independently of the time interval said magnet remains in circuit.

In testimony whereof I have signed my name to this specification in the presence of two witnesses.

ERWIN EHRHARDT.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.