L. HENNINGER.

COLLECTING APPARATUS FOR AUTOMATIC MATCHMAKING MACHINES.

APPLICATION FILED MAY 9, 1916.

1,419,732. **Patented June 13, 1922.**

2 SHEETS—SHEET 1.

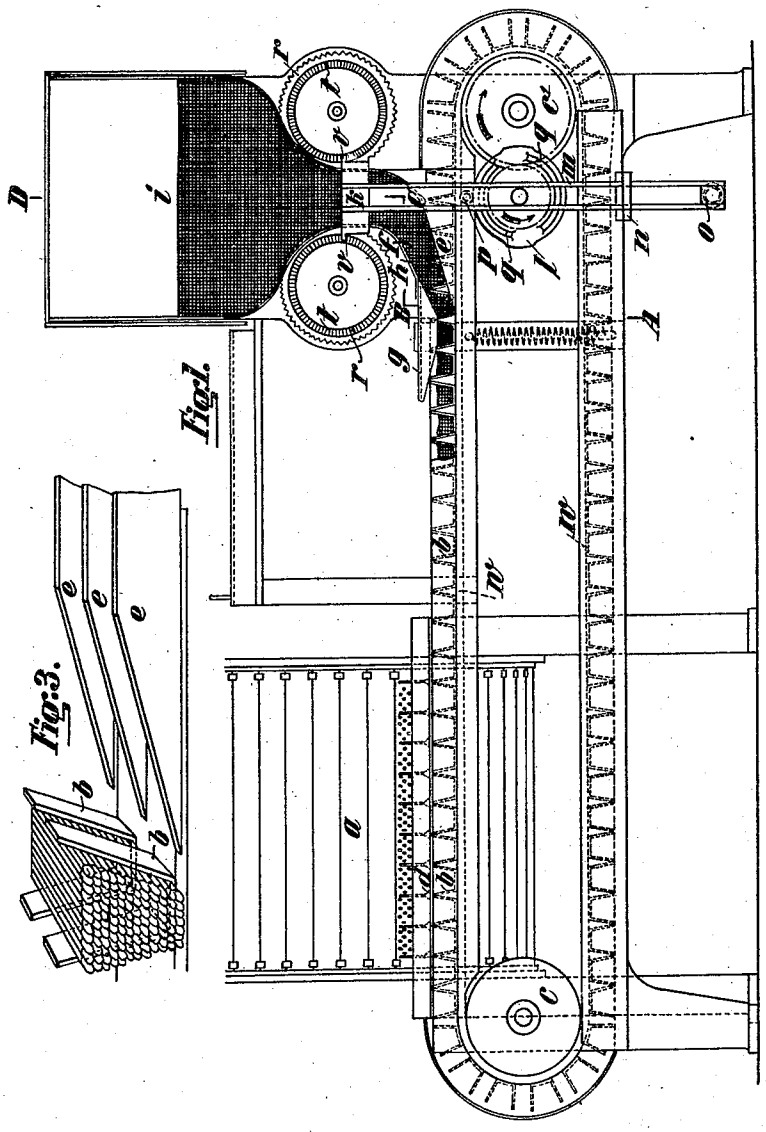


Fig. 1.

Fig. 3.

