

Apparatus for the application of rivets, buttons or the
like

5 The invention relates to an apparatus for the application of rivets, buttons or the like, having a top tool and a bottom tool, the top tool being preferably push-rod actuatable, and one tool executing a yielding movement during the riveting operation.

10 An apparatus of the type in question is known, for example, from DE 44 31 948 A1. The contents of this patent application are hereby also included in full in the disclosure of the present invention, also for the purpose of including features of this patent

15 application in claims of the present invention. In this patent application, there is described an apparatus in which a top end of a push rod, which can actuate the top tool, is spring-loaded against a circumferential surface of a cam plate mounted axially on a drive shaft

20 of a motor. The rivets, buttons or the-like which are to be applied each comprise a top article part and a bottom article part. These top parts and bottom parts are stored in separate magazines and pass out of the magazines, by way of feed rails, into the region of a

25 loading slide. The latter can be displaced horizontally and is provided with a top push-in strip and a bottom push-in strip. The top push-in strip brings in each case one top article part into a retaining gripper associated with the top tool, while the bottom push-in

30 strip moves the bottom article parts into the region of the bottom tool, into alignment with respect to the top part. The bottom tool is mounted such that it can be pivoted on a pin, mounted in a mounting plate, such that, for the purpose of riveting the top part and the

35 bottom part to a textile, the bottom tool engages against the underside of the textile by way of the bottom article part, which is disposed in the bottom tool. The bottom article part is provided with teeth, which act on the underside of the textile and pass

40 through the latter. Depending on the thickness of the

textile, the bottom tool can execute a yielding movement to a greater or lesser extent against a compression spring during the riveting operation, in that it pivots out about the bearing pin.

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As regards the abovedescribed state of the art, a technical problem of the invention is to provide an apparatus of the type in question which, while maintaining the tried-and-tested basic form, is distinguished by improved control possibilities, correct riveting and high functional reliability.

15 This problem is solved first and foremost by the subject matter of Claim 1, this being based on the fact that the extent of the yielding movement is used for the purpose of monitoring the riveting operation. As a result of this configuration, there is provided an apparatus for the application of rivets, buttons or the like, of particularly straightforward construction and high reliability. The riveting quality depends, inter alia, on the depth by which the teeth of the bottom article part penetrate into the flanged edge of the top article part, which may be a spherical or resilient part. In this case, predetermined dimensions, so-called pinch-setting dimensions, are not to be exceeded. Upon 25 riveting of a top article part and bottom article part into textiles with one or more layers, one tool yields back to a greater or lesser extent in a spring-force actuated pressure-compensation arrangement. The length of the yielding-movement path may be used as a measure of the strength of the riveting. Preferred in this case is an arrangement in which the extent of the yielding movement of the bottom tool is used for monitoring purposes. By sensing the extent of the yielding 30 movement, there is provided monitoring which, for example, by way of a display, informs the user as to whether the depth by which the teeth of the bottom article part penetrate into the flanged edge of the top article part is sufficient. It may thus be provided

that when a predetermined dimension is exceeded, a fault signal is emitted. A configuration in which the applying machine is stopped is preferred. Thus the user is given a signal to check the riveting which has been carried out and, if appropriate, to repeat it. In a development of the subject matter of the invention, it is further provided that the path of movement of the bottom tool is sensor-monitored. In this case, it is possible, for example, for a measuring sensor to be provided on a pressure-compensation means of the bottom tool, provided in the form of a spring assembly, which measuring sensor is capable, in conjunction with an evaluation circuit, of reliably indicating whether the depth by which the teeth of the bottom article part penetrate into the flanged edge of the top article part is sufficient. This allows conclusions to be drawn as to the pinch-setting dimension which is to be observed, this pinch-setting dimension corresponding to the spacing between top side and underside of the rivet or the like, once riveting has taken place. It may alternatively be provided that upon exceeding a predetermined dimension, the bottom tool actuates a switch. This switch may be formed as a contact switch or a proximity switch. If the predetermined maximum dimension is observed, then a switch which acts in the path of movement of the bottom tool is not actuated. The riveting is correct in relation to the permissible pinch-setting dimension. If, on the other hand, for example a multi-layered material whose thickness causes the predetermined dimension to be exceeded is processed, then the switch, which is directed into the path of movement, is actuated by the bottom tool, for example a contact switch is actuated by the bottom tool. This switch actuation preferably causes the applying apparatus to stop. The reliability of the measuring equipment depends to a great extent on the calibration following a tool/die change, following an article change with the bottom article part having a different tooth length, or following a flanging

