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(54) **MECHANISM FOR CRIMPING OR INCISING MATERIAL STRIP, APPARATUS COMPRISING SAID MECHANISM AND METHOD OF CONTROLLING MECHANISM**

(57) Mechanism (4) for crimping or incising a material strip (3) comprising two rotary mounted rolls (21, 22) provided with circumferential grooves (21U, 22U) and projections (21T, 22T), whereas the rotation axes (k, m) of the first and second roll are situated parallel to each other, width (T) of the first projections of the first roll is adapted to width (U) of the second grooves (22F) of the second roll, and width of the second projections of the second

roll is adapted to width of the first grooves of the first roll, the first roll being settable relative to the second roll so as to alter the distance (d) between the rotation axis of the first roll and the rotation axis of the second roll. The apparatus further comprising a carrying mechanism (31) provided with a lever (23), and a setting mechanism (32, 32', 32'') coupled with the carrying mechanism.

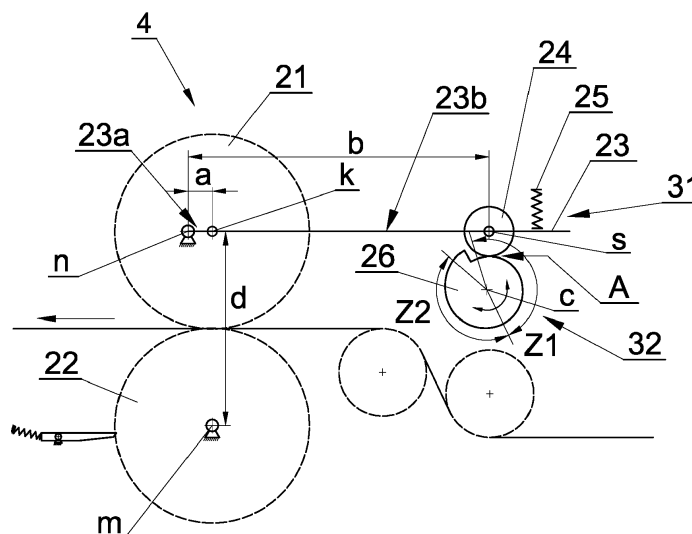


Fig. 2a

Description

[0001] The object of the invention is a mechanism for crimping or incising a material strip, an apparatus for manufacturing tobacco industry rods and a method of controlling the mechanism for crimping or incising the material strip.

[0002] The invention finds application in the tobacco industry on machines for manufacturing filter rods.

[0003] The publication EP 3 725 168 A1 discloses an apparatus for crimping a paper strip for the production of filters in the tobacco industry wherein setting of the distance between the pressing or incising rolls is carried out by means of a hydraulic actuator.

[0004] The publication CN202020511979 discloses setting of the pressing depth by mounting a pressing roll to an actuator arm.

[0005] The publication EP3 473 113 A1 discloses a unit for crimping or incising a material strip used to manufacture tobacco industry products, comprising: a feeding station provided with feeding means for feeding the material strip used to manufacture tobacco industry products; a pressing station which comprises a first pressing roll and a second pressing roll operatively connected to make a plurality of longitudinal lines of increased air overlapping on the strip when the material strip passes through the two pressing rolls.

[0006] The problem known in the state of the art is to achieve a precise setting of the depth of pressing performed in the material strip used to manufacture tobacco industry products, namely the overlapping of the rolls for incising or crimping the material strip. The precise setting of the degree of overlapping of the rolls is related to the precise setting of the crimping parameter.

[0007] The object of the invention is a mechanism for crimping or incising a material strip comprising two rotary mounted rolls provided with circumferential grooves and projections, whereas the rotation axis of the first roll and the rotation axis of the second roll are situated parallel to each other, width of the first projections of the first roll is adapted to width of the second grooves of the second roll, and width of the second projections of the second roll is adapted to width of the first grooves of the first roll, the first roll being settable relative to the second roll so as to alter the distance between the axis of rotation of the first roll and the axis of rotation of the second roll. The apparatus according to the invention is characterised by comprising a carrying mechanism provided with a lever having a rotation axis on which the first roll is mounted, and a setting mechanism coupled with the carrying mechanism so that altering the position of the setting mechanism causes an alteration of the position of the lever to alter the distance between the rotation axes of the rolls, the rotation axis of the first roll being situated on a first arm and the point of coupling the lever with the setting mechanism being situated on a second arm.

[0008] Preferably, the mechanism according to the invention is characterised by comprising a push-away

mechanism for altering the position of the carrying mechanism so that the distance of the axis of the first roll to the axis of the second roll is altered independently of the position of the setting mechanism.

[0009] Preferably, the mechanism according to the invention is characterised in that the push-away mechanism comprises an actuator acting on the lever of the carrying mechanism so that the carrying mechanism is uncoupled from the setting mechanism and the distance between the axes of the rolls is increased so that there is no overlapping of the first roll and the second roll.

[0010] Preferably, the mechanism according to the invention is characterised in that the setting mechanism is provided with two setting ranges, whereas in the first setting range it causes an alteration of the distance between the axes of the rolls and an alteration of the degree of overlapping of the projections and the grooves, and in the second setting range it causes an alteration of the distance between the axes of the rolls so that the projections and the grooves are pushed away so that there is no overlapping of the first roll and the second roll.

[0011] Preferably, the mechanism according to the invention is characterised in that the setting mechanism is a cam mechanism.

[0012] Preferably, the mechanism according to the invention is characterised by comprising a rotatably mounted cam.

[0013] Preferably, the mechanism according to the invention is characterised by comprising a slidably linearly mounted cam.

[0014] Preferably, the mechanism according to the invention is characterised in that, at the coupling point, the lever is provided with a coupling roll which is in contact with the cam.

[0015] Preferably, the mechanism according to the invention is characterised in that at one of the rolls there is arranged a detection unit for detecting dirt in the grooves of the first roll or the grooves of the second roll, the detection unit being provided with a movable scraper adapted to alter its position when dirt is detected.

[0016] Preferably, the mechanism according to the invention is characterised in that the ratio of the carrying mechanism is in the range 20:1 to 5:1, preferably 10:1.

[0017] Preferably, the mechanism according to the invention is characterised in that the ratio of the setting mechanism is in the range 20:1 to 5:1, preferably 10:1.

[0018] The object of the invention is also an apparatus for the manufacture of tobacco industry rods, comprising a feeding apparatus for feeding a material strip adapted to continuously feed the material strip, provided with a splicing device for splicing consecutive sections of the material strip, a mechanism for crimping or incising the material strip, a compacting apparatus for pre-compacting the material strip, a supplying unit for supplying a wrapping material, a forming apparatus for forming a continuous rod, a cutting head for cutting the continuous rod into rods, a controller. The apparatus according to the invention is characterised by being provided with a mech-

anism for crimping or incising the material strip according to the invention, whereas the controller of the rod manufacturing apparatus transmits a signal of splicing the sections of the material strip as a result of the actuation of the splicing device or of a variation in the quality of the material strip so as to alter the distance between the axes of the rolls in the mechanism for crimping or incising the material strip.

[0019] The object of the invention is also a method of controlling the mechanism for crimping or incising the material strip in the apparatus for the manufacture of tobacco industry rods, comprising steps wherein, in normal operation, the crimping parameter and the corresponding degree of overlapping of the grooves and the projections of the first roll and the second roll are determined, and in the case of a signal of splicing of sections of the material strip or a signal of a variation in the quality of the material strip, the first roll is pushed away from the second roll so that there is no overlapping of the rolls.

[0020] The advantages of the invention are obtaining a precise setting of the pressing depth, avoiding the destruction of the rolls for incising or crimping the material strip. An unexpected effect is obtaining, by setting the pressing depth of the material strip, a precise setting of the final parameters of the rod R, in relation to the pressure drop of the gas flowing through the rod in the axial direction, which is an important quality parameter of the filters in smoking articles.

