Splicing device for webs, particularly for paper webs for cigarettes.

The invention relates to a device for the splicing of paper webs, for example wrapping paper webs, for example paper webs for cigarettes, more particularly for the splicing of the web (NS) coming from a depleted bobbin to the leading end of the web (NR) coming from a standby or reserve bobbin, particularly under stationary conditions of the webs (NS, NR). The device according to the invention is characterized by transversal alignment shifting means (38) of the web (NS) coming from a depleted bobbin and/or of the leading end of the web (NR) of the standby bobbin, which shifting takes place in the direction of the width of the webs. Said transversal alignment means (38) are automatically controlled by sensors (41, 42) which are sensible to the transversal position of either one or both webs (NS, NR) with respect to a predetermined correct mutual alignment position before the splicing.
The present invention relates to devices for the splicing of webs, for example wrapping material webs and particularly paper webs for cigarettes, for the splicing of the web coming from a depleted bobbin to the leading end of the web coming from a standby or reserve bobbin. More particularly the invention relates to devices of this type which effect the splicing under stationary conditions of the webs, i.e. by holding stationary the web from the depleted bobbin, after having formed with this web a sufficient reserve in a buffer magazine provided downstream of the splicing device, so as to guarantee the continuous operation of the machine fed with the web.

In the known devices of this type, when the web unwound from the depleted bobbin is stopped to carry out
the splicing, its median longitudinal axis results to be frequently offset, due to the unavoidable side skids, with respect to the median longitudinal axis of the leading end of the web from the standby bobbin. As a consequence, the splicing is not perfect, since the two webs are superposed in a defective manner, i.e. one web is offset with respect to the other in the direction of the width which disturbs the regular operation of the machine being fed.

The invention has the scope of avoiding this inconvenience and guarantees a perfect alignment of the median longitudinal axis of webs when effecting the splicing of webs. For this purpose the invention includes shifting means for the transversal alignment of the web coming from a depleted bobbin and/or the leading end of a web coming from the standby bobbin, in the direction of the width of the webs, said shifting means being automatically controlled by sensors which are sensible to the transversal position of either one or both webs with respect to a predetermined correct mutual alignment position and being capable of bringing one or both webs into correct mutual alignment position before the splicing.

The invention is independent with respect to the splicing system of the two webs and can be applied to any splicing device of the above described type. Particularly the invention includes a splicing device of the above mentioned type characterized by two opposite splicing heads provided with two movable suction pressers.
which can be angularly shifted between a rest position, at which onto a suction presser of one splicing head is applied and is held the leading end of the web from the standby bobbin, and a working position at which the pressers of the two splicing heads are facingly arranged on opposed sides of the depleted bobbin and are moved one towards the other so as to press the depleted bobbin web against the leading end of the web of the standby bobbin with the interposition of an adhesive label, one or both splicing heads being mounted transversally slidable with respect to the relevant webs in the direction of the width of the webs and under the action of the said alignment means for the transversal alignment shifting.

 Those and other characteristic features of the invention and its advantages will appear evident from the following description of an embodiment shown as a non-restrictive example in the attached drawings in which:

 Figures 1 and 2 show in elevation, with parts in section, a splicing device according to the invention, before and during splicing of the two webs.

 Figure 3 shows a vertical cross section according to line III-III of figure 1.

 Figure 4 shows a cross sectional view according to line IV-IV of figure 3.
Figure 5 shows an elevation view in an enlarged scale of the detail of sensor means which act in response to the web transversal position.

Figure 6 shows the blade cutting the depleted bobbin web tail, after splicing to the standby bobbin web.

With reference to the figures, reference letters NS indicate a web of wrapping material, in particular a cigarette paper web, coming from a bobbin (not shown) and fed, in the direction of arrow F of figure 1, to a machine, for example a machine for cigarette wrapping (not shown).

The web NS being unwound passes through a roller 1 and around a roller 2. In the embodiment shown the portion of web NS between rollers 1 and 2 is substantially vertical but it may have any other direction. NR indicates a similar web coming from a standby bobbin (not shown). The leading end of the standby web NR is connected to the tail of pay-off web NS when the bobbin of web NS is depleted.