pressure adjustment. It is thus necessary to allow as straightforward as possible a calibration, for example by way of visual displays and with the aid of digital setpoint generators. It is thus possible to provide, for example, on the apparatus a scale or the like, with reference to which the switch which monitors the bottom tool may be aligned in accordance with the permissible pinch-setting dimension. The invention also relates to an apparatus of the type in question, the apparatus having feed rails on which rivet or button parts are conveyed. In order to achieve a reliable functioning sequence, it is provided in this case that a sensing device for the purpose of monitoring the movement of a rivet or button part is associated with at least one feed rail. This device senses the movement of the articles sliding down after the article preceding them, it being possible for sensing to take place, for example, by means of a switch or the like which is integrated in the feed rail. However, a configuration in which each feed rail is provided with a light barrier for the top article part and the bottom article part is preferred. The article which slides down after the article preceding it during an application cycle produces a voltage pulse as it passes through the light-barrier region, and this can be used, if there is no pulse, to generate a fault signal. This fault can be caused either by a part blocking or if the rivet supply in the magazine and/or in the feed rail has been used up. Accordingly, this device monitors not just the presence of articles in the feed rails, but also the movement of the articles in the feed rails. The lastmentioned point in particular allows conclusions to be drawn as to whether an article part has been removed from the monitored feed rail in previous application cycles. If this is not the case, then it is not possible either for the following parts to slide down after the part preceding them. There is no monitoring pulse, which preferably causes the applying machine to stop. For this purpose, there is further provided

according to the invention that in the case of an apparatus of the type in question in which the rivet or button part is conveyed from the feed rail into the path of a loading slide, the sensing device is disposed
5 in the feed rail such that it is spaced apart from the loading slide by the extent of a plurality of rivets or button parts. By virtue of this configuration, emptying of the respective feed rail is counteracted. If a light barrier is provided as the sensing device, then the
10 light beam is preferably aligned perpendicularly with respect to the direction of movement of the article, a light-passage opening being provided at a suitable location in the preferably hardened feed rail. Furthermore, the arrangement may be selected such that
15 feed rails are arranged to extend in parallel for the various top article parts (spherical or resilient parts), said feed rails being separate from the magazines which store said parts. In order to ensure reliable monitoring in this case, the two rails have to
20 be provided with a sensing device, preferably formed as a light barrier. However, since it is only one top article part or the other which can be processed in an application cycle, then, accordingly, it is also only the light barrier which is associated with the article
25 to be applied which is activated. One advantageous development provides that, during each riveting operation, the reaching of an end position of the loading slide is monitored. Preferred in this case is a configuration in which the front end position of the
30 loading slide is monitored. As a result, the path between the feed rails and the riveting region, i.e. the region between the top and bottom tools, is also monitored. Should, for example, an article skew as it is conveyed from the feed rails into the riveting
35 region by means of the loading slide, then the latter does not reach its front end position. This end position is monitored, for example, by a sensor or switch which, if malfunctioning takes place, supplies a signal, preferably for the purpose of switching off the

apparatus. This configuration counteracts push-rod actuation of the top tool if there are no articles in the riveting region. Such no-rivet riveting could result, for example, in damage to the textile. In the

5 case of an apparatus of the type in question in which the riveting takes place by means of a push rod, it is provided according to the invention that the push-rod movement is monitored. It has proven advantageous in this case, in particular, for the monitoring of the

10 push-rod movement to be effected by means of the movement of a push-rod cam plate which actuates the push rod. For this purpose, it is possible, for example, for a sensor to "feel" the push-rod cam plate. The monitoring of the push-rod movement is

15 advantageous, in particular, in relation to the feed-rail monitoring, since it is only in a specific, predetermined part of an application cycle that an article is removed from the feed rail, and, going hand in hand with this, the following articles slide down

20 after it. If the sensor or the like for the push-rod monitoring senses that region of the push-rod cam plate which is predefined for the feed rails, then an evaluation unit expects the signal from the feed-rail sensing device. If there is no signal from the latter

25 device in this region, then this results in the apparatus shutting down. When the predefined region of the push-rod cam plate moves away from the sensor for the push-rod monitoring, then the feed-rail sensing devices are deactivated. The time dependence between

30 the feed-rail signal and the control signal at the push-rod cam plate is established by the position of the light barrier with respect to the article in the feed rail, a minimum distance of 30° of angle being prescribed in this case. In a preferred embodiment, it

35 is provided that a control switch is disposed on the push-rod cam plate. Said control switch may be provided in the form of a control clock-pulse switch which feels the push-rod cam plate, for example, over its circumference, the cycle-appropriate signal from the

feed-rail monitoring device being monitored in relation to the push-rod movement. The abovedescribed control and monitoring devices may be used both individually and in combination in an apparatus of the type in question.