[0021] The object of the invention is shown in more detail in a preferred embodiment a drawing in which:

- Fig. 1 shows an apparatus for manufacturing tobacco industry rods according to the invention,
- Fig. 2a, 2b, 2c schematically show a mechanism for crimping or incising a material strip according to the invention,
- Figs. 3a, 3b, 3c show a cross-sectional view of the rolls in various setting positions of the distance between the rolls;
- Fig. 4 shows a cross-sectional view of the rolls in a another embodiment of the invention,
- Figs. 5a, 5b schematically show the mechanism for crimping or incising the material strip in another embodiment of the invention,
- Figs. 6a, 6b, 6c schematically show the mechanism for crimping or incising the material strip in another embodiment of the invention,
- Figs. 7a, 7b schematically show the mechanism

for crimping or incising the material strip in another embodiment of the invention,

- 5 Figs. 8a, 8b schematically show the mechanism for crimping or incising the material strip in another embodiment of the invention, and
- 10 Figs. 9a, 9b schematically show the mechanism for crimping or incising the material strip in another embodiment of the invention.
- 15 **[0022]** An apparatus 1 for manufacturing rods R from a strip of a filling material 3 shown in Fig. 1 comprises a feeding unit 2 for feeding the strip of the filling material 3, a mechanism 4 for crimping or incising the filling material 3, a compacting apparatus 5 for pre-compacting of the filling material 3, a guiding channel 6, an apparatus 20 10 for feeding a wrapping material 11, a forming apparatus 8 for forming a continuous rod CR, a cutting head 9 for cutting the continuous rod CR of the tobacco industry into individual rods R. The strip of the filling material 3 is unwound from a bobbin 15, the terms "material strip" and "strip of filling material" being used equivalently in this description. The forming apparatus 8 comprises a format bar 12, a glue apparatus 13 and a wrapping unit 14. Moreover, the apparatus 1 for manufacturing the rods R is provided with a tensioning apparatus 16 for tensioning the material 3 and a splicing apparatus 17 for splicing consecutive sections of the material 3, being adapted to splice sections of the material after changing the bobbin 15. The apparatus 1 for manufacturing the rods R from a strip of the filling material 3 is provided with a controller 18.
- 25 30 35 **[0023]** The mechanism 4 for crimping or incising the material strip 3 shown in Fig. 2a comprises a first roll 21 with a rotational axis k and a second roll 22 with a rotational axis m. The first roll 21 and the second roll 22 are provided, on the circumferential surfaces, with circumferential grooves and circumferential projections adapted to crimp or incise the material. The first roll 21 has first grooves 21U and first projections 21T, the second roll 22 has second grooves 22U and second projections 22T, whereas the grooves and projections may overlap, Figs. 3a, 3b show the grooves and projections in various degrees of overlapping, and in Fig. 3c the rolls 21, 22 are pushed away so that there is no overlapping of the grooves 21U, 22U and the projections 21T, 22T, the figure does not show the material strip that is situated between the rolls 21, 22. Fig. 3a shows a situation where the rolls 21 and 22 are pushed together so that the maximum degree of overlapping is reached and the maximum value of the crimping parameter CI is achieved. The term "crimping parameter" used in the present description is understood as the distance over which adjacent fragments of the material are pulled apart when the material
- 40 45 50 55

strip is crimped or incised. The crimping parameter is dependent on the degree of overlapping of the circumferential projections and grooves of the rolls of the mechanism for crimping or incising the material strip. **Fig. 3b** shows a situation where the rolls **21**, **22** are to some extent pulled apart and the crimping parameter **CI'** is smaller than the maximum parameter **CI**. The widths **U** of the grooves **21U**, **22U** and the thicknesses **T** of the projections **21T**, **22T** can be selected so as to incise the material strip **3** or to crimp the material strip **3**. **Fig. 4** shows a cross-section through the first roll **21** and the second roll **22** which are provided with rounded projections and grooves adapted to crimp the strip of the filling material **3**.

[0024] In the first embodiment shown in **Fig. 2a**, the mechanism **4** for crimping or incising the material strip **3** comprises a carrying mechanism **31** and a setting mechanism **32**. The carrying mechanism **31** comprises a lever **23** with a rotation axis **n** and a coupling roll **24** with a rotation axis **s** mounted on the lever **23**. On the carrying mechanism **31**, a first roll **21** with a rotation axis **k** is mounted. The mechanism **4** for crimping or incising the material strip comprises the first roll **21** and the second roll **22** which rotate concurrently, whereas the drive elements are not shown in the figure. The first roll **21** is movable, the position of the rotation axis **k** of the first roll **21** may change, the second roll **22** is stationary, the position of the rotation axis **m** of the second roll **22** does not change. The first roll **21** is mounted on a lever **23** on a first arm **23a** of the length **a**. The coupling roll **24** is mounted on the lever **23** on the arm **23b** of the length **b**, the swinging movement of the lever **23** being carried out by the pressure of the setting mechanism **32** on the coupling roll **24**. The movement of the setting mechanism **32** forces an alteration of the position of the carrying mechanism **31**. In this embodiment, the setting mechanism **32** comprises a cam **26** rotary mounted on the axis **c**. The cam **26** of the setting mechanism **32** is in contact with the carrying mechanism **31** at the coupling point **A** which may be the point at which the coupling roll **24** rolls over the cam **26**, whereas a sliding contact may be provided at the coupling point **A** when the lever **23** slides over the cam **26**. The carrying mechanism **31** may comprise a spring **25** or another element or mechanism that provides a contact between the carrying mechanism **31** and the setting mechanism **32**, in the present embodiment the spring **25** provides the pressure of the roll **24** against the cam **26**, and the rotational movement of the cam **26** of the setting mechanism **32** provides a swinging movement of the lever **23**, which alters the degree of overlapping of the grooves **21U**, **22U** with the projections **21T**, **22T**. **Fig. 2a** shows the position of the cam **26** for which the distance **d** between the axis **k** of the first roll **21** and the axis **m** of the second roll is the smallest, which corresponds to the maximum value of the crimping parameter **CI** marked in **Fig. 3a**, in practice the maximum used value of the crimping parameter **CI** is about 1mm. The push-away mechanism **36**, discussed further below, alters the position of

the carrying mechanism **31** so that the distance **d** from the axis **k** of the first roll **21** to the axis **m** of the second roll **22** is altered independently of the position of the setting mechanism **32**. **Fig. 2b** shows the cam **26** after a rotation by a certain angle so that the lever **23** has been rotated and the distance from the axis **k** of the first roll **21** to the axis **m** of the second roll **22** is **d'**, where **d' > d**. In **Fig. 2a**, **Fig. 2b** and **Fig. 2c** there are indicated the setting ranges **Z1**, **Z2** of the setting mechanism **32** with respect to the working surface of the cam **26**, whereas the setting of the crimping parameter **CI** in the range from 0mm to 1mm is provided when the coupling roll **24** is in contact with the cam **26** in the first setting range **Z1**. In both **Fig. 2a** and **Fig. 2b**, the coupling roll **24** is in contact with the cam **26** in the first setting range **Z1**, i.e. the coupling point **A** lies in the first setting range **Z1**. In **Fig. 2c**, the cam **26** has been rotated so that the coupling point **A** lies in the second setting range **Z2**, and the lever **23** has been rotated so that the distance of the axis **k** of the first roll **21** to the axis **m** of the second roll **22** is **d''**, where **d'' > d' > d**. The position of the first roll **21** relative to the second roll **22** is such that the projections **21T** are pulled out from the grooves **22U**, and the projections **22T** are pulled out from the grooves **21U** as shown in **Fig. 3c**. In this way, the altered quality section **J** of the material strip **3** can move between the rolls **21**, **22** without incising, for example the section **J** can have a double thickness as a result of splicing of two consecutive material strips **3** after changing the bobbin **15**. The mechanism **4** for incising or crimping the material strip **3** can be provided with a detection unit **40** for detecting dirt. In the embodiment shown, the detection unit **40** is situated at the second roll **22** and comprises a rotary mounted scraper **41** which is provided with two stable positions. The scraper **41** has a comb shape corresponding to the shape of the grooves **22U** and the projections **22T**. A spring **42** holds the scraper **41** in the working position as shown in **Fig. 2c**. When it is detected that the groove **22U** is contaminated with glue or with fragments of the material **3**, the scraper **41** is rotated, the scraper **41'** after rotation is shown with a dashed line, its position being detected by the sensor **43**, whereas the signal from the sensor **43** can be used to stop the machine. Thus, it is possible that if the rolls **21**, **22** are not pushed away fast enough and the grooves of the second roll **22** are contaminated with the material or the glue from the section **J**, the operation of the machine will be interrupted.

[0025] In the second embodiment shown in **Fig. 5a**, the carrying mechanism **31'** comprises the lever **23** with a rotation axis **n** on which the coupling roll **24** is mounted. The push-away mechanism **36** comprises an actuator **28** whose piston rod is articulated with the lever **23**, in the embodiment shown, the actuator **28** is connected to the end of the lever **23** opposite to the rotation axis **n** of the carrying mechanism **31'**, whereas different connection points for the actuator **28** are possible. The setting mechanism **32** comprises the rotary cam **26** similar to the first embodiment. The actuator **28** presses the coupling roll

24 against the cam **26**. The actuator **28** is part of the push-away mechanism **36** and has the function of deflecting the lever **23** in the event that the altered quality section **J** of the material strip appears. When the push-away mechanism **36** in **Fig. 5b** is actuated, the lever **23** is rotated so that the coupling roll **24** is not in contact with the cam **26** and the distance d''' between the axis **k** of the first roll **21** and the axis **m** of the second roll **22** is greater than the distance d'' and ensures that the projections **21T**, **22T** and the grooves **21U**, **22U** are pushed away to a greater extent than in the first embodiment, where the first roll **21** is pushed away by the cam **26**. The actuation of the push-away mechanism **36** can be carried out for any position of the cam **26**. After the actuation of the push-away mechanism **36**, the altered quality section **J** of the material strip **3** can move between the rolls **21**, **22** without incising or crimping.