The device for splicing webs NS and NR includes two splicing heads GS and GR located on opposed sides of the path of web NS between roller 1 upstream and roller 2 downstream the splicing head GS. Splicing head GR is associated to an upstream roller 3 for web NR. The two splicing heads GS and GR are identical and alternately
work in the same way. Consequently a description of
splicing head GS only will follow, including the parts
associated to it and the same reference numbers will
indicate also the elements of the other splicing head
GR and the parts associated thereto.

Each splicing head GS and GR is formed by a
suction presser 4 integral with piston 5 of a simple
action pneumatic cylinder equipped with spring return 7.
This means that the suction presser 4 is pulled
forward by the compressed air of cylinder 6 while a
pressure spring 7 interposed between the body of
cylinder 6 and a rear extension 9 of piston 5 keeps
back this latter together with suction presser 7 when
the pneumatic pressure in cylinder 6 stops.
Cylinder 6 is mounted in overhanging manner onto a
transversal pivot 10 revolving and axially sliding by
means of ball sleeves 11 in a tube 12 connected to a
supporting plate 13.

Compressed air is supplied to chamber 20 of
cylinder 6 mounted on the back side of piston 5 by
connection 14 and a longitudinal slot 15 in pivot 10.
Suction is instead applied by connection 16 and by an
annular chamber 17 located on the upper side of piston 5
and connected, by means of radial holes 18, to a
chamber 19 mounted behind the flat head provided with
holes of presser 4.

Cylinder 6 of each splicing head GS, GR is provided
with an arm 21 bringing the relevant roller 1, 3 of web NS, NR and its respective web-pinching finger 101, 103. Web NS coming from its bobbin passes through roller 1 and respective web-pinching finger 101, while web NR from the standby bobbin is passed between roller 3 and web-pinching finger 103. Each web-pinching finger 101, 103 is assembled on a pivot 22 and swinging on the respective support integral with arm 21 and is pulled by a spring 23 towards its corresponding roller 1,3. Due to spring 23 each web-pinching finger 101, 103 can have a locking position in which it locks the respective web NS, NR on the corresponding roller 1, 3.

Thanks to the above described embodiment, each splicing head GS, GR swings, together with roller 1, 3 and respective web-pinching finger 101, 103, around a transversal axis formed by pivot 10, and moves with pivot 10 along the above said axis and transversally to the relevant plane of web NS, NR, that is in the direction of the width of the web itself.

A pneumatic cylinder 24 provides for the angular movement of each splicing head GS, GR i.e. of the respective cylinder 6 around the transversal pivot 10, the cylinder being mounted swinging on pivot 25 to supporting plate 13 while its shaft 26 is fitted to the end 127 of a pivot 27 integral to arm 28 of a sleeve 29 assembled and revolving around tube 12 coaxially to pivot 10.

Pivot 27 slides through a curved slot 30 located in
the supporting plate 13 coaxially to pivot 10. Coaxially to pivot 27, arm 28 of revolving sleeve 29 is provided with a dragging pin 31 which engages in rotatable manner and slides longitudinally by means of a ball sleeve 32 in a cylindrical housing over arm 21 of cylinder 6.

Under the action of actuator cylinder 24 each splicing head GS, GR can be angularly shifted around the axis of the respective transversal pivot 10 and together with pivot 10 so as to reach alternately an angular working position in which the face of suction presser 4 is substantially parallel to web NS of the pay-off bobbin, passed around roller 2 downstream and fed to the user machine as shown for splicing head GS, and an angular rest position in which the face of suction presser 4 is inclined outwardly with respect to the path of the web NS being unrolled and is, for example, facing upwardly as shown for splicing head GR.

Splicing of webs NS and NR is carried out as follows: Splicing head GS of web NS of the pay-off bobbin is in the above mentioned angular working position and suction through its presser 4 is interrupted. An extension 34 of web pinching finger 101 cooperating with roller 1 of splicing head GS touches, in this working position of splicing head GS, an adjustable screw 35 that causes web-pinching finger 101 swinging on fulcrum 22 lifting it -- by the action of spring 23, from its respective roller 1.
Web NS of the bobbin, being unrolled passes freely between roller 1 and its respective lifted web-pinching finger 101 as shown in figure 1. Splicing head GR connected to web NR of the standby bobbin is in the above described angular rest position and suction, through presser 4, is carried out. The leading end of web NR of the standby bobbin is provided with an label L adhesive on both sides and is applied to suction presser 4 which holds it by sucking.

