April 12, 1932. S. RAKOWITZKY ET AL 1,854,063

PROCESS FOR THE MANUFACTURE OF BOOK MATCHES FROM CONTINUOUS STRIPS

Original Filed Aug. 11. 1927 3 Sheets-Sheet 1

Fig.1.

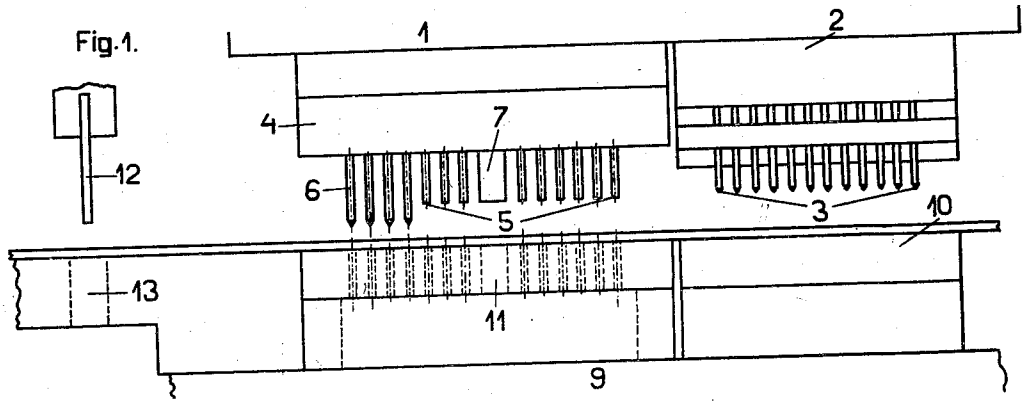

Fig.2.

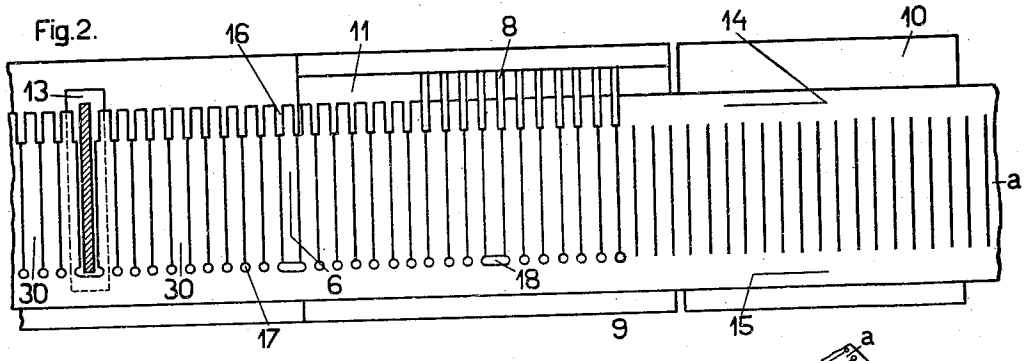

Fig.3.

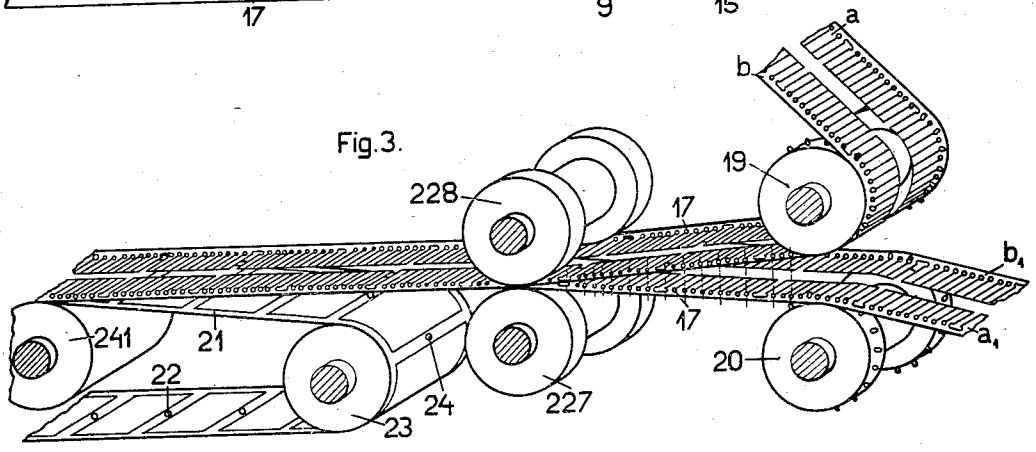

Fig.4.