[0026] The apparatus in the third embodiment shown in **Fig. 6a**, **6b**, **6c** is built similar to the apparatus in the second embodiment, whereas the lever **23** is a flexible lever, the axis **k** of the first roll **21** is mounted on the arm **23a**, and the coupling point **A** is arranged on the arm **23b** situated perpendicular to the arm **23a**. The arm **23a** has a length **a** and the arm **23b** has a length **b**. As in the first embodiment, the first setting range **Z1** and the second setting range **Z2** are marked in relation to the working surface of the cam **26**, the setting of the crimping parameter **CI** in the range from 0mm to 1mm being provided when the coupling roll **24** is in contact with the cam **26** in the first setting range **Z1**. In **Fig. 6c**, the first roll **21** and the second roll **22** have been pushed away after the actuation of the push-away mechanism **36**.

[0027] The apparatus in the fourth embodiment shown in **Fig. 7a**, **7b** comprises a setting mechanism **32'** which is provided with a cam **29** adapted to perform a linear movement in the direction **P**, whereas a drive element for moving the cam is not shown. The working surface **29A** of the cam **29** causes an alteration of the position of the coupling roll **24** and an alteration of the distance between the axis **k** of the first roll **21** and the axis **m** of the second roll **22**. As in the preceding embodiments, the setting mechanism **32'** allows precise setting of the distance between the axes of the rolls and setting of the crimping parameter **CI**. In **Fig. 7a**, the coupling roll **24** has a coupling point **A** with the cam **29** in the first setting range **Z1**. **Fig. 7b** shows the cam **29** having been displaced by a certain value so that the coupling point **A** of the coupling roll **24** also lies in the first setting range **Z1**, whereas the lever **23** is rotated so that the distance between the axis **k** of the first roll **21** and the axis **m** of the second roll **22** is d' , where $d' > d$, whereas, as in the preceding embodiments, the first setting range **Z1** corresponds to the setting of the crimping parameter **CI**. After a further displacement of the cam **29**, the coupling point **A** will be in the second setting range **Z2** for which the projections and grooves of the rolls **21** and **22** do not overlap. Complete pushing away of the rolls **21** and **22** can be carried out by a pulling movement of the actuator

28 in the push-away mechanism **36**.

[0028] The apparatus in the fifth embodiment shown in **Fig. 8a**, **8b** comprises the setting mechanism **32'** which is provided with the cam **29** as in the previous embodiment, whereas a precise mechanism with a pulling screw **33** and a nut **34** is used to perform the linear movement of the cam **29**. In this embodiment, the cam **29** is slidably linearly mounted. The working surface **29A** of the cam **29** is adapted to alter the position of a slide member **35**, whereas the movement of the slide element **35** causes an alteration of the position of the lever **23**. The first setting range **Z1** and the second setting range **Z2** are the same as in the fourth embodiment.

[0029] The apparatus in the sixth embodiment shown in **Fig. 9a**, **9b** comprises the carrying mechanism **31** and a setting mechanism **32''**. The setting mechanism **32''** comprises a lever **27** which is rotary mounted on the axis **r**. The end of the lever opposite the axis of rotation **r** is displaced by means of a screw mechanism **30**. The first setting range **Z1** and the second setting range **Z2** refer to the angular position of the lever **27**. The proportion of the length **b** to **a** determines the ratio of the carrying mechanism **31**, the ratio may be in the range 20:1 to 5:1, preferably 10:1. The proportion of the length **f** to **e** determines the ratio of the setting mechanism **32''**, the ratio may be in the range 20:1 to 5:1, preferably 10:1.

Claims

1. A mechanism (4) for crimping or incising a material strip (3) comprising two rotary mounted rolls (21, 22) provided with circumferential grooves (21U, 22U) and projections (21T, 22T), whereas the rotation axis (k) of the first roll (21) and the rotation axis (m) of the second roll (22) are situated parallel to each other, width (T) of the first projections (21T) of the first roll (21) is adapted to width (U) of the second grooves (22F) of the second roll (22), and width (T) of the second projections (22T) of the second roll (22) is adapted to width (U) of the first grooves (21U) of the first roll (21), the first roll (21) being settable relative to the second roll (22) so as to alter the distance (d) between the rotation axis (k) of the first roll (21) and the rotation axis (m) of the second roll (22),
characterised by
 comprising a carrying mechanism (31) provided with a lever (23) having a rotation axis (n) on which the first roll (21) is mounted, and a setting mechanism (32, 32', 32'', 32''') coupled with the carrying mechanism (31) so that altering the position of the setting mechanism (32, 32', 32'', 32''') causes an alteration of the position of the lever (23) to alter the distance (d) between the rotation axes (k, m) of the rolls (21, 22), the rotation axis (k) of the first roll (21) being situated on a first arm (23a) and the point of coupling (A) the lever (23) with the setting mechanism (32, 32'', 32''', 32''') is situated on a second arm (23b).

2. The mechanism as in claim 1, **characterised in that** it comprises a push-away mechanism (36) for altering the position of the carrying mechanism (31) so that the distance (d) of the axis (k) of the first roll (21) to the axis (m) of the second roll (22) is altered independently of the position of the setting mechanism (32, 32', 32'', 32''').
3. The mechanism as in claim 2 or 3, **characterised in that** the push-away mechanism (36) comprises an actuator (28) acting on the lever (23) of the carrying mechanism (31) so that the carrying mechanism (31) is uncoupled from the setting mechanism (32, 32', 32'', 32''') and the distance between the axes of the rolls (21, 22) is increased so that there is no overlapping of the first roll (21) and the second roll (22).
4. The mechanism as in claim 1 or 3, **characterised in that** the setting mechanism (31) is provided with two setting ranges, whereas in the first setting range (Z1) it causes an alteration of the distance (d) between the axes (k, m) of the rolls (21, 22) and an alteration of the degree of overlapping of the projections (21T, 22T) and the grooves (21U, 22U), and in the second setting range (Z2) it causes an alteration of the distance (d) between the axes (k, m) of the rolls (21, 22) so that the projections (21T, 22T) and the grooves (21U, 22U) are pushed away so that there is no overlapping of the first roll (21) and the second roll (22).
5. The mechanism as in any of the claims 1 to 4, **characterised in that** the setting mechanism (32, 32', 32'') is a cam mechanism.
6. The mechanism as in claim 5, **characterised in that** the setting mechanism comprises a rotatably mounted cam (26).
7. The mechanism as in claim 5, **characterised in that** the setting mechanism comprises a slidably linearly mounted cam (29).
8. The mechanism as in any of the claims 5 to 7, **characterised in that** at the coupling point (A) the lever (23) is provided with a coupling roll (24) which is in contact with the cam (26, 29).
9. The mechanism as in any of the claims 1 to 8, **characterised in that** at one of the rolls (21, 22) there is arranged a detection unit (40) for detecting dirt in the grooves (21U) of the first roll (21) or the grooves (22U) of the second roll (22), the detection unit (40) being provided with a movable scraper (41) adapted to alter its position when dirt is detected.
10. The mechanism as in any of the claims 1 to 9, **characterised in that** the ratio of the carrying mechanism (31) is in the range 20:1 to 5:1, preferably 10:1.
11. The mechanism as in any of the claims 1 to 10, **characterised in that** the ratio of the setting mechanism (32) is in the range 20:1 to 5:1, preferably 10:1.
12. An apparatus (1) for manufacture of tobacco industry rods, comprising a feeding apparatus (2) for feeding a material strip (3) adapted to continuously feed the material strip (3), provided with a splicing device (17) for splicing consecutive sections of the material strip (3), a mechanism (4) for crimping or incising the material strip (3), a compacting apparatus (5) for pre-compacting the material strip (3), a supplying unit (10) for feeding the wrapping material (11), a forming apparatus (8) for forming a continuous rod (CR), a cutting head (9) for cutting the continuous rod (CR) into rods (R), a controller (18), **characterised in that** the apparatus is provided with a mechanism (4) for crimping or incising the material strip (3) as in any of claims 1 to 11, whereas the controller (18) of the rod manufacturing apparatus (1) transmits a signal of splicing sections of the material strip (3) as a result of the actuation of the splicing device (17) or of a variation in the quality of the material strip (3) so as to alter the distance (d) between the axes of the rolls (21, 22) in the mechanism (4) for crimping or incising the material strip (3).
13. A method of controlling the mechanism (4) for crimping or incising a material strip (3) on the machine (1) for the manufacture of tobacco industry rods, comprising steps wherein, in normal operation, the crimping parameter (CI) and the corresponding degree of overlapping of the grooves (21U, 22U) and the projections (21T, 22T) of the first roll (21) and the second roll (22) are determined, and in the case of a signal of splicing of sections of the material strip (3) or a signal of a variation in the quality of the material strip (3), the first roll (21) is pushed away from the second roll (22) so that there is no overlapping of the rolls (21, 22).