In the meanwhile web NR is blocked on roller 3 by its respective web pinching finger 103 pressed against roller 3 by spring 23. When the pay-off bobbin is depleting, a sufficient reserve of web NS is provided by a buffer magazine located downstream the splicing device and the running of web NS is stopped upstream the said buffer magazine. Subsequently, when the web is in a stationary position, splicing head GR is driven in its angular working position as shown in figure 2. During this angular movement of splicing head GR, web NR is pulled and comes from its respective standby bobbin, being blocked by the web-pinching finger 103 on the movable roller 3 together with splicing head GR. A little before splicing, head GR reaches its working position shown in figure 1, extension 34 of web-pinching finger 103 cooperating with roller 3 touches screw 35 and lifts roller 3 which frees web NR.

In working position of both splicing heads GS and GR, pressers 4 are facing and opposed to the interposed
webs NS and NR. Compressed air is fed to chamber 20 of cylinder 6 of splicing head GS and presser 4 of this head is pushed against the presser of the opposite head GR, thus connecting the leading end of web NR to web NS by the interposed adhesive label L.

During the forward movement of presser 4 of splicing head GS, the presser causes the cutting of the end of web NS by a fixed blade 36 located between the two splicing heads GS and GR on a stationary support, the edges of which are facing the splicing heads GS and GR and are saw-shaped as shown in detail by figures 1, 2 and 6. After splicing of webs NS, NR, suction is stopped by presser 4 of splicing head GR that remains in its angular working position while the splicing head GS is brought in its angular rest position similar to that shown in figure 1 of splicing head GR, to receive the leading end of the web of a new standby bobbin which replaces the depleted bobbin.

The next splicing operation is carried out as above explained with inverted functions of the two splicing heads. The possibility of a rectilinear shifting of the splicing heads GS and GR together with the corresponding roller 1, 3 of the respective web-pinching finger 101, 103 axially to pivot 10 and in the direction of the width of webs NS, NR serves to guarantee the mutual alignment of web NS, NR to be spliced. The above mentioned rectilinear shifting of each splicing head GS, GR is obtained by a stepping electric motor 38 moving a roller 39
eccentrically pivoted to shaft 138 of motor 38 and connected to the peripheral ring slot of a dragging collar 40 which is mounted freely revolving but not axially sliding on the bottom end 110 of pivot 10.

By shifting roller 39 with the relevant stepping motor 38, collar 40 drags and axially shifts, in one direction or the other, pivot 10 together with cylinder 6 and arm 21 carrying the associated roller 1 or 3 and the respective web-pinching finger 101, 103. Axial shifting of each roller 1, 3 causes the corresponding shifting of the respective web NS, NR in the direction of the width as web NS, NR is friction dragged by roller 1, 3 also when it is not blocked on it by the respective web-pinching finger 101, 103. During its rectilinear movement in a direction axial to pivot 10, cylinder 6 of each splicing head GS, GR is operatively coupled to its respective actuator cylinder for its angular shifting due to the axially sliding assembly of dragging pin 31 in its relevant cylindrical housing 33 on arm 21. Direction and amplitude of movement of each stepping motor 38 are controlled by a sensor associated to each splicing head GS, GR and sensible to the transversal position of relevant webs NS, NR with respect to a pre-set transversal position of perfect mutual alignment of the two webs NS, NR.

In the embodiment shown this sensor is formed by two fork photocells 41, 42 which are assembled on the arm 28.
of the revolving sleeve 29 on the fixed tube 12 of pivot 10 and are placed one after the other in the longitudinal direction of respective web NS, NR. One arm of the fork of each photocell 41, 42 is equipped with a light emitter, while the other arm of the fork, facing the light emitter, is equipped with its respective photosensible receiver. Web NS, NR associated to each splicing head GS, GR passes with its edge through the two subsequent fork photocells 41, 42. The two fork photocells 41, 42 are slightly off-set one with respect to the other in the direction of the width of web NS, NR. When web NS, NR associated to a splicing head GS, GR and with respect to presser 4 of this head is in a correct position and guarantees superposing with perfect alignment to web NR, NS associated to the other splicing head GS, GR, its edge passes between the two fork photocells 41, 42 and intercepts the light flow between emitter and receiver of one of these photocells (41), while keeping free the light flow between emitter and receiver of the other photocell 42 as shown in figure 5 for web NS.