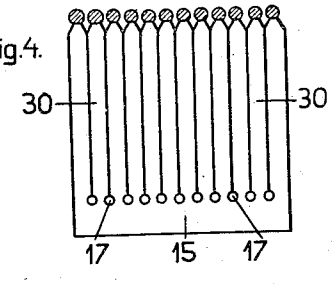

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Fig.5.

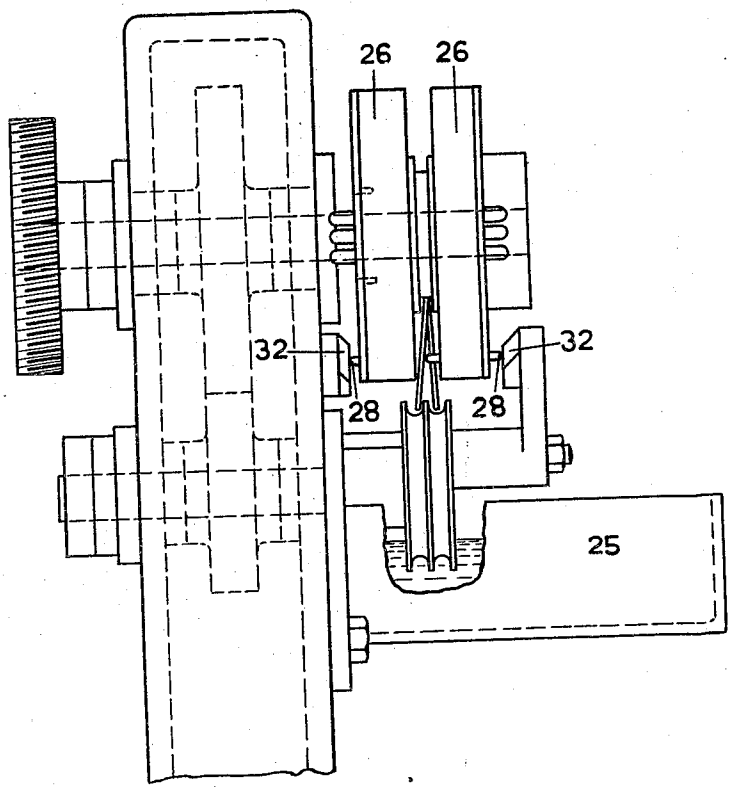
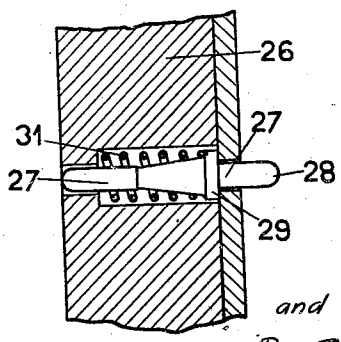


Fig.7.



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PROCESS FOR THE MANUFACTURE OF BOOK MATCHES FROM CONTINUOUS STRIPS

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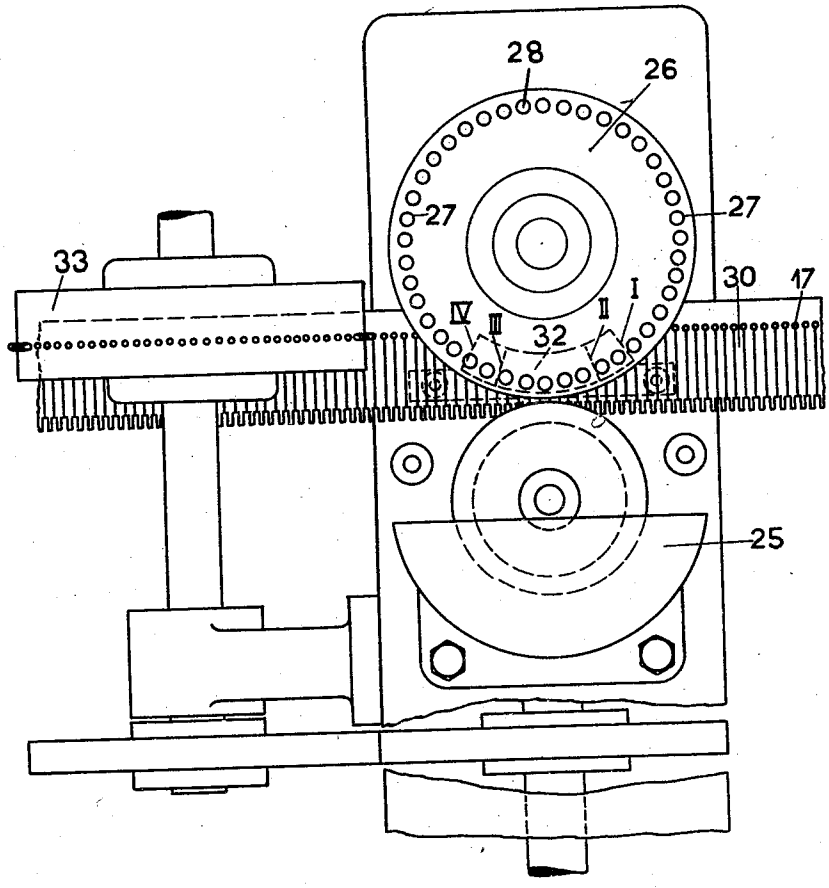
Fig.6.



