

Paper Removal In A Vibrating Conveyor Bowl Of The Tobacco Processing Industry

Description

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The invention relates to a method for recovering tobacco in or from a cigarette making machine of the tobacco processing industry, wherein rejected material is conveyed into a vibrating conveyor bowl and in the vibrating conveyor bowl is further conveyed on a spiral rising transport track, wherein tobacco is sorted out of the rejected material in the vibrating conveyor bowl and/or in an outlet of the vibrating conveyor bowl, and/or cigarettes are conveyed to a comminuting device via the outlet of the vibrating conveyor bowl. The invention further relates to a corresponding arrangement, a use thereof, and to a cigarette making machine of the tobacco processing industry.

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A generic apparatus for recovering tobacco from imperfect cigarettes in which the cigarettes sorted out downstream of a cigarette making machine arrive via an elevator in a recovery device for destroying the paper wrapper and for separating the tobacco from the paper pieces and any filters present, is known from EP 0 370 202 B1. This apparatus processes imperfect cigarettes which during their production were sorted out automatically from a rod maker or assembly machine. In the corresponding tobacco recovery apparatus, the cigarettes that were sorted out are torn open, the tobacco is separated from paper and filter residue, and is resupplied together with fresh tobacco into the cigarette making machine.

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The apparatus according to EP 0 370 202 B1 enables an immediate recovery of tobacco without loss of quality with respect to the

recovered tobacco, in that a conical vibrating conveyor bowl has a spiral rising transport track, in whose outlet parallel running baffles are arranged in several rows next to each other for distributing the separated cigarettes, and a roller system is provided for tearing
5 open the paper wrappers of the cigarettes. The solution with a conical vibrating conveyor bowl has a low space requirement and good mounting options also on existing cigarette making machines.

Further, the use of a conical vibrating conveyor bowl creates the possibility even with a batch-like accrual of imperfect cigarettes, for
10 example, during startup of the cigarette making machine, to collect these in a type of buffer and subsequently to align them in the transport direction while simultaneously spreading them uniformly so that they can be fed to a roller system located downstream for
15 destroying the paper wrapper.

The vibrating conveyor bowl is set electromagnetically into oscillating vibrations. As a result, the cigarettes located in the bowl-like receiving area are conveyed upward on a spiral rising transport
20 track, wherein they are simultaneously aligned such that they lie with their longitudinal direction aligned to the transport direction. The correspondingly aligned cigarettes exit the vibrating conveyor bowl in an approximately tangential direction via an outlet.

Along with rejected cigarettes, other rejected material also arrives in the vibrating conveyor bowl, namely loose tobacco particles, paper
25 strips and filter rods. The cigarettes can also lose tobacco during the transport in the vibrating conveyor bowl. These further rejected materials can hinder the orderly transport of the cigarettes to a comminuting device, for example, to a roller system, and must be
30 led away. In particular, the paper strips and pieces of paper can block the sieves that are used in the downstream connected

equipment on a device for recovering tobacco material and for separating tobacco particles and other components of the rejected material.

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EP 0 634 259 B1 describes a ripper with which the supplied material is comminuted, and supplied on a sieve conveyor. The tobacco falls through the sieve, however, paper and filter plugs remain on the sieve and are conveyed further . For separating filters and paper, a
10 nozzle bar is attached beneath the sieve at approximately half the length of the sieve conveyor, this nozzle bar lifts the paper, which is lighter than the filter plugs, from the sieve base. A suction device that is attached above the sieve conveyor, removes the paper with negative pressure.

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In this device, the paper components of the comminuted rejected material can further block the sieve before the nozzle bar.

Starting from this prior art, the object of the present invention is to
20 provide a recovery of tobacco in an efficient manner that is gentle on the tobacco, wherein in particular, machine stops for cleaning components of a device for recovering tobacco are avoided.