In case that - after splicing head GS associated to web NR of the standby bobbin shifts angularly from its rest position (Figure 1) to its working position (figure 2) to carry out splicing, and after lifting of web-pinching finger 103 from its relevant roller 3, but before splicing of the two webs NS, NR - one or both the webs are not in their preset correct mutual alignment position, that is if one and/or the other web NS, NR intercept or allow the light flow between emitter and
receiver of both photocells 41, 42 associated to their relevant splicing head GS, GR, then the corresponding stepping motor 38 receives a signal from the photocells 41, 42 and shifts cylinder 6 of splicing head GS, GR and the respective roller 1, 3 together with web NS, NR in the direction and measure necessary to intercept or uncover the light flow between emitter and receiver of one of the two associated photocells 41, 42. Thus the two webs NS, NR are led to their correct mutual alignment position in which the edge involved in its respective couple of fork photocells 41, 42 is between the light barriers mutually offset of these two photocells. This guarantees automatically the perfect alignment of the two webs NS, NR during splicing.

In order to obtain the above mentioned transversal alignment shifting of web NR of the standby bobbin, it is sufficient to effect the corresponding shifting of cylinder 5 and roller 3 of the associated splicing head GR which, in order to carry out splicing, moves from its rest position according to figure 1, to its working position according to figure 2. In fact the leading end of web NR is held by sucking on presser 4 which moves together with roller 3, so the portion of web NR included between roller 3 and suction presser 4 is not affected by the transversal alignment shifting of splicing head GR.

Instead, the transversal alignment of splicing head GS associated to web NS of the depleted bobbin would
affect web NS with undesirable stresses in case roller 2, located downstream the splicing head GS and around which is passed web NS, is kept in its position.

In fact, in this case, the contact area of web NS with upstream roller 1 would be transversally shifted, in the direction of the width of web NS, together with cylinder 6 of splicing head GS, while the contact area of web NS with the roller 2 downstream would remain motionless.

To avoid any consequent stress of web NS, the invention includes an axial shifting of downstream roller 2 in the direction of the width of the web together with splicing head GS corresponding to the web NS of the depleted bobbin, in the same direction and measure and controlled by the couple of photocells 41, 42 associated to splicing head GS.

For this purpose, as shown by figure 3, roller 2 is rotatably mounted on pivot 43 supported and axially sliding on ball sleeves 44 in a tube 45 assembled to the supporting plate 13. The rear end 143 of pivot 43 is fork-shaped and is sliding, by means of ball sleeves 47, on a pin 46 fixed to head 145 of tube 45. The fork end 143 of pivot 43 is engaged by a small roller 48 eccentrically pivoted to shaft 149 of a stepping motor 49, as shown by figure 4. Stepping motor 49 effecting the axial shifting of pivot 43 and roller 2 is controlled by a couple of photocells 41, 42 of the splicing head being in the working position and associated to the web of the depleted bobbin, so as to shift roller 2 axially in the same direction and measure of the said splicing head.
and consequently of the respective roller 1 or 3.

Obviously the invention is not restricted to the above described embodiment, but it can be widely changed and modified, mainly as far as construction is concerned, without departing from the leading principle as above described and claimed hereafter.
1. A splicing device for webs, for example wrapping paper webs, particularly paper webs for cigarettes, for splicing the web (NS) of a depleted bobbin to the leading end of the web (NR) of a standby bobbin particularly under stationary conditions of the said webs (NS, NR) characterized by alignment means (38) for the transversal alignment shifting of the web (NS) from the depleted bobbin and/or the leading end of the web (NR) from the standby bobbin, which shifting takes place in the direction of the width of the webs, in which said alignment means (38) are automatically controlled by sensors (41, 42) which are sensible to the transversal position of either one or both webs with respect to a predetermined correct alignment position and are capable of bringing one or both webs into correct alignment position before the splicing.