INVENTOR:
Ludwig Henninger
By Wm Wallace White
ATTY

L. HENNINGER.

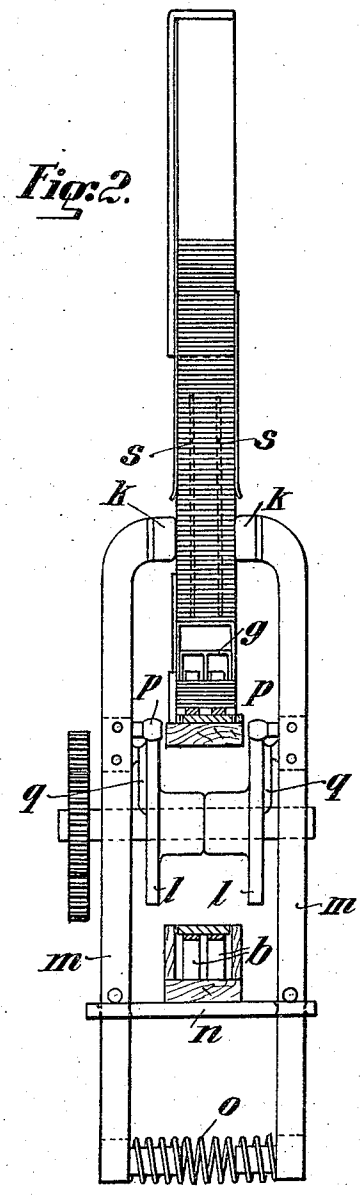
COLLECTING APPARATUS FOR AUTOMATIC MATCHMAKING MACHINES.

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2 SHEETS—SHEET 2.

Fig. 2.



INVENTOR
Ludwig Henninger
By Wm Wallace White
ATTY.

UNITED STATES PATENT OFFICE.

LUDWIG HENNINGER, OF DURLACH, GERMANY, ASSIGNOR TO BADISCHE MASCHINENFABRIK & EISENGIESSEREI VORM. G. SEBOLD UND SEBOLD & NEFF, OF DURLACH, BADEN, GERMANY.

COLLECTING APPARATUS FOR AUTOMATIC MATCHMAKING MACHINES.

1,419,732. Specification of Letters Patent. **Patented June 13, 1922.**

Application filed May 9, 1916. Serial No. 96,440½.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, LUDWIG HENNINGER, a subject of the Emperor of Germany, residing at Durlach, near Karlsruhe, in the county of Baden and State of Germany, have invented certain new and useful Improvements in a Collecting Apparatus for Automatic Matchmaking Machines (for which I have filed applications in Germany Nov. 6, 1915; Austria Nov. 26, 1915; Switzerland Nov. 26, 1915; Belgium Nov. 23, 1915; Sweden Nov. 29, 1915), of which the following is a specification.

This invention relates to a collecting apparatus for automatic match making machines in which the matches are conducted from the supporting means, i. e., the supporting strips or the like, to the collecting box by aid of means combining great simplicity with reliable manner of operation. The invention makes use of the known conveying chain which runs uninterruptedly from the supporting strips to the collecting box and which consists of small receptacles of such construction that lifting ledges provided below the collecting box contact with projecting parts of the matches and lead these latter upwards in the direction toward the collecting box by aid of the continuing movement of the conveying chain.

The breadth of said receptacles in the longitudinal direction of the matches is such that the matches placed in the receptacles project at both ends so as to be capable of contacting at these latter with the appropriately located lifting ledges in order to be lifted and guided by the same up to the collecting box.

Each of said receptacles consists of two parts arranged side by side and leaving a space between them. There are two lifting ledges co-operating with the projecting ends of the matches, and a third lifting ledge co-operating with the middle match parts that are accessible in said space left between said two receptacle parts.

There are, besides the working parts mentioned in the above preamble, other working parts, some of which co-operate with those mentioned, and some of which come after them in operation, and all of which are described hereinafter.

In order to make my invention more clear, I refer to the accompanying drawings, in which—

Fig. 1 shows the improved collecting apparatus, in connection with the conveying device, in side view, partly in section;

Fig. 2 is a section in line A—B—C—D of Fig. 1, and on a larger scale.

Fig. 3 is a perspective representation of one of the receptacles, in connection with the lifting ledges (to be seen also in Fig. 1 below the collecting box, at the righthand side of the figure).

Suppose, a receptacle *b* (Fig. 1) has arrived at the lifting ledges *e* (Fig. 3), the matches therein contained are lifted out of the receptacle in consequence of the continuing movement of the conveying chain, of which said receptacle forms a part. In the form of construction shown in Fig. 3, the receptacle consists of two parts leaving a space between them. The dimensions of each part are such that the matches (which have been pushed out of the supporting strips, Fig. 1, in known manner by means of suitable needles making the matches drop upon the continuously moving conveying chain below them, or into the receptacles forming the latter respectively)—project at both ends in order to be able to be lifted by the corresponding arranged ledges *e*. There are three such ledges as already mentioned in the specification, of which the middle one acts upon the middle part of the matches (Fig. 3).