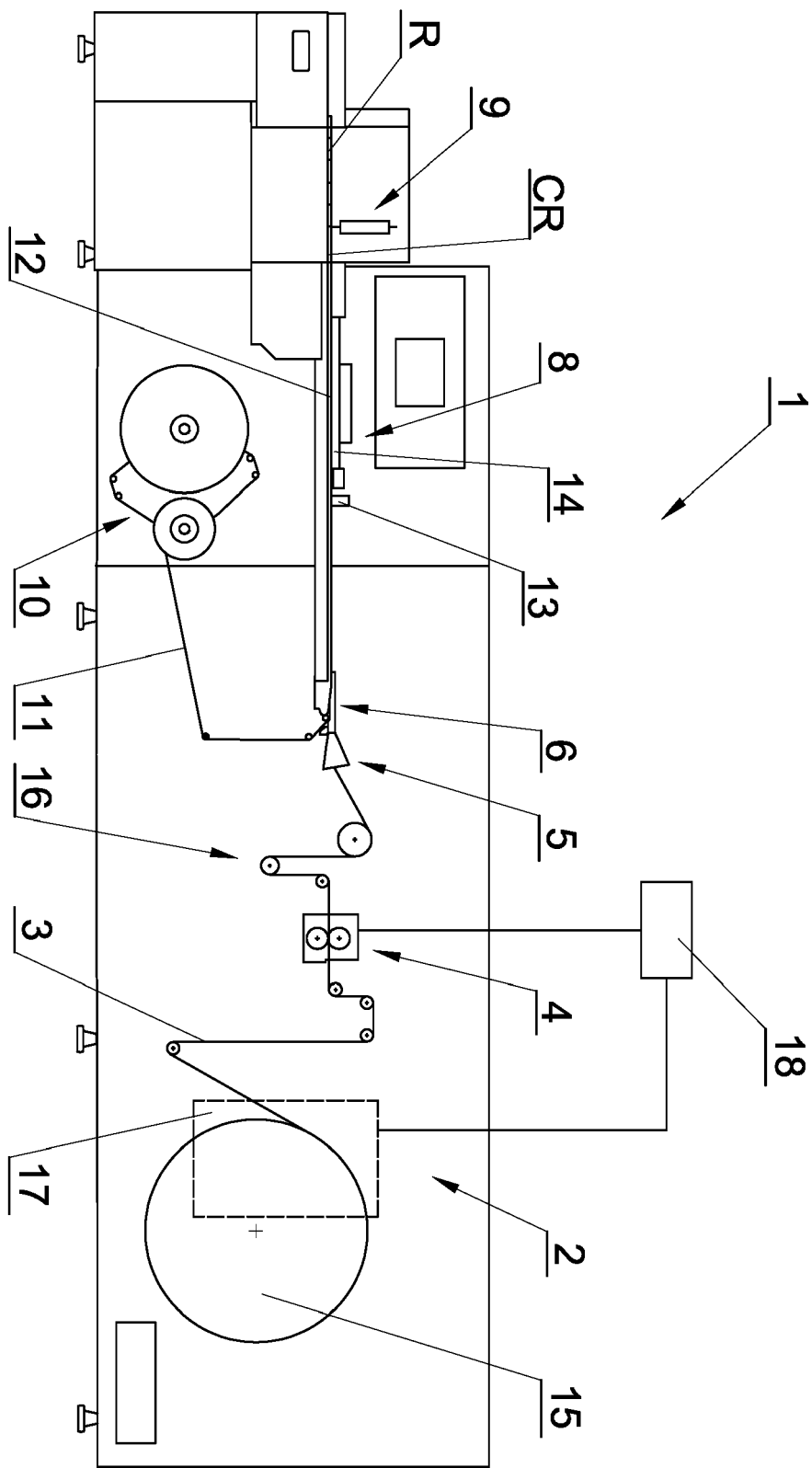


Fig. 1

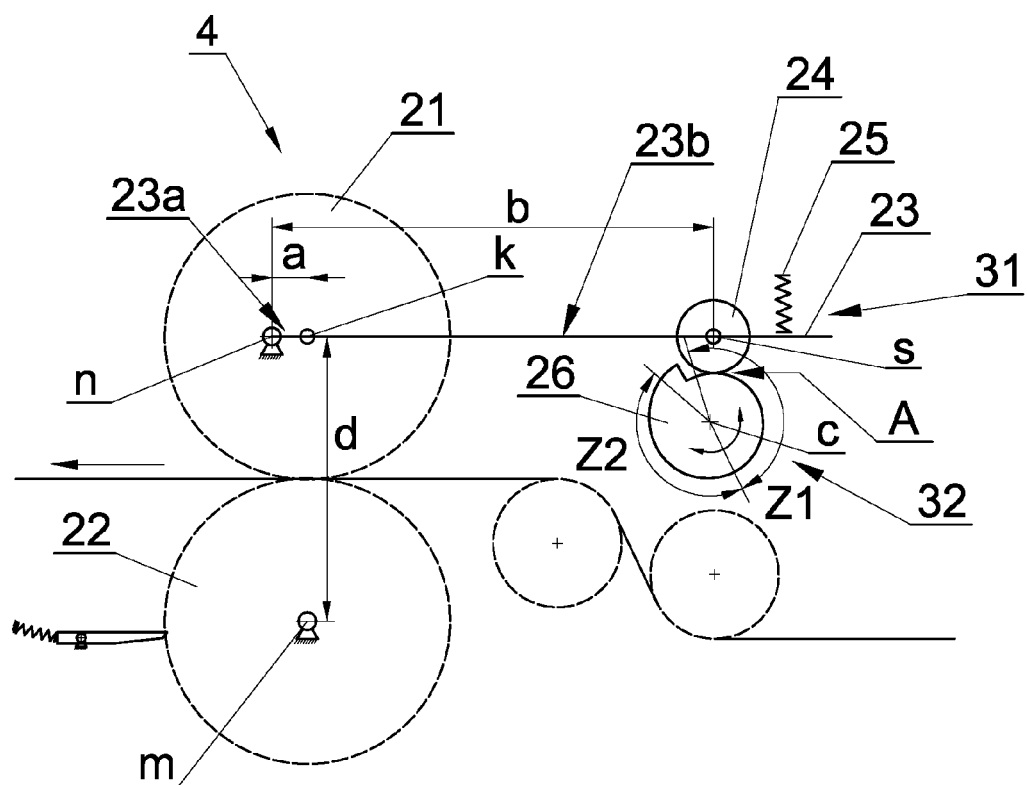


Fig. 2a

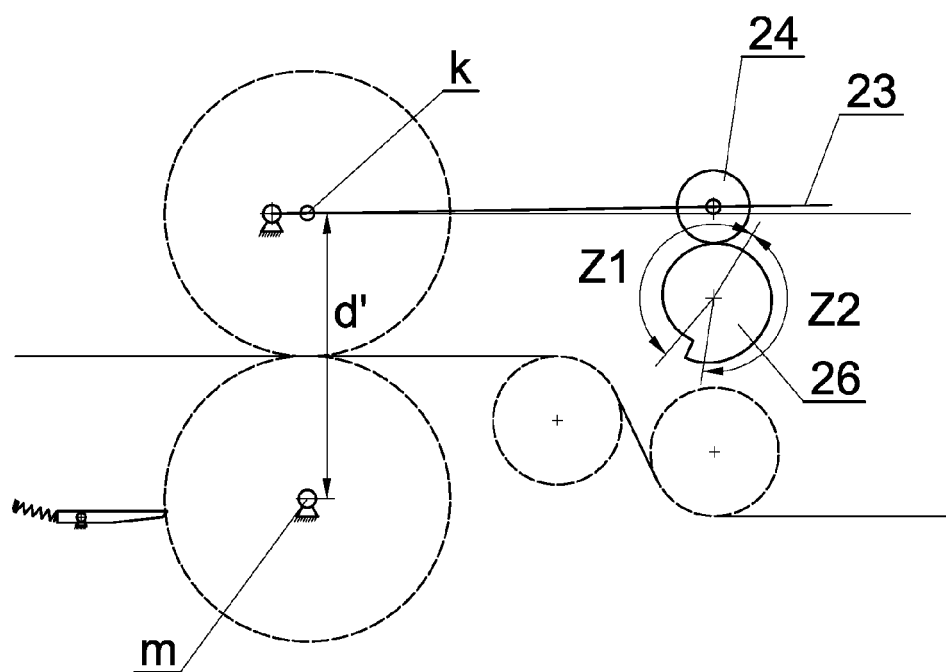


Fig. 2b

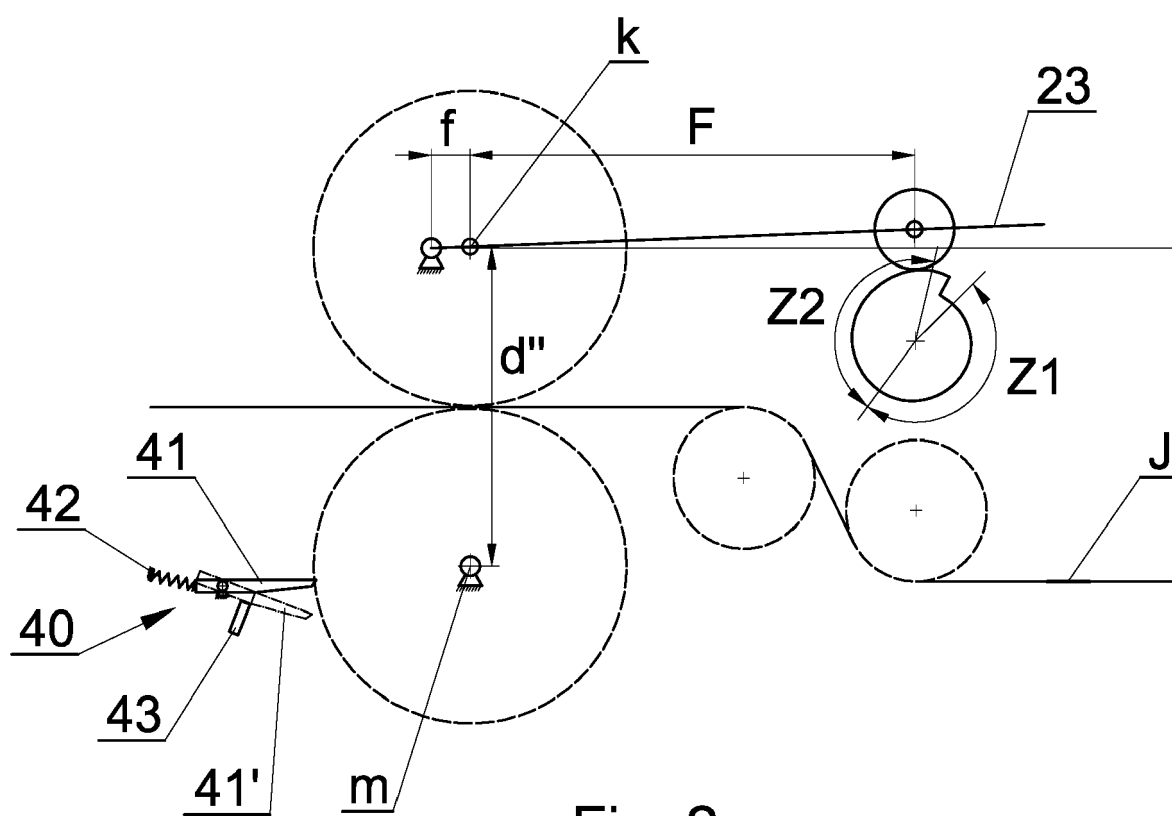


Fig. 2c

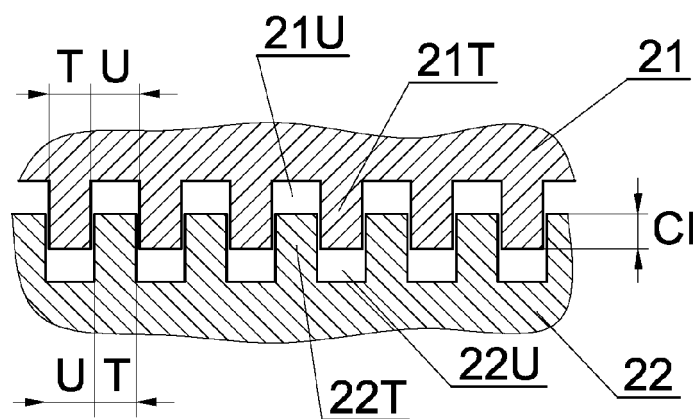


Fig. 3a

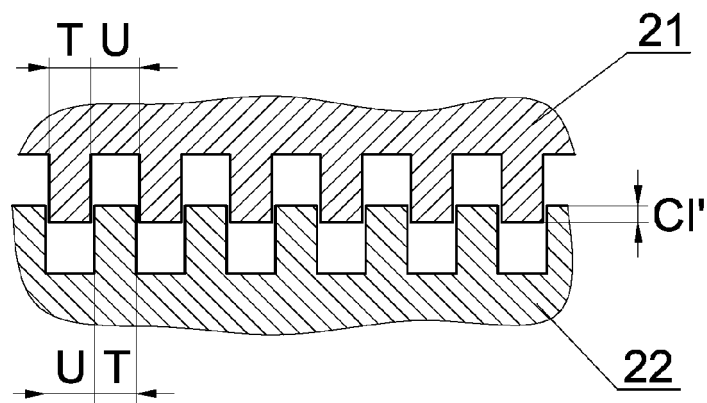


Fig. 3b

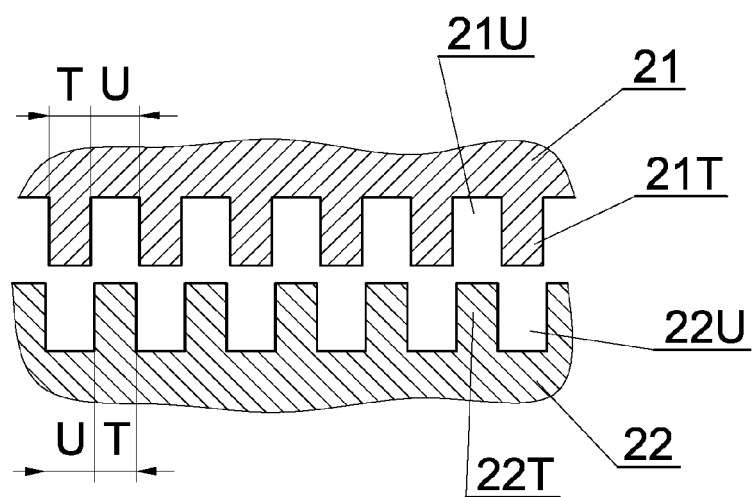


Fig. 3c

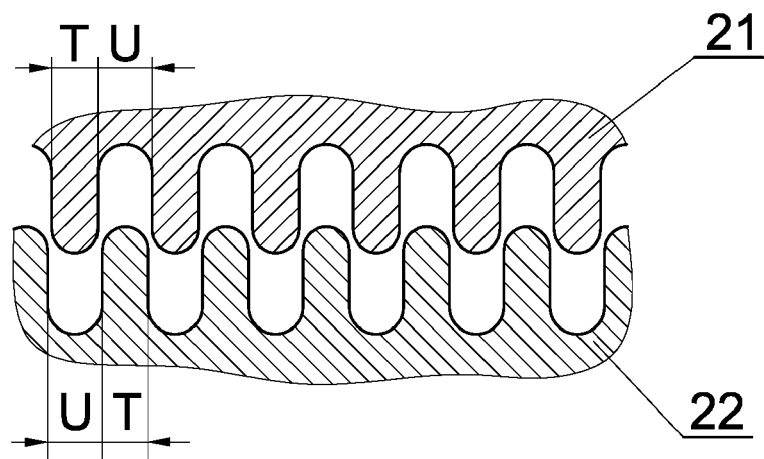