2. A device according to Claim 1, characterized by two opposed splicing heads (GS, GR) which are provided with suction pressers (4) and can be angularly shifted between a rest position, at which onto the suction presser (4) on one splicing head (GR) there is applied and is held the leading end of the web (NR) from the standby bobbin, and a working position at which the pressers (4) of the two splicing heads are facingly arranged on opposed sides of the web (NS) of the depleted bobbin and are moved one towards the other so as to press the web (NS) of the depleted bobbin against the leading end of the
web (NR) of the standby bobbin with the interposition of an adhesive label (L), one or both splicing heads (GS, GR) being mounted transversally slideable with respect to their respective webs (NS, NR), in the direction of the width of the webs and under the action of alignment means (38) for the transversal alignment shifting.

3. A device according to Claims 1 and 2, characterized by the fact that each splicing head (GS, GR) carries upstream a roller (1, 3) onto which the respective web (NS, NR) is passed, said rollers (1, 3) being shiftable transversally together with the respective splicing heads (GS, GR) in the direction of width of the webs (NS, NR) and cooperating each with a respective movable web-pinchling finger (101, 103).

4. A device according to Claims 1 to 3, characterized by the fact that downstream of the two splicing heads (GS, GR) there is arranged, in a stationary position, a roller (2) onto which the web is passed, said roller (2) being mounted axially shiftable in the direction of the width of the web by means of shifting means (49) which are controlled by the sensors (41, 42) of the splicing head (GS) which is in the angular working position and is associated to the web (NS) of the depleted bobbin, so as to shift said roller (2) axially in the same direction and of the same amount as the respective splicing head (GS) and the roller located (101) upstream of the splicing head.
5. A device according any one or more of the preceding Claims, characterized by the fact that the transversal alignment shifting means of each splicing head (GS, GR) and/or of roller (2) downstream of the splicing heads consist of a stepping motor (38, 49) presenting a shaft (138, 139) onto which there is eccentrically pivoted a roller (39, 48) which is engaged in the recess of a fork-like portion (40, 143) of the pivot (10, 43) axially shiftable which carries the splicing head (GS, GR) or the roller (2) downstream of the splicing head.

6. A device according to any one or more of the preceding Claims, characterized by the fact that the sensors (41, 42) associated to each splicing head (GS, GR) consist of at least two subsequently arranged photocells (41, 42), which are arranged at one edge of the web (NS, NR) and are offset with respect to each other in the direction of the width of the web, so that in the correct transversal position of alignment of the web (NS, NR) this latter covers one of the photocells (41) and leaves the other uncovered (42).

7. A device according to any one or more of the preceding Claims characterized by the fact that in order to promote the angular shifting of each splicing head (GS, GR) there is provided a transmission device (28, 29) which is mounted coaxially revolving with respect to the splicing head (GS, GR) and is driven by an actuator cylinder (24), the said transmission device (28, 29) being provided with at least one driving pivot (31)
parallel to the angular shifting axis (10) of the splicing head (GS, GR) and axially sliding in a portion integral with the head itself.

8. A device for splicing webs, wrapping paper webs particularly paper webs for cigarettes, the whole or in part substantially as described, shown and for the above mentioned purposes.
<table>
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<tr>
<th>Category</th>
<th>Citation of document with indication, where appropriate, of relevant passages</th>
<th>Relevant to claim</th>
<th>CLASSIFICATION OF THE APPLICATION (Int Cl +)</th>
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<tr>
<td>Y</td>
<td>DE - A1 - 2 701 438 (AMF INC.) * Fig. 1-3; specification page 6, lines 2-10; claims 1-3 *</td>
<td>1,2,6,8</td>
<td>B 65 H 19/18</td>
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<td>Y</td>
<td>EP - A3 - 0 067 481 (TEVOPHARM SCHIEDAM B.V.) * Fig. 3,4; specification page 9, line 30 - page 10, line 25</td>
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<td>US - A - 3 753 381 (T. REIME et al.) * Fig. 1,2; abstract *</td>
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The present search report has been drawn up for all claims

Place of search

VIENNA

Date of completion of the search

24-09-1985

Examiner

SÜNDERMANN

CATEGORY OF CITED DOCUMENTS

T: theory or principle underlying the invention
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