This objective is solved by a method for recovering tobacco in or out
25 of a cigarette making machine of the tobacco processing industry, wherein rejected material is conveyed into a vibrating conveyor bowl, and is further conveyed on a spiral rising transport track in the vibrating conveyor bowl, wherein in the vibrating conveyor bowl and/or in an outlet of the vibrating conveyor bowl tobacco is sorted
30 out of the rejected material, and/or cigarettes are conveyed via the outlet of the vibrating conveyor bowl to a comminuting device, wherein the method is further developed in that rejected material, in

particular pieces of paper, are suctioned out of the vibrating conveyor bowl, in particular, out of the transport track and are removed, by means of a tubular paper suction device that is subjected to a negative pressure or can be subjected to a negative pressure.

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The invention is based on the fundamental concept that loose pieces of paper that arrive through an entry into the vibrating conveyor bowl, are not to be conveyed again out of the vibrating conveyor bowl together with cigarettes that are likewise in the vibrating conveyor bowl. The separation of the loose pieces of paper and paper strips from the cigarettes is performed therefore already in the vibrating conveyor bowl, and not only in the downstream devices that can become blocked due to the pieces of paper. The design with suction air that is applied by means of a tubular paper suction device in the vibrating conveyor bowl enables separating pieces and strips of paper from cigarettes because the latter are less likely to follow a suction air stream than flat pieces of paper. The adjustment of the strength of the suction air stream therefore depends on which strength of suctioned air attains an optimal suction removal of paper rejects, wherein rejected cigarettes are simultaneously conveyed further on the spiral transport path of the vibrating conveyor bowl without being suctioned away.

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The paper suction device is designed therefore to suction away all reject materials, thus in particular, pieces of paper and paper strips, without influencing the material flow of other rejected materials. In particular, the vibrating conveyor bowl has a sieve at the bottom of the receiving area space, by means of which loose tobacco particles are separated from the further rejected materials before these arrive at the paper suction device.

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In case, that individual rejected cigarettes are nonetheless suctioned into the paper suction device, rejected material in the paper suction device that is heavier than the paper pieces to be suctioned away, is preferably conveyed back into the vibrating conveyor bowl via a lateral outlet.

These rejected materials that are conveyed back, in particular cigarettes, can be conveyed in a further conveyance in the vibrating conveyor bowl to the outlet of the vibrating conveyor bowl, and are then available for recovery of tobacco.

The sorting out of heavier rejected materials from the suction stream preferably occurs in that for separating different weight rejected materials in the paper suction device, a speed of an air stream prevailing in the paper suction device is reduced in sections by a cross-sectional enlargement of the paper suction device. The cross-sectional enlargement is preferably such that cigarettes are not carried along further in the reduced air stream speed.

Cigarettes have a relatively small specific surface area, that is, a low ratio of surface area to weight or volume in comparison to pieces of paper and paper strips. They require a minimum speed in order to be carried along upward in an air stream against the force of gravity. This effect is utilized according to the invention for the purpose of separating cigarettes from paper strips and pieces of paper in the air stream. The cross-section according to the invention is enlarged, in particular, compared to an inlet of the paper suction device, which is disposed inside or above the vibrating conveyor bowl.

The object of the invention is also solved by an arrangement for recovering tobacco in or out of a cigarette making machine of the tobacco processing industry having a vibrating conveyor bowl for conveying rejected material of the cigarette making machine, where
5 a conveyor device is provided for conveying rejected materials into the vibrating conveyor bowl, and the vibrating conveyor bowl has a spiral rising transport track and an outlet for rejected material connecting substantially tangentially to the transport track, wherein the arrangement is further developed in that a tubular paper suction
10 device, which is disposed above the transport track of the vibrating conveyor bowl and can be subjected to negative pressure for creating a suction air stream, is provided for rejected material.

Thus, the arrangement according to the invention corresponds in
15 part to a known arrangement, for example, according to EP 0 370 202 B1, however, is expanded by a paper suction device which applies a suction air stream at a location in the vibrating conveyor bowl. The arrangement according to the invention permits, in particular, the method according to the invention described above to
20 be performed advantageously. It also offers the advantages of the vibrating bowl conveyor, namely a small construction type, and the possibility to buffer rejected material which may arrive in surges, as well as avoiding blockages in the downstream connected separation apparatus of the arrangement for recovering tobacco.