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UNITED STATES PATENT OFFICE

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PROCESS FOR THE MANUFACTURE OF BOOK MATCHES FROM CONTINUOUS STRIPS

Application filed August 11, 1927, Serial No. 212,312, and in Austria May 13, 1927. Renewed September 4, 1931.

Book matches which are manufactured in continuous strips or bands and in which the single matches are held together by a strip of the material, are very largely used at present. Experience shows that in practical use, the single matches are almost never completely detached at their roots, but break off a little higher, owing to which the length of the match is reduced, and irregular bits are left in the book.

It has been already proposed, for the purpose of facilitating the tearing off of the matches, to weaken their connection to the strip of material by means of a notch. This notching has not, however, led to the desired result as it leaves between the match and the strip a bridge difficult to break, in which the fibres lie very close together.

It is necessary to give the match, preferably before the beginning of the process of manufacture, a shape that would eliminate the drawbacks above referred to, and at the same time enable strips or books of matches to be manufactured from one or more continuous bands in a single operation.

In order always to ensure an easy breaking off of the matches at the root, the junction of the matches to the strip could be weakened by removing material at that point. This is preferably done by means of perforations, the object of which is to provide the points of least resistance and thereby insure the breaking off of the matches just at those exact points, so that the whole of the length of the match can be utilized, and no pieces are left in the book; moreover, these perforations which are made at the beginning of the process which finally results in the production of finished matches, constitute organs which, in cooperation with a suitably arranged machine, afford a guarantee for a perfect manufacture of finished match books or packets.

In carrying out the process, the strip or band, or a plurality of such bands to be treated in a uniform manner, preferably made of cardboard or the like, are unwound from large reels or rolls and during the various operations required for the manufacture of books of matches, are guided in a suitable manner so that on the one hand the feed or advance of the band always remains the same for given operations or, when treating simultaneously several strips of matches, or such strips and a band of cardboard intended to form the cover for the same, the relative length of the bands is regulated.

In accordance with the foregoing, the bands drawn off from one or more rolls are provided with perforations at the beginning of the process of manufacture leading to the production of strips or books of matches, the said perforations being moreover intended subsequently to guide and to advance the bands. With the said perforations engage pins of holding devices or of feed devices which latter insure simultaneous movement of the single strips to the extent of the width of one book match.

It is obvious that the said perforations (17) can fulfill their object irrespectively of the point of the width of the match at which they are produced. In view however of what has been stated in the beginning, it appears advisable to provide these perforations at the root of the matches so that they produce a weakening at the joint between the matches and their common holding strip (15), which weakening is of great importance for the subsequent use of the matches.

The perforations provided at the root of the matches, will best fulfill their object in subsequent use if they are arranged exactly between each two matches, in such a manner that each cut separating the matches, is of exactly the same length, as owing to the perforations provided, the matches can be torn off in a neat manner. It must be pointed out here that the perforations provided in the continuous band cannot fulfill their object of forming guide organs in a perfect manner if they are open even only at one side, as this affects the reliable guiding by the pin wheels described later on. It is therefore inadvisable to remove a portion of the material between each two matches, at the point where the separation cut is made, whether such removal be effected throughout the whole length or only close to the root of the matches, on the contrary no more material should be removed round the perforation

provided for the guiding. Another drawback of any removal of material is also that the material is wasted, the cutting tools work in a more complicated manner, and a smaller number of matches can be produced during the same operation of the machine.