Fig. 4

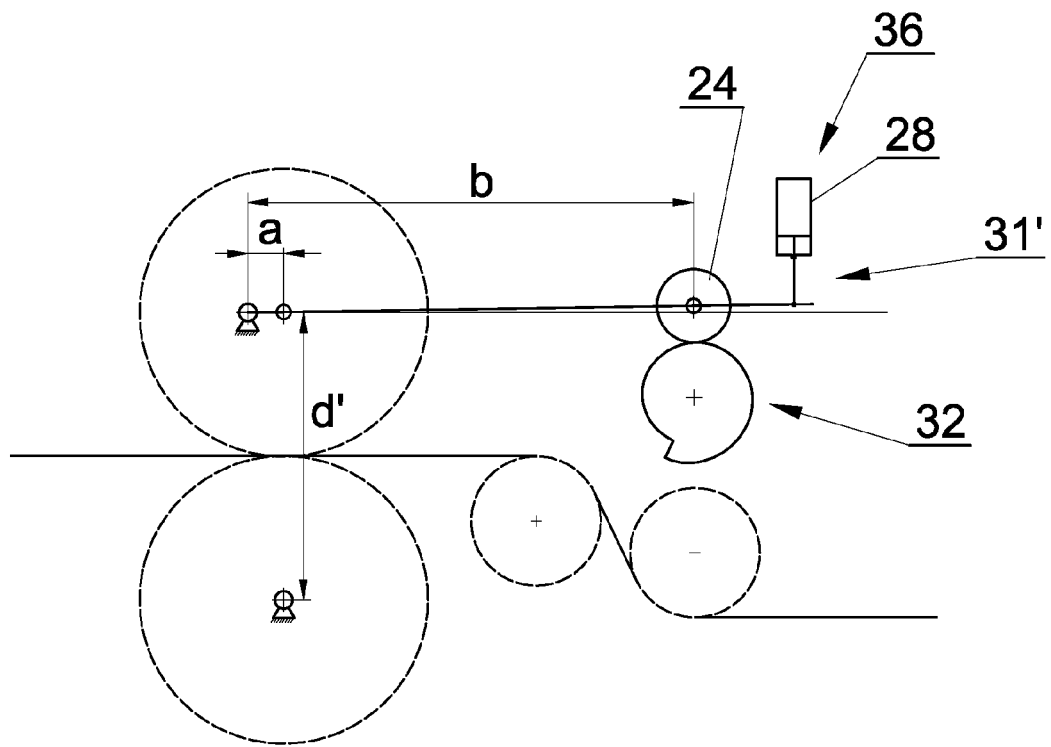


Fig. 5a

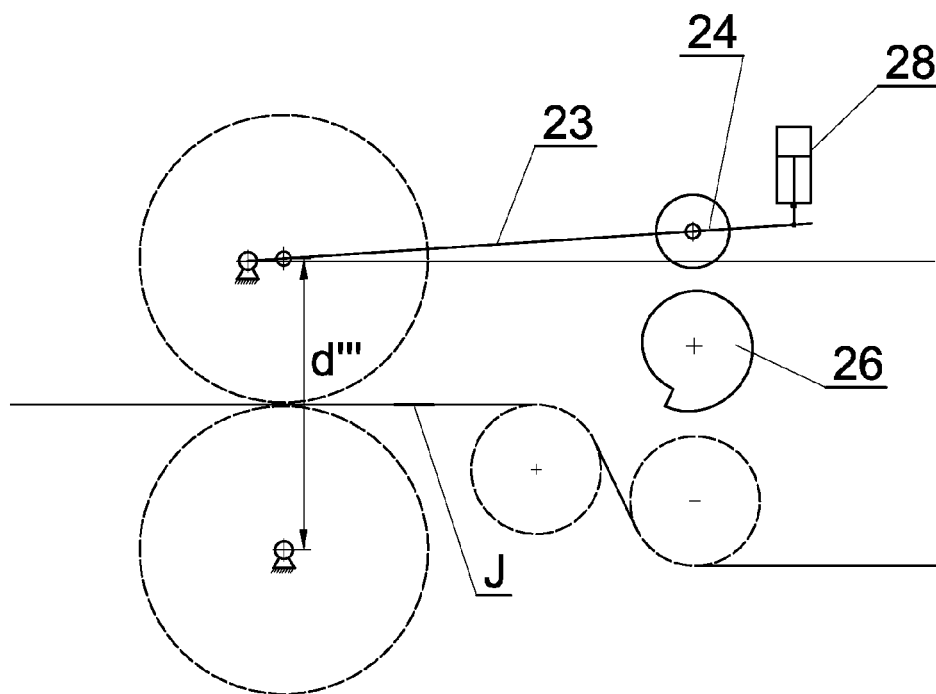


Fig. 5b

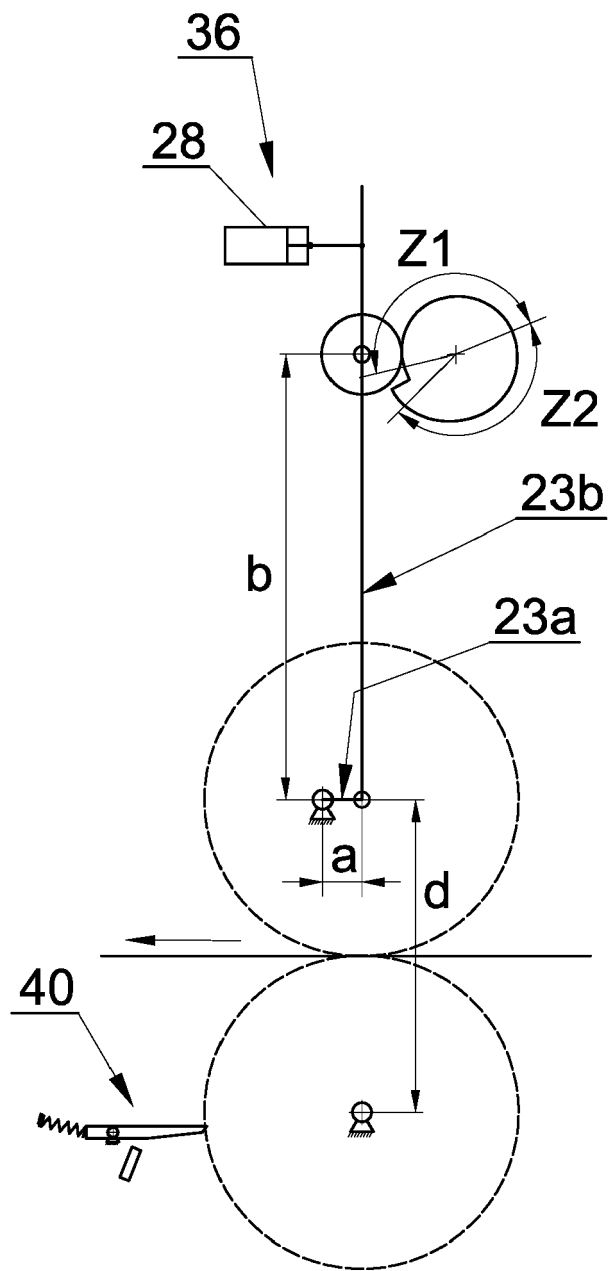


Fig. 6a

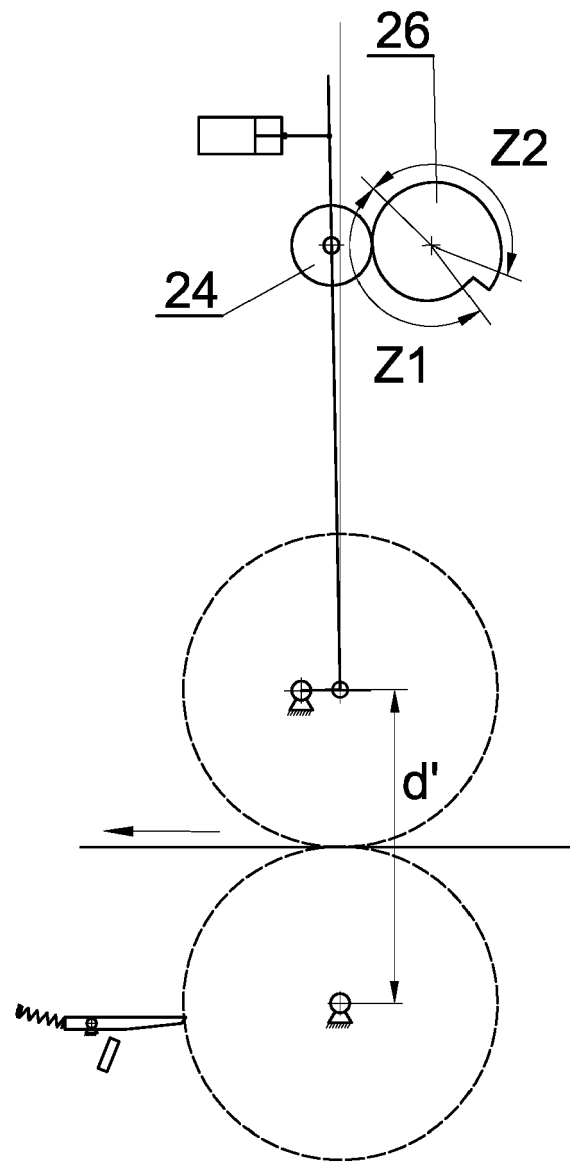


Fig. 6b

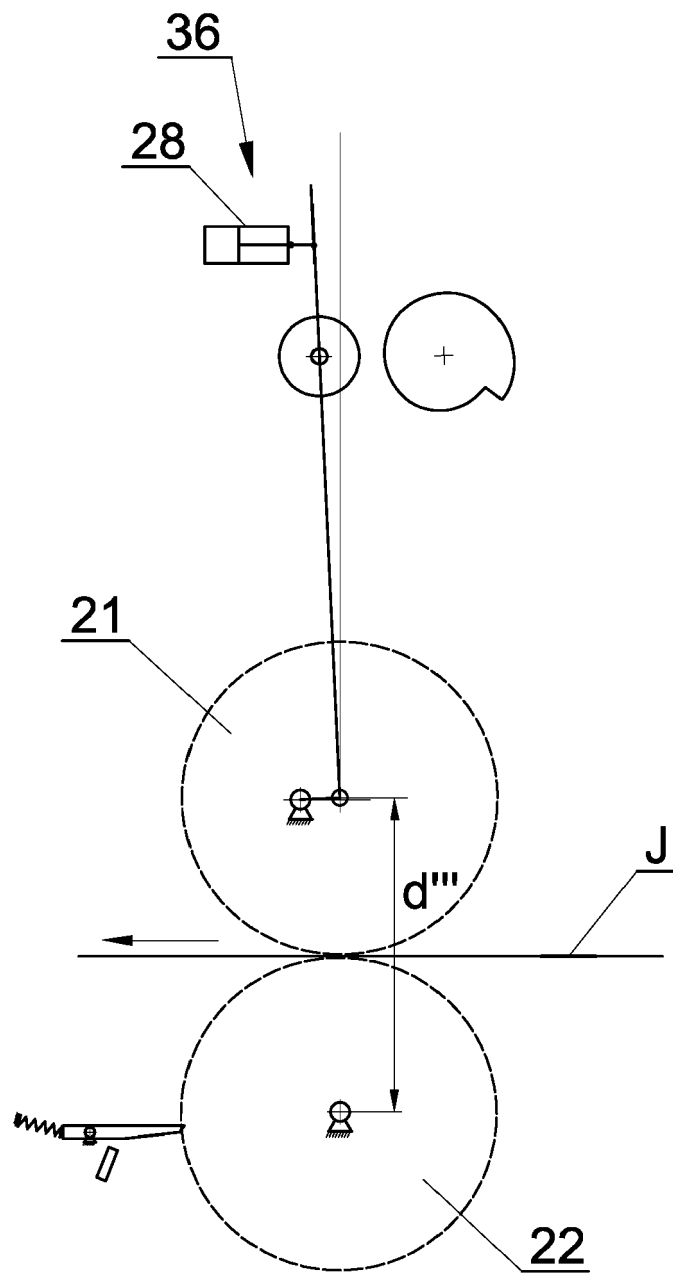


Fig. 6c

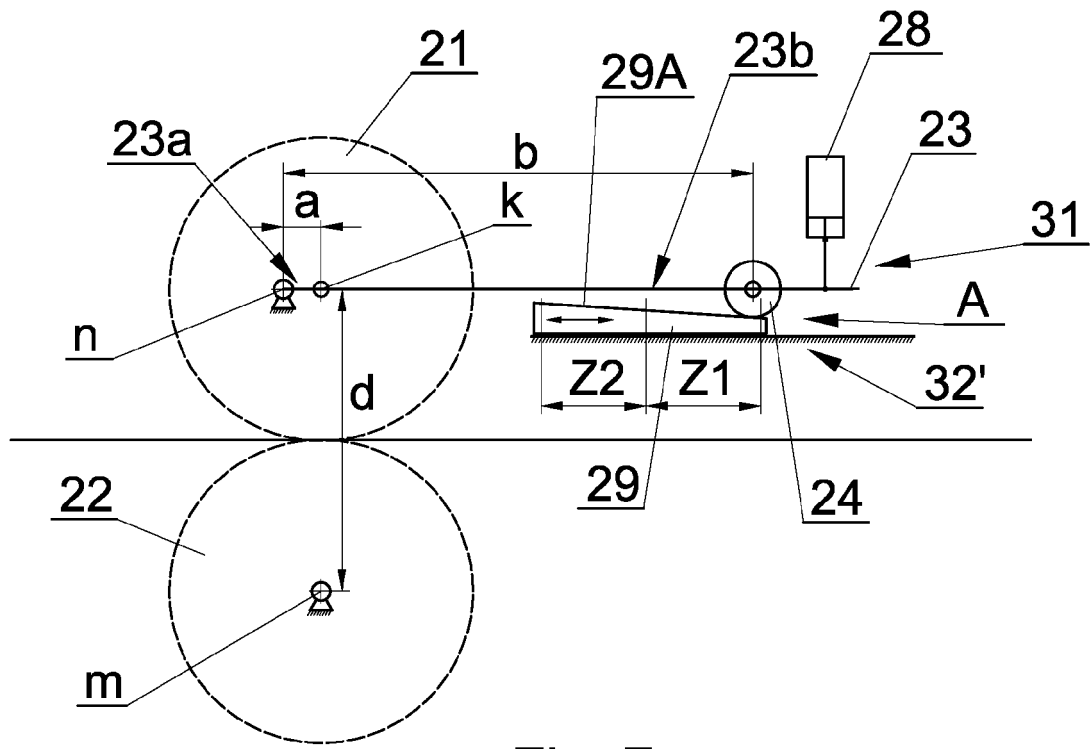


Fig. 7a

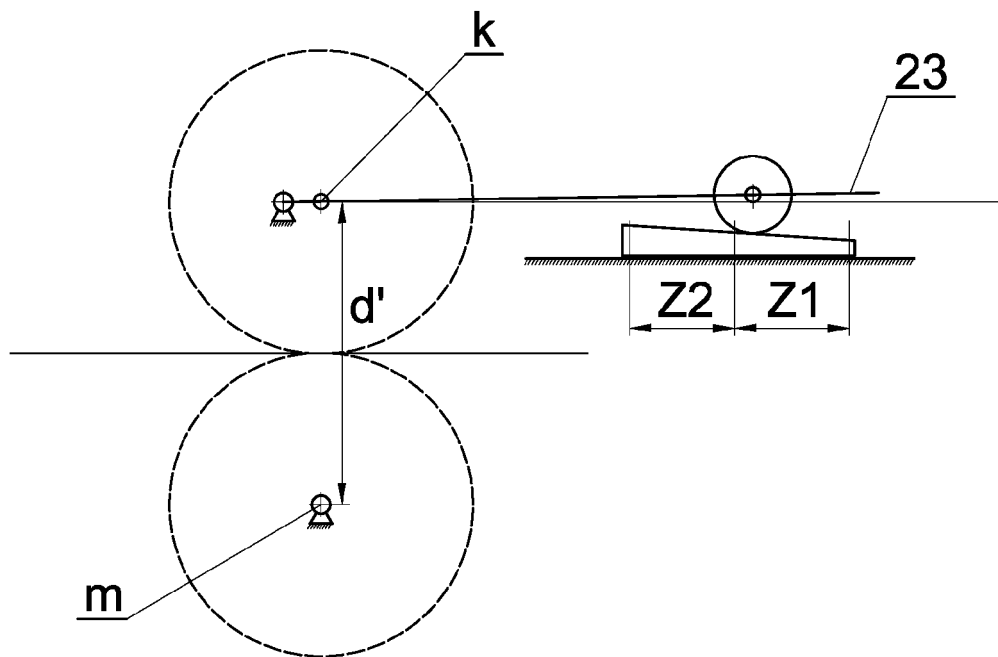


Fig. 7b