25 Preferably, the paper suctioning device has, in particular, a tube-shaped lateral exit which is disposed above the vibrating conveyor bowl, and particularly, above a receiving area of the vibrating conveyor bowl. With this measure it is possible to feed back
30 cigarettes and other heavy rejected material that was erroneously suctioned off by the paper suction device, to the planned tobacco recovery.

For this purpose, the lateral outlet is preferably disposed at a lower side of a sloped section of the tubular paper suction device. The lower side of a sloped section of the tubular paper suction device is the side at which heavy cigarettes, due to gravity, preferably remain in a sloping section so that at this location a particularly effective separation from cigarettes of the stream of suction air is possible.

The lateral outlet is preferably disposed in a section of the tubular paper suction device having an enlarged cross-section. The enlarged cross-section of the paper suction device ensures that the speed of the stream of suction air is reduced within the paper suction device. The lower speed of suction air ensures that the cigarettes in the suction air stream are no longer carried along, and can drop down again due to gravity. An outlet disposed at this location effectively collects the cigarettes that are no longer carried along in the air stream because they are too heavy.

A conveying device, in particular, a pneumatic conveying device is advantageously provided for rejected material sorted out in the paper suction device. The paper material, that is, pieces of paper or strips of paper, can be conveyed by means of the conveying device into a container in which the collected paper is later transported away.

The floor of the receiving area of the vibrating conveyor bowl preferably has a sieve by means of which loose tobacco particles can be removed downward out of the vibrating conveyor bowl. In this case, the tobacco particles are supplied into a separate material stream of the tobacco return and are reused, whereas the larger particles, that is, pieces of paper, paper strips, cigarettes, filter plugs, and similar remain in the vibrating conveyor bowl, and are on

the one hand suctioned away by a paper suction device, and on the other hand, are supplied to a comminuting device which frees the tobacco in the cigarettes from the wrapping paper and makes it accessible for recovery.

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The object of the invention is also solved by the use of a tubular paper suction device for suctioning rejected material out of a vibrating conveyor bowl of an arrangement for recovering tobacco in or out of a cigarette making machine of the tobacco processing industry, wherein the tubular paper suction device is equipped, in particular, as described above.

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Finally, the object of the invention is also solved by a cigarette making machine of the tobacco processing industry with an arrangement according to the invention, described above, for recovering tobacco.

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The invention is described below, without restricting the general idea of the invention, based on exemplary embodiments in reference to the drawings, whereby we expressly refer to the drawings with regard to the disclosure of all details according to the invention that are not explained in greater detail in the text. They show:

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25 Fig. 1 a schematic representation of a cigarette making machine with an arrangement for recovering tobacco according to the prior art,

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Fig. 2 a schematic representation of a detail of a known arrangement for recovering tobacco according to figure 1,

Fig. 3 a schematic lateral representation of the known arrangement for recovering tobacco according to figure 2, and

5 Fig. 4 a schematic perspective view of an arrangement according to the invention for recovering tobacco.

In the following figures, the same or similar types of elements or corresponding parts are provided with the same reference numbers
10 so that a corresponding re-introduction is omitted.

Figure 1 shows a known cigarette making machine 1 having an arrangement for recovering tobacco 2 as is known from EP 0 370 020 B1. The schematic representation according to figure 1 is a top
15 view of the corresponding components from above. The cigarette making machine 1 has an elevator 4 that carries rejected material, for example cigarettes, loose tobacco, filter plugs or pieces of paper, and conveys them in a direction of conveyance 4' into a vibrating conveyor bowl 3.

20 The vibrating conveyor bowl 3 has a spiral transport track which leads to an outlet 5, in which the rejected materials conveyed into the vibrating conveyor bowl 3 are conveyed in an outlet direction 5' in the direction of a transport belt 6, from which they arrive at a
25 roller arrangement 9, in which the materials, for example, cigarettes, are ripped open so that the tobacco contained therein can be separated from the wrapping paper. Next, the thusly separated materials are conveyed on a elevator 7 in a conveying direction 7' to a sieve conveyor trough 8, where they are conveyed in a conveying
30 direction 8' to an outlet 8c or an exit 8d.