The general construction of a machine for the manufacture of strips of matches or of books of matches containing such strips, in a single operation, may be for instance such that the support for the rolls of cardboard bands is adjoined by the punching device which cuts the single matches in the cardboard bands. Then follows a paraffining device which if desired may be combined with an impregnating device. A setting device which now follows, bends the matches alternately to different sides and prepares them for the dipping process which provides them with heads. After the band has been carried in long sinuous lines for the purpose of air drying, a device could be provided which glues together two bands of matches carried one above the other, and at the same time these two superposed bands can be brought to another cardboard band intended to form the cover. By means of a cutting device can then be produced sections or cuts, corresponding to the width of the match book, namely in such a manner that the strips of matches which are now superposed, and the band supplying the cover, are cut simultaneously. The manner in which the match books are finished, is immaterial for the invention.

It is clear that such a machine, of a construction similar to that just described by way of example, could work correctly only provided that the feed devices arranged between the single working devices give a perfectly regulated or positive advance, as is the case when gear wheels are used, but not when friction wheels are used. This can be obtained with exactness if the perforations made in the cardboard band or bands are themselves arranged at a uniform distance apart. The pin wheels or the like engaging with these perforations, must then necessarily give an advance corresponding exactly to the distance between two such holes, that is to say to the width of one match.

In the accompanying drawings is diagrammatically shown a device for carrying out the process of the invention. Figs. 1 and 2 represent in side view and elevation the various tools effecting the perforations and cuts in their places relatively to an already finished strip. Fig. 3 represents perspectively the junction of four strips, and Fig. 4 shows a card of matches manufactured by the process according to the present invention. Figs. 5 and 6 show the setting device in front and side view. Fig. 7 shows a spring-controlled pin of the setting device.

The manner in which the said holes or perforations are to be produced, in diagrammatically illustrated by way of example in Figures 1 and 2. To a press plate 1 vertically adjustable for instance by means of eccentrics not shown, is secured a plate 2 with parallel cutters 3 and further a plate 4 with perforating punches 5, setting mandrels 6, a wide punch 7 and head cutters 8. A table 9 carries a plate 10 as counter-plate for the cutters 3, as well as a plate 11 with holes for the guiding of the punches 5, 7 and 8. Moreover, to the press plate 1 is secured an ejector device 12 which ejects the completely cut-out tongues through a slot 13 of the table top.

On reaching the punching device, a cardboard band *a* is provided between the plates 2 and 10 by the cutters 3 with parallel cuts which do not extend quite to the edge of the cardboard bands, so that at each longitudinal edge there will still be left a holding strip 14 or 15. After a further advance of the cardboard band or bands, during the passage between the plates 4 and 11, the cutters 8 cut out at one longitudinal side of the band the ends 16 of the tongues subsequently carrying the match heads, and at the same time the punches 5 punch at the root of the matches 30 holes 17 in the holder strip 15, and the wide punch 7 punches out an elongated hole 18. Each two of such elongated holes 18 enclose a strip of matches intended for a match book.

The setting mandrels 6 which are arranged on the left hand side of the perforating punches 5 and are of the same construction as the latter, only longer and with pointed ends, engage during the working stroke of the punching device with the previously punched out holes 17 of the match strip or band and bring it into the correct position, so that the punching perforators 5 which come into action immediately afterwards, punch the holes 17 in a perfectly exact manner and at the correct distance apart. Any slight movement of the band that may be necessary can be effected by the setting mandrels 6, as the band is not held fast before the punching device becomes operative, but is merely laterally guided.

The holes 17 provided in the described manner at proper intervals, are utilized during the whole subsequent working operation for the guiding and advancing of the band *a*, owing to the engagement with the said holes of pins of pin wheels or the like.

The manner in which these holes are utilized for the guiding, is illustrated in perspective in Figure 3, by way of example for the simultaneous guiding of four match bands which are to be guided together with a band intended to form the book cover. Each two strips *a* and *b* or *a*1 and *b*1 are arranged here side by side, whilst the strips *a* and *b*′ or *b* and *a*′ are situated above each other. The

two upper match strips *a* and *b* pass over an upper pin wheel 19, and the lower match strips *a*1, *b*1 pass over a lower pin wheel 20.