Hereinbelow, the invention is explained further with reference to the attached drawing, although the latter illustrates just two exemplary embodiments. In the drawing:

Fig. 1 shows the apparatus in a side view, partly broken away, in a top dead centre position of the push rod;

Fig. 2 shows a detail of the apparatus according to Fig. 1 in the region of the bottom tool and of the top tool, likewise in the top dead centre position of the push rod;

Fig. 3 shows a front view of Fig. 1, magazines for storing article parts being illustrated;

Fig. 4 shows an illustration corresponding to Fig. 1, but with tools assuming the riveting position;

Fig. 5 shows a detail of the apparatus according to Fig. 2, but relating to the position according to Fig. 4;

Fig. 6 shows a greatly enlarged illustration of a rivet applied to a textile;

Fig. 7 shows a further detail enlargement from Fig. 5, illustrating correct riveting, an extension arm which controls the bottom tool releasing a control switch;

Fig. 8 shows an illustration corresponding to Fig. 7, but with riveting which, as a result of an excessively thick textile, has not been carried out correctly, the extension arm of the bottom tool actuating the control switch;

Fig. 9 shows in perspective, partly sectioned illustration, an enlargement of the detail of the region of the feed rails leading from the magazines to the apparatus;

Fig. 10 shows an illustration corresponding to Fig. 2, but relating to a second embodiment for monitoring the bottom tool;

Fig. 11 shows an illustration corresponding to Fig. 5, but relating to the exemplary embodiment according to Fig. 10; and

Fig. 12 shows an illustration corresponding to Fig. 11, but with riveting which, as a result of an excessively large textile thickness, is incorrect.

The apparatus, which is provided in the form of a machine, has a vertically aligned stand 2 carried by a foot plate 1. Said stand is the carrier for a mounting plate 3, which is in the form of a U which has been tilted through 90° in the anticlockwise direction and of which the bottom U-leg constitutes an extension arm 4.

At its free ends, the extension arm 4 holds a bottom tool 5. The latter has a cross-sectionally circular anvil 6, the top end of which receives a bottom article part 7.

The bottom article parts 7 are stored in a magazine 8, which is arranged to the side of the mounting plate 3

and from which a feed rail 9 extends obliquely downwards in the direction of the extension arm 4. The bottom article parts 7 are retaining parts which are provided with teeth and may be connected to two different top article parts. A top article part 10 is shown in the illustrations. This serves as a functional part in the form of a spherical part and can be applied with the bottom article part 7 to a textile 11. The two differently configured top article parts (spherical part and resilient part) pass out of magazines 12 and 13, which are located opposite the magazine 8, and travel, by way of the feed rails 14 and 15, which are associated with the respective magazines 12 and 13, into the region of the loading slide 16.

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The loading slide 16 can be displaced horizontally and is provided with a top push-in strip 17 and a bottom push-in strip 18. The top push-in strip 17 brings in each case one top article part 10 into a retaining gripper 19, while the bottom push-in strip 18 moves the bottom article part 7 into alignment with respect to the anvil 6 of the bottom tool 5. An electromagnetic control means (not depicted) can be used to bring either the one or the other top article part out of the magazine 12 or 13, by way of the respective feed rail 14 or 15, into the movement region of the top push-in strip 17.

In the initial position of the apparatus, the retaining gripper 19 is aligned opposite the anvil 6 and is carried by a sliding element, which is guided at the bottom end of a push rod 20 which extends opposite the bottom tool 5.

At its bottom end, the push rod 20 carries a top tool 21 which, in the top dead centre position of the push rod 20 according to Figures 1 to 3, terminates above a receiving means for the top article 10, which receiving

means is disposed in the region of the retaining gripper 19.