In the sieve conveyor trough 8, the freed tobacco material is separated from the wrapping paper in that the tobacco particles fall through the sieve and are transported away via the outlet 8c, whereas the wrapping paper remains on the top side of the sieve and is

transported away via an exit 8d.

The vibrating conveyor bowl 3 is placed into oscillating vibrations electromagnetically, whereby the materials located in the bowl-like receiving area of the vibrating conveyor 3 are conveyed upward onto the spiral rising transport track, and simultaneously aligned such that their longitudinal direction lies in the direction of conveyance.

The embodiment of a vibrating conveyor bowl 3 shown in figure 1 conveys all materials, thus, also loose tobacco, pieces of paper and strips of paper, as well as filter plugs on the spiral transport track 3b in the direction of outlet 5. For removing tobacco from these materials, the outlet 5 has according to EP 0 370 202 B1 holes, not shown in figure 1, that form a sieve through which tobacco particles fall, whereas larger components such as cigarettes or pieces of paper remain on the outlet and are transported further on the transport belt 6. The separated tobacco arises, among other sources, also from cigarettes which during their conveyance in the oscillating vibrating conveyor bowl can lose tobacco particles from their ends.

Figure 2 shows the arrangement 2 from figure 1 for recovering tobacco in greater detail. The vibrating conveyor bowl 3 has a spiral rising transport track 3b, whereas the central receiving area 3a is formed planar. According to the invention the receiving area 3a can

also have a sieve-shaped floor in order to already sort out tobacco particles at this location, and to convey them back for recovery.

5 Baffle plates 5a, represented in the outlet 5 of the vibrating conveyor bowl 3 are arranged staggered, in order to separate the cigarettes that are disposed next to each other, and further convey them individually for the case that the rejected cigarettes are conveyed in surges next to each other on the transport track 3b. The tracks between the baffle plates 5a open in turn onto the
10 transport belt 6.

The comminuting device, that is, the roller arrangement 9, is shown in figure 2 with a roller 9a of a roller pair disposed vertically beneath one another. Cigarettes that are transported on the transport belt 6
15 in the direction of the roller pair 9a are crushed between the roller pair 9a, or the roller 9a, the wrapping paper of the cigarette is ripped open, and the tobacco contained therein is released. The tobacco and the ripped wrapping paper arrive on the elevator 7, which is represented in sections, and the torn material is further
20 conveyed to the sieve conveyor trough 8. The sieve of the sieve conveyor trough 8 is also represented to some extent.

Figure 3 shows a schematic lateral view of the arrangement 2 for recovering tobacco according to figure 2. It can be seen that the
25 transport track 3b which spirals upwards has a spiral-shaped bottom that is designed sloping toward the outside in each case. This measure prevents cigarettes and other rejected materials from sliding toward the interior during the oscillating conveyance, and arrive again at the receiving area 3a of the vibrating conveyor bowl
30 3. The outward sloping angled bottom design also supports the alignment of the cigarettes in the longitudinal direction along the

conveyance direction.

The top winding of the transport track 3b opens into the outlet 5 which leads to the transport belt 6 with a transport direction 6'. A

5 collecting pipe 10 disposed beneath the outlet 5 collects tobacco particles falling through the sieve-shaped floor of the outlet 5, and deflects them onto a vibration trough 11 on which the tobacco particles are conducted in a conveyance direction 11' to the elevator 7

10 for recovering the tobacco particles.

The comminuting device in figure 3 has, along with deflection rollers for the transport belt 6, also a roller pair 9a, that receives and comminutes the conveyed cigarettes between the two rollers of the roller pair 9a. Next, the comminuted material is led on the elevator 7.

20 From the elevator 7, the comminuted material arrives on the sieve conveyor trough 8, represented from the side. The sieve conveyor trough 8 has a sieve part that is movable and driven in an oscillating manner by a drive motor 8e, and that is disposed pivotably on pivot members 8a, and is pivoted or vibrated back and forth in a pivot direction 8a'.