The pin wheels 19, 20 are of exactly the same construction and make the same movement, so that the pins of the wheels 19, 20 engage exactly with the holes 17 of the match strips, and all the match strips, *a*, *b*, *a*1, *b*1, are moved in a perfectly uniform manner. The holes 17 of the upper bands *a*, *b* always coincide therefore exactly with the holes 17 of the lower bands *a*1, *b*1, and the bands can therefore be for instance glued together exactly hole and hole. The glued together double match strips *a*, *a*1 and *b*, *b*1 which travel next to each other, can further be connected, in a manner which need not be further described here, to a cover band 21 which is provided with advance holes 22 arranged at distance apart which correspond exactly to the width of a single match book. A feed roller 23 of the cover band 21 carries on the circumference pins 24, the distance between which corresponds to the distance between the holes 22, or to the width of a match book. The pins 24 of the adjustable roller 23 during its rotation, engage with the holes 22 of the cover band 21, and thus bring about always an exact and uniform advance of the cover band. As the match strips are moved in the manner already described by the pin wheels 19 and 20, the pins of which engage with the series of holes 17 of the match strips, the correct position of the match strips on the cover band 21 is ensured provided that the drives for the pin wheels 19 and 20 and for the roller 23 are properly connected together, so that this also ensures that during the subsequent cutting of the strips into books, the cuts will always be effected at the proper place.

For the part of the machine just described, the guiding by holes and pins is required wherever it is a question of exact cooperation of tools with portions of the match strips to be treated. Only by way of example may be mentioned the setting device which is intended for bending the matches, before their dipping, alternately to opposite sides. The strip is moved above a receptacle 25 filled with the impregnating mass for the tops of the matches between two wheels 26 in its longitudinal direction. In each wheel there are provided spring controlled pins (27) near the edge of these wheels. The tops 28 of these pins pressed by the springs 31, project over the side walls of the wheels. On the frame there is mounted a cam 32 upon which run the tops 28 of the spring controlled pins 27 while the corresponding wheel turns so that the spring-controlled pins are displaced in the wheel 26; the cam 32 rises obliquely from the right edge I to the edge II, then it does not alter its place up to the edge III and falls obliquely to the edge IV. Therefore the cam 32 has a trapezoid-like cross section. The spring-controlled pins 27 of the wheel mounted to the right (according to Fig. 5) are removed to the left and the pins of the left wheel are removed to the right side. In this way the matches are set off in alternate opposite directions: The setting-off of the matches is effected, as the strip is moved above the receptacle 25 as at this time the pins 27 do not alter their places according to the form of the cams 32.

The setting device is followed by a feeding device (Fig. 6), consisting of a sprocket wheel 33, the pins of which engage with the holes 17 of the strips, in order to insure a perfectly regulated advance of the strip, so that the spring-controlled pins engage the matches exactly at the proper place.

For the purpose of exact guiding of the match strips during the various working operations of the machine, it is in itself immaterial at which portion of the width of the bands the holes or perforations 17 are provided. It is preferable however to arrange these perforations in the manner illustrated, at the root of the matches, namely in such a manner that the perforations are always situated between each two matches. As already stated, this provides the weakening of the joints of the matches to the holder part 15, facilitating the tearing off of the single matches from the said holder, as points of least resistance are produced at the root of the matches, so that the separation takes place easily and always at the root, owing to which the matches broken off, always have the same length, and no irregular bits are left in the book cover.

A card or strip of matches manufactured by the process described, is shown in Figure 4.

The single matches 30 separated from each other by cuts, are attached at their bottom end to a narrow strip 15 of the material, of which they are made, and between each two matches 30, immediately above the root, is arranged a series of holes 17 in such a manner that they are situated between each two matches 30. Owing to the provision of these holes 17, places of least resistance are produced at the root of the single matches, where they can be broken off. The perforations 17 can have any desired shape, but the round shape has proved best. The process described can be applied to any materials suitable for the manufacture of such matches, such as flat wood plates, cardboard, and the like.

What we claim is:

1. A machine for the manufacture of strip matches, comprising means for transversely slitting said strip, means for perforating said strip adjacent the ends of the slits, and means cooperating with said perforations to advance said strip a predetermined distance.

2. A machine for the manufacture of strip matches, comprising means for transversely

slitting said strip, means for perforating said strip adjacent the ends of the slits, and a plurality of pin members cooperating with said perforations for positioning said strip with respect to said perforating means.

3. A machine as claimed in claim 1, said perforations coinciding with the end of each slit.

4. A machine for the manufacture of strip matches, comprising means for feeding a plurality of strips to said machine, means for transversely slitting said strips, means for perforating said strips, and means on said feeding means for simultaneously engaging the perforations on superposed strips to advance said strips a predetermined distance.

In testimony whereof we have signed our names to this specification.

SELMAN RAKOWITZKY.
HIRSCH RAKOWITZKY.