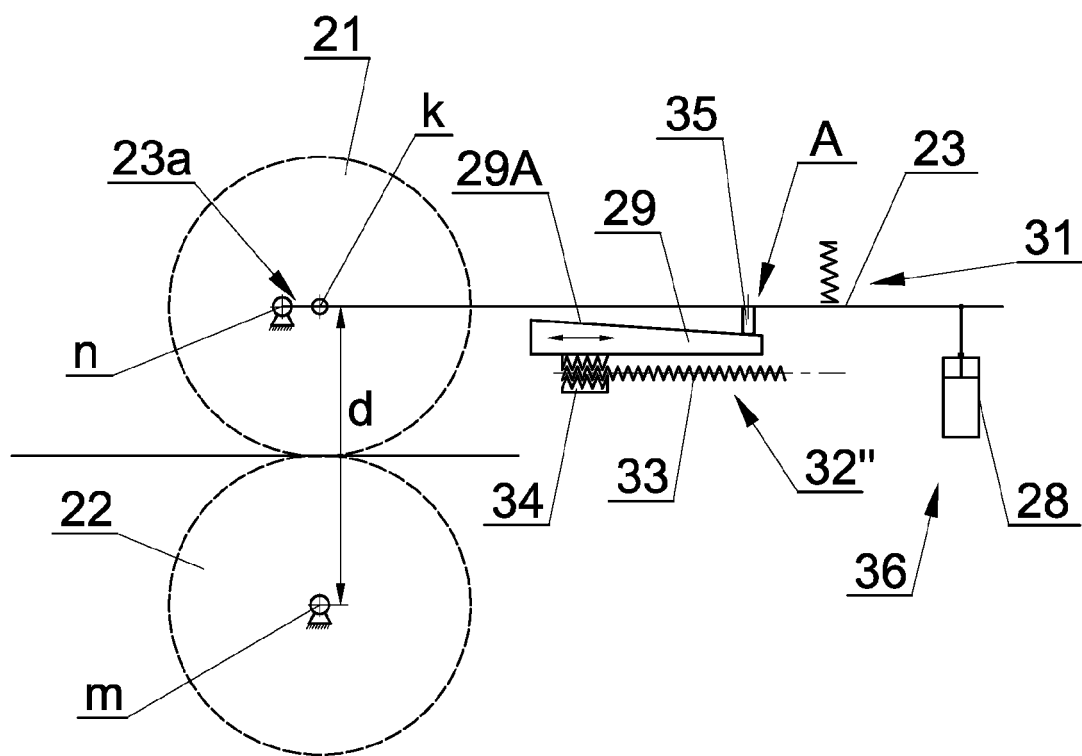


Fig. 8a

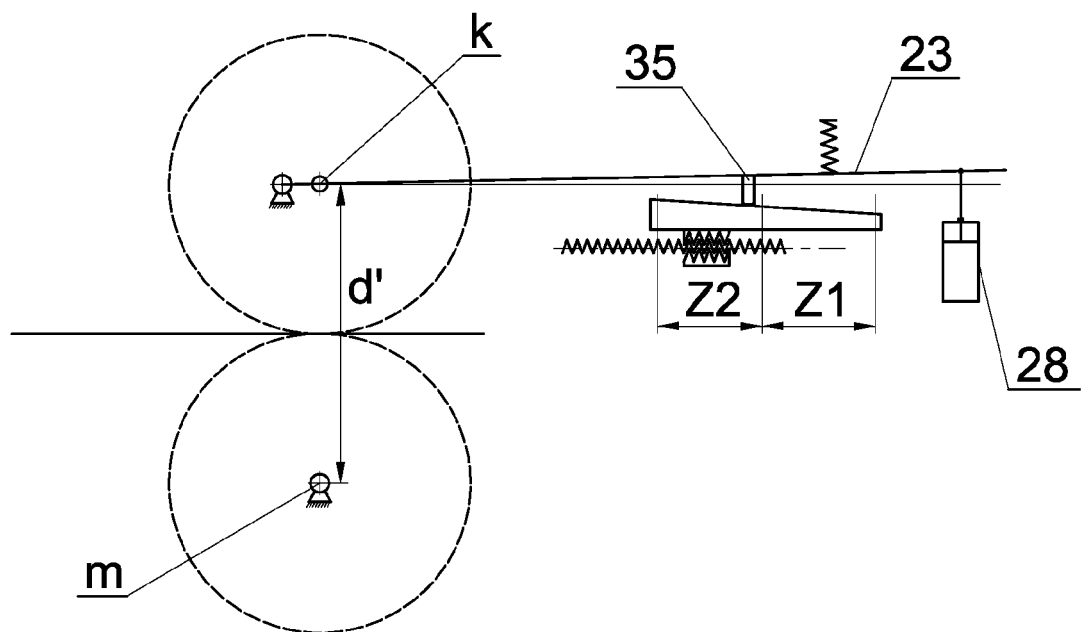


Fig. 8b

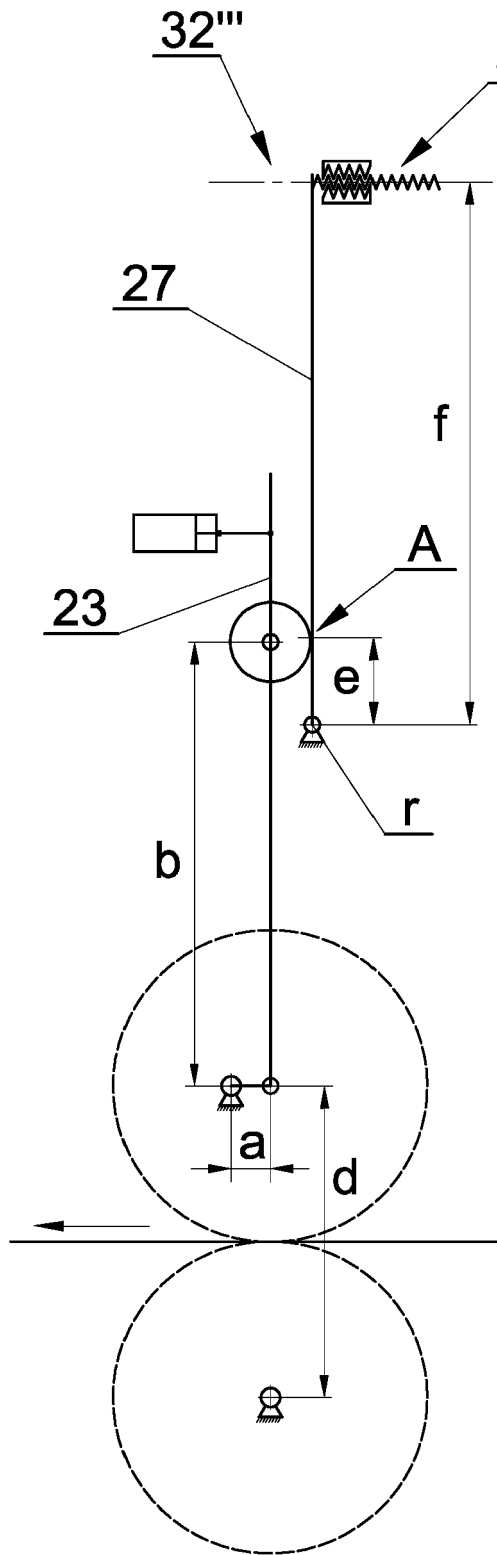


Fig. 9a

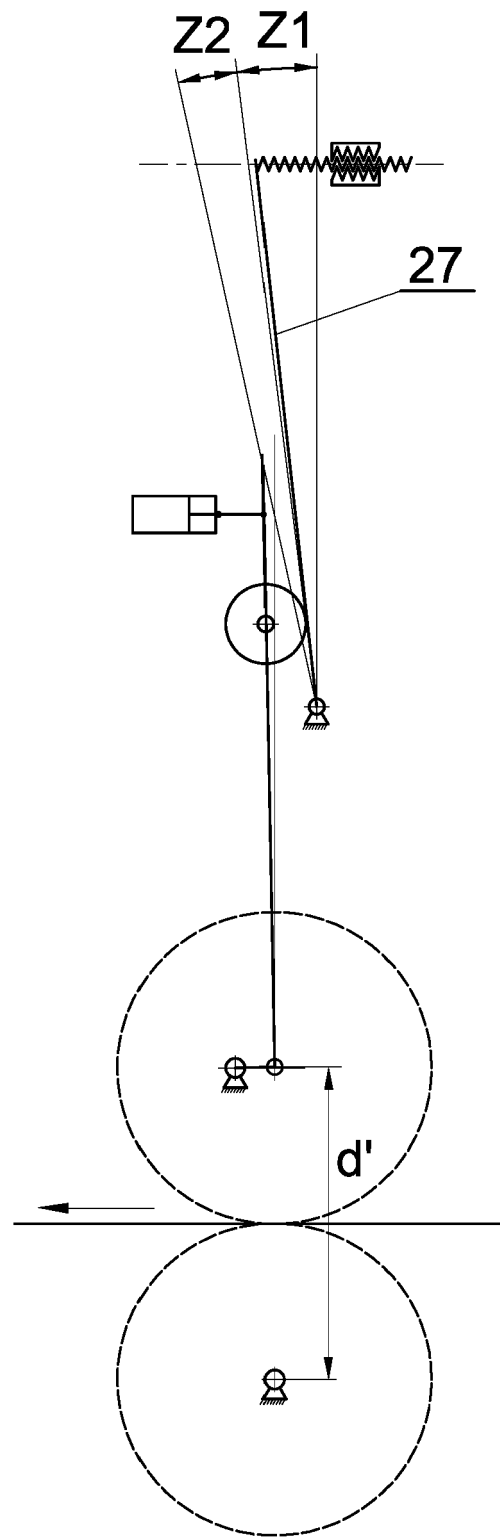


Fig. 9b



EUROPEAN SEARCH REPORT

Application Number

EP 23 16 4806

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2019/158333 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 22 August 2019 (2019-08-22)	1, 5-8, 10, 11	INV.
A	* abstract; figures 1-6 *	2-4, 9, 12, 13	A24C5/01
	* page 1, line 21 - line 30 *		A24D3/02
	* page 9, line 13 - page 13, line 21 *		

A	US 2023/031707 A1 (BERTOLDO MASSIMILIANO [IT] ET AL) 2 February 2023 (2023-02-02)	1-13	
	* abstract; figures 1-5 *		
	* paragraph [0131] - paragraph [0132] *		
	* paragraph [0138] *		
	* paragraph [0144] - paragraph [0145] *		

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			A24F
			A24D
The present search report has been drawn up for all claims			

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EPO FORM 1503 03.82 (P04C01)

Place of search	Date of completion of the search	Examiner
Munich	7 September 2023	Alaguero, Daniel
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