25 The floor of this part forms a sieve 8b through which the tobacco particles fall, however, larger components such as pieces of paper, paper strips or filter plugs do not fall through. These are conveyed on the sieve conveyor trough 8 to the exit 8d, from where they are transported away and removed.

30 The tobacco particles conveyed through the sieve 8b are further

transported with the same shaking movement on the lower level of the sieve conveyer trough 8 in the direction of the outlet 8c, from where they are supplied for recovery to a tobacco rod making machine.

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Figure 4 shows a schematic perspective view of an arrangement 2 according to the invention for recovering tobacco. The vibrating conveyor bowl 3 corresponds substantially to the vibrating conveyor bowl 3 of figures 1 to 3. The vibrating conveyor bowl 3 is formed substantially cylindrical, wherein a receiving area 3a is disposed centrally in the vibrating conveyor bowl 3. Rejected materials such

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as cigarettes 20 with minor imperfections, partially unrolled cigarettes 21, or pieces of paper 22 are conveyed via a trough 25 into the receiving area 3a of the vibrating conveyor bowl 3.

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The vibrating conveyor bowl 3 that is driven electromagnetically oscillating has a transport track 3b that begins at the bottom of the receiving area 3a and spirals upward to an outlet 5. Due to the oscillating movement, cigarettes are aligned axially longitudinally along their conveying direction on the transport track 3b, and travel on the spiral transport track upward to the outlet 5.

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In contrast to the prior art, at the location of the transport track 3b in front of the outlet 5, a paper suction device 26 is disposed whose input 27 is disposed somewhat above the transport track 3b. A negative pressure is present at the paper suction device 26, so that a suction air stream arises, and lightweight rejected materials are sucked into the suction device 26. This applies above all to pieces of paper and paper strips 22 that are suctioned upward, and exit in a removal direction 29' out of an outlet or passage 29 of the paper

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suction device 26. Instead of an outlet, a passage can also be provided into a pneumatic pipeline.

5 In order to prevent tobacco particles that are to be recovered from being suctioned into the suction air stream by means of the paper suction device, it is also provided that the floor of the receiving area 3a is designed as a sieve so that tobacco particles are already sorted out from the reject stream at this location.

10 The paper suction device 26 has a section 28 that is slightly sloped and has an enlarged cross-section, out of which a tubular lateral exit 30 branches downward in the direction of the vibrating conveyor bowl 3, or the receiving area 3a of the vibrating conveyor bowl 3.

15 The enlarged cross-section of the paper suction device in the section 28 leads to a reduction of the speed of the air stream in the interior of the paper suction device 26. Because the speed of the air stream at this location is reduced, cigarettes 20, 21 that are unintentionally also suctioned into the paper suction device 26, are
20 separated from pieces of paper and paper strips 22 in the air stream, in that the heavier cigarettes are no longer carried along in the slowed air stream.

25 The cigarettes fall, due to gravity, downward where at the lower side of the sloped section 28 the lateral outlet 30 is located. In this outlet there is no prevailing air stream or only a very minor air flow that also does not stop the cigarettes 20, 21 so that they fall out of the paper suction device 26 in a direction 30' onto the floor of the receiving area 3a of the vibrating conveyor bowl 3. From there they
30 are conveyed again on the spiral rising transport track 3b in the direction of the outlet 5, from where they arrive at a comminuting

device and to a separating device for tobacco particles and ripped wrapping paper of cigarettes.

5 All named characteristics, including those taken from the drawings alone, and individual characteristics, which are disclosed in combination with other characteristics, are considered alone and in combination as essential to the invention. Embodiments according to the invention can be fulfilled through individual characteristics or a combination of several characteristics.