The conveying chain being constantly moved by the wheels *c* c^1, the matches are made to glide upon the oblique upper edges of said ledges upwards in the direction toward the lower channel-like end of the collecting box *i*. Before, however, the matches get upon said edges, their common upper surface which, in the single receptacles, is not always complete in consequence of a match or matches lacking now and then in the supporting strips, is made complete, or flattened or equalized respectively, by special equalizing ledges *g* (Figs. 1 and 2) which are located in front of, and above the lifting ledges and in the vertical planes of the same. I prefer to employ as many of the equalizing ledges as there are lifting ledges. If there are three equalizing ledges, two of them act upon the

match ends and the third upon the match middle, from above, similarly as do the lifting ledges from below. The equalizing ledges are either themselves elastic or they are attached to an elastic holder. In the form of construction shown as an example, they are affixed to a flat spring *h* (Fig. 1) which forms, at the same time, the front wall of the inlet channel *f* to the collecting box *i*. If, owing to some matches lacking in the supporting strips, the receptacles are not equally filled, the ledges *g* adapt themselves to the height of the amount of matches present in the respective receptacles, and the arising of empty spaces in the bulk of the matches within the channel *f* is prevented, as is also a disorderly position of the matches upon their way from the receptacles to the collecting box. Furthermore and particularly, the uniformly continuing supply of the matches to the box is not disturbed.

To secure the continuous ascent of the matches within the inlet channel *f*, it is preferable to provide assisting means for that purpose. Such means are formed, in the example shown, by ledges *k* which also take told of the matches at their ends. The active surface of each of these ledges is preferably cushioned. The inlet channel is open at both sides and the ledges *k* are situated just at these places where they grasp the matches between them, carrying them upwards, without disturbing the proper relative position either of the matches grasped or of those below or above the same.

The ledges *k* are secured to the upper ends of tong-legs *m* situated at both sides of the conveying chain and guided below the same in a frame *n*. Below this latter is a compression spring *o* constantly tending to place the ledges *k* against the ends of the matches. Each tong-leg is provided with a roll *p* running upon a cam disk *l* rotated by the machine. Each of these disks has two projections *q* located upon the outer side of the same. The cams serve for lifting the tong-legs *m* together with the matches grasped between the ledges in question, and the projections *q* serve for moving the ledges *k* asunder, i. e. for opening the pair of tongs, so as to make the ledges *k* leave said matches. Lowering the pair of tongs is effected by the weight of the same and closing is effected by the spring *o*.

The succession of the working phases is as follows: When the tong-legs *m* have arrived on their lower position, the pair of tongs is closed by the spring *o*, the ledges *k* being thereby pressed against the ends of the matches so as to grasp a certain number of these latter. The pair of tongs is then lifted, as are, of course, also the grasped matches, by means of the cams, after which the ledges *k* are moved asunder by the projections *q*, leaving the matches. Now the pair of tongs is made to return to its initial position, and to grasp another quantity of the matches which are constantly fed to the parts in question by the conveying chain, as well as by the ledges *e*.

To further secure the proper working of the apparatus, I have provided toothed disks *r* situated about the height of the ledges *k*, these disks taking through slots *s* into the collecting box *i* and driving upwards the matches that have arrived in their proximity and are then coming in contact with them. This operation occurs in steps corresponding to the step-by-step movement of the ledges *k*. In the example shown, the disks *r* are moved by the mediation of the ledges *k* which are provided, for that purpose, with projections *v* acting upon toothed lateral rings *t* of the disks *r*. When the ledges *k* are raised by the pair of tongs *n*, in the above-described manner, the projections *v* rotate the disks *r*, the teeth of which now assist in lifting the matches further upwards into the collecting box *i*.