At the top end, the push rod 20 carries a roller 22.
5 Under the action of a compression spring 23, the roller 22 engages against the circumferential running surface of a cam plate 24. The latter is wedged on the drive shaft 25 of an electromotive drive 26. Accordingly, as the cam plate 24 rotates through 360°, the push rod 20
10 is displaced in the downward direction and in the upward direction again to the top dead centre position. Also secured on the push rod 20 is an extension arm 27, which carries a control roller 28. An arm 29 of a lever 31, which is mounted on the mounting plate 3 about a
15 pivot pin 30, engages against the underside of said control roller 28. In obtuse-angled alignment with respect to the arm 29, the lever 31 forms an obliquely downwardly directed lever arm 32, the end of which, according to the position in Figures 1 to 3, runs
20 vertically and is there provided with a guide slot 33 in which a sliding block 34 engages. The latter is connected to the carriage-like loading slide 16 which, for its part, can be displaced in a machine-framework-mounted carriage guide 35 during pivoting of the lever
25 31.

The bottom end of the lever arm 32 forms a control edge 36, on which a contact roller 37 is supported. The latter is located at the free end of a control lever
30 38. This is mounted about a bolt 39 on the machine framework. A tension spring 41 acts on a transverse arm 40 of the control lever 38 and loads the control lever 38 in the direction of an abutment position relative to the lever 31. This goes hand in hand with the lever 31
35 being forced, by way of its arm 29, into an abutment position relative to the control roller 28 of the push rod 20.

Opposite the contact roller 37, the control lever 38 forms a control cam 24 which is disposed in the vicinity of the bolt 39 and, for its part, cooperates with a rotationally secured contact bolt 43, which is
5 guided in a laterally extending transverse arm 44 of the transmission lever 45. The contact bolt 43 is supported, by means of a transmission compression spring 46, on an adjustable-thread counter-bolt 47 at the bottom end of the transmission lever 45, which is
10 more or less of angled configuration. At the angle point, the transmission lever 45 is mounted about an extension-arm-mounted transverse pin 48. The free end of the transmission lever 45 extends to beneath the bottom tool 5. The transmission lever 45 engages in a
15 positively locking manner, by way of an angled element 49, in an annular groove 50 at the bottom end of the anvil-like bottom tool 5. A restoring spring 51, which acts in the vicinity of the counter-bolt 47, loads the transmission lever 45 such that the contact bolt 43
20 thereof is supported on the control lever 38, to be precise, and according to Figures 1 to 3, in the region in front of the control cam 42.

A projection lamp 52 is used for precise application of
25 the article parts to the textile 11. Said lamp is secured on the machine framework and produces a reticule, for example on the top side of the textile 11.

30 According to Figures 1 to 3, the push rod 20 assumes the top dead centre position as a result of the correspondingly rotated cam plate 24. A top article part 10 has been transferred from the top push-in strip 17 to the retaining gripper 19, while the bottom push-
35 in strip 18 has introduced the bottom article part 7 into the bottom tool 5.

Actuation of a foot switch 53 provided on the foot plate 1 initiates the drive operation, in conjunction

with a rotation of the cam plate 24 in the arrow direction according to Figure 3, as a result of which the push rod 20 is displaced in the downward direction. Hand in hand with this, the retaining gripper 19 has
5 been displaced in the downward direction and, accordingly, is located at a spacing from the bottom tool 5.

Hand in hand with the downward movement of the push rod
10 20, the control roller 28 acts on the arm 29 of the lever 31 and pivots the latter in the anticlockwise direction, this taking place in conjunction with the loading slide 16, and the push-in strips 17 and 18 positioned thereon, being carried along. During this
15 operation, the lever arm 32 of the lever 31 acts on the contact roller 37 of the control lever 38 and pivots the latter in the clockwise direction. In this case, the contact bolt 43 butts against the control cam 42, as a result of which the transmission lever 45 is
20 pivoted by the transmission spring 46, so that the bottom tool 5 moves upwards more or less at the same time as the retaining grippers 19 and the push rod 20 come to a standstill. Later on in the application cycle, a second lowering movement of the push rod 20
25 and of the retaining gripper 19 causes the retaining gripper 19 to be positioned on the top side of the textile 11. The push rod 20, in contrast, moves further downwards for the purpose of riveting the bottom article part 7 to the top article part 10. In this
30 case, the teeth of the bottom article part 7 pass through the textile 11 and penetrate into a flanged edge of the top article part 10.