Reference List

	1	cigarette making machine
5	2	arrangement for recovering tobacco
	3	vibrating conveyor bowl
	3a	receiving area
	3b	transport track
	4	elevator
10	4'	conveyance direction
	5	outlet
	5'	outlet direction
	5a	baffle sheet
	6	transport belt
15	6'	transport direction
	7	elevator
	7'	conveyance direction
	8	sieve conveyor trough
	8'	conveyance direction
20	8a	pivot member
	8a'	pivot direction
	8b	sieve
	8c	outlet
	8d	exit
25	8e	drive motor for sieve conveyor trough
	9	roller arrangement
	9a	roller
	10	collection tube
	11	vibration trough
30	11'	transport direction
	20	rejected cigarette
	21	partially unwrapped cigarette

	22	piece of paper
	25	trough
	26	paper suction device
	27	inlet opening
5	28	sloped section with enlarged cross-section
	29	outlet or passage
	29'	direction of conveying away
	30	lateral outlet
	30'	conveyance direction

CLAIMS

1. A method for recovering tobacco in or out of a cigarette making
5 machine (1) of the tobacco processing industry, wherein
rejected material (20, 21, 22) is conveyed into a vibrating
conveyor bowl (3) and in the vibrating conveyor bowl (3) it is
further conveyed on a spiral rising transport track (3a), wherein
10 in the vibrating conveyor bowl (3) and/or in an outlet (5) of the
vibrating conveyor bowl (3) tobacco is sorted out of the
rejected material (20, 21, 22) and/or cigarettes (20, 21) are
conveyed via the outlet (5) of the vibrating conveyor bowl (3) to
a comminuting device, characterized in that by means of a
15 tubular paper suction device (26) that is subjected to a
negative pressure or can be subjected to a negative pressure,
rejected material (20, 21, 22), in particular, paper pieces (22),
is or are suctioned out of the vibrating conveyor bowl, in
particular, from the transport track (3a), and is or are removed.
- 20 2. The method according to claim 1, characterized in that in the
paper suction device (26) rejected material (20, 21) that is
heavier than paper pieces (22) to be suctioned, is conveyed
back through a lateral outlet (28) into the vibrating conveyor
bowl (3).
- 25 3. The method according to claim 2, characterized in that for
separating rejected materials (20, 21, 22) of different weights
in the paper suction device (26) a speed of an air stream
prevailing in the paper suction device (26) is reduced in
30 sections by a cross-sectional enlargement of the paper suction
device (26).

4. An arrangement (2) for recovering tobacco in or out of a cigarette making machine (1) of the tobacco processing industry having a vibrating conveyor bowl (3) for conveying rejected material (20, 21, 22) of the cigarette making machine (1), wherein a feeder device (2, 25) is provided for feeding rejected material (20, 21, 22) to the vibrating conveyor bowl (3), and the vibrating conveyor bowl (3) has a spiral rising transport track (3b) and an outlet (5) connecting substantially tangentially to the transport track (3b) for rejected material (20, 21, 22), characterized in that a tubular paper suction device (26) for rejected material (20, 21, 22) is provided, and is disposed above the transport track (3b) of the vibrating conveyor bowl (3) and can be subjected to a negative pressure for generating a suction air stream.
5. The arrangement (2) according to claim 4, characterized in that the paper suction device (26) has a, in particular, tubular, lateral outlet (30), which is disposed above the vibrating conveyor bowl (3), in particular above a receiving area (3a) of the vibrating conveyor bowl (3).
6. The arrangement (2) according to claim 5, characterized in that the lateral output (30) is disposed on a lower side of a sloped section (28) of the tubular paper suction device (26).
7. The arrangement (2) according to claim 5 or 6, characterized in that the lateral outlet (30) is disposed in a section (28) of the tubular paper suction device (26) that has an enlarged cross-section.

8. The arrangement (2) according to one of the claims 4 to 7, characterized in that a conveyor device, in particular, a pneumatic conveyor device, is provided for rejected material (22) sorted out in the paper suction device (26).

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9. The arrangement (2) according to one of the claims 4 to 8, characterized in that a floor of the receiving area (3a) of the vibrating conveyor bowl (3) has a sieve.

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10. A use of a tubular paper suction device (26) for suctioning out rejected material (22) from a vibrating conveyor bowl (3) of an arrangement (2) for recovering tobacco in or out of a cigarette making machine (1) of the tobacco processing industry.

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11. A cigarette making machine (1) of the tobacco processing industry having an arrangement (2) for recovering tobacco according to one of the claims 4 to 9.