Having now described my invention, what I desire to secure by a patent of the United States is:—

1. In an automatic match making apparatus, in combination: a collecting box; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet opening of the collecting box; and means for continuously moving the said conveying chain.

2. In an automatic match making apparatus, in combination: a collecting box; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, each receptacle consisting of two parts leaving a space between them, and the breadth of the two parts with said space together being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends, as well as below the middle parts of the matches and to lift and guide the latter in the direction toward the inlet opening of the

collecting box; and means for continuously moving the said conveying chain.

3. In an automotic match making apparatus, in combination: a collecting box; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet opening of the collecting box; equalizing ledges situated in front of said lifting ledges and being so arranged as to be adapted to contact with the upper surface of the bulk of matches contained in a chain receptacle; and means for continuously moving the said conveying chain.

4. In an automatic match making apparatus, in combination: a collecting box; an inlet channel to the same, said channel being open at its sides; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet channel of the collecting box; a pair of other lifting ledges located at the open sides of the said inlet channel and being adapted to grasp between them the matches at the ends proper of the same and to carry the grasped matches further upwards; and means for continuously moving the said conveying chain.

5. In an automatic match making apparatus, in combination: a collecting box; an inlet channel to the same, said channel being open at its sides; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet channel of the collecting box; a pair of other lifting ledges located at the open sides of the said inlet channel and being adapted to grasp between them the matches at the ends proper of the same and to carry the grasped matches further upwards; means for lifting said pair of ledges with the grasped matches, making it move off the same, making it return to its initial position, and making it grasp another quantity of matches; and means for continuously moving the said conveying chain.

6. In an automatic match making apparatus, in combination: a collecting box; an inlet channel to the same, said channel being open at its sides; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet channel of the collecting box; a pair of other lifting ledges located at the open sides of the said inlet channel and being adapted to grasp between them the matches at the ends proper of the same and to carry the grasped matches further upwards; a pair of vertically guided tongs having said pair of lifting ledges attached to their upper ends; a pair of cam disks located between said tong legs and being adapted to lift and lower the same; lateral projections provided upon said disks opposite to the tong legs and being adapted to move them asunder; and means for continuously moving the said conveying chain.

7. In an automatic match making apparatus, in combination; a collecting box; an inlet channel to the same, said channel being open at its sides; slots provided in the collecting box walls above the open inlet channel sides; cogged disks located outside of the box and taking with their cogged rims into the same through said slots; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet channel of the collecting box; a pair of other lifting ledges lo-

cated at the open sides of the said inlet channel and being adapted to grasp between them the matches at the ends proper of the same and to carry the grasped matches further upwards; means to transmit the upward movement of said pair of ledges to the said cogged disks so as to rotate them in corresponding steps; and means for continuously moving the said conveying chain.

8. In an automatic match making apparatus, in combination: a collecting box; an inlet channel to the same, said channel being open at its sides; slots provided in the collecting box walls above the open inlet channel sides; cogged disks located outside of the box and taking with their cogged rims into the same through said slots; a ring of lateral teeth provided upon each of said disks; supporting means for the matches intended to be collected in said box; a conveying chain for carrying the matches from said supporting means to the collecting box; match receptacles forming parts of said chain, the breadth of each receptacle being smaller than the length of a match so as to let the ends of the latter project at both sides of such receptacle; lifting ledges located below the said collecting box and being so shaped and arranged as to be adapted to take below the projecting match ends and to lift and guide the matches in the direction toward the inlet channel of the collecting box; a pair of other lifting ledges located at the open sides of the said inlet channel and being adapted to grasp between them the matches at the ends proper of the same and to carry the grasped matches further upwards; lateral projections forming parts of said other pair of lifting ledges and being so arranged as to be adapted to mesh with said rings of lateral teeth so as to rotate the said cogged disks in corresponding steps; and means for continuously moving the said conveying chain.

In testimony whereof I affix my signature.

LUDWIG HENNINGER. [L. S.]

Witnesses:

BERT. A. BRAUER. [L. S.]

H. ERMANN DELL. [L. S.]