During this riveting operation, the bottom tool 5 can
35 execute a yielding movement, the extent of this yielding movement depending on the textile thickness in the riveting region. This yielding movement is made possible by the non-rigid displacement of the transmission lever 45. In this case, the transmission

compression spring 46 acts as a pressure-compensation means and is compressed in accordance with the extent of the yielding movement.

- 5 Said yielding extent is used for the purpose of monitoring the riveting operation. For this purpose, a contact switch 54 is provided in the first exemplary embodiment, which is shown in Figures 1 to 9.
- 10 The riveting quality essentially depends on the depth by which the teeth of the bottom article part 7 penetrate into the flanged edge of the top article part, which is formed as a spherical part or resilient part. This penetration depth depends directly on the
- 15 textile thickness and the tooth length of the bottom article part 7. Upon riveting, a predetermined dimension, the so-called pinch-setting dimension, must not be exceeded. This dimension encompasses the spacing
- 20 a between the top side and underside of the rivet 55 once riveting has taken place (see Figure 6 in this respect). Upon riveting the bottom article part 7 and top article part 10 in textiles with one or more layers, the bottom tool 5, and the transmission lever 55 connected to it, yield back to a greater or lesser
- 25 extent. The extent of this yielding-movement path may be used as a measure of the strength of the riveting.

The abovementioned contact switch 54 is provided on the mounting plate 3 in an adjustable manner. This makes it

30 possible for the contact switch 54 to be adjusted in accordance with the maximum pinch-setting dimension, for which purpose a scale or the like may be provided, for example in the region of the mounting plate 3.

35 Figures 7 and 8 show in schematic illustrations, riveting operations for two textiles of different thicknesses. In Figure 7, a rivet 55 is applied to a textile 11, the thickness of which is dimensioned such that the predetermined pinch-setting dimension, which

is selected in dependence on the tooth length of the bottom article part 7, is observed. In this case, the bottom tool 5 and the transmission lever 45 yield back only to a very small extent, if at all, with the result that the monitoring contact switch 54 provided is not actuated by the transmission lever 45. There is no signal.

In contrast, the textile 11 which has been selected in Figure 8 has a thickness which, if the same bottom article part 7 as in Figure 7 is used, causes the predetermined dimension to be exceeded. The bottom tool 5 and the transmission lever 45 yield to such an extent that the contact switch 54 is actuated. This actuation causes a signal which may be used for example by an evaluation circuit, in order, by means of a visual display, to indicate to the user that incorrect riveting has taken place. Preferred in this case is a configuration in which the signal causes the apparatus to shut down, so that the riveting which has been carried out may be checked and, if appropriate, repeated.

As an alternative to the contact switch 54, it is also possible to use measuring sensors, proximity switches or the like. This makes it possible to allow as straightforward as possible a calibration by means of visual displays and with the aid of digital setpoint generators. This is important, in particular, since the reliability of the measuring equipment depends to a great extent on the calibration following a die change, an article change with a different tooth length, or following a flanging pressure adjustment.

In the riveting position, furthermore, the loading slide 16 has been displaced back to such an extent that the push-in strips 17 and 18 are located in front of the article parts fed in. In this position, the article parts in the feed rails automatically slide down after

the article part preceding them, in each case one top article part and one bottom article part being located in front of the respective push-in strip. The operation in which the article parts slide down after the article part preceding them is prevented during the rest of the cycle, since in this case the push-in strips and the loading slide 16 are located in front of the feed-rail openings and close off the same.

10 The movement of the articles in the feed rails sliding down after the article preceding them is monitored according to the invention by a sensing device 56. The latter is in the form of a light barrier 57, a sensing device 56 being associated with each feed rail 9, 14
15 and 15.

These sensing devices 56 sense the movement of the articles sliding down after the preceding article as soon as a application cycle has been initiated. In this
20 case, each application cycle produces a voltage pulse by way of the articles sliding down after the article preceding them within the region of the sensing device 56. This fact can be used, if there is no pulse, to generate a fault signal. Such a fault can be caused
25 either by an article part blocking or if the article supply in the feed rail and/or in the magazine has been used up. Thus, there is monitored according to the invention not just the presence of articles in the feed rails, but also the necessary movement when, in a
30 drawn-back position of the loading slide 16, the articles slide down after the article preceding them.

The light barriers 57, which form the sensing device 56, act more or less perpendicularly with respect to
35 the movement direction of the articles or with respect to the alignment of the feed rails, the latter being provided with passage openings 58 at the bottom for the passage of the light beam through the feed rails 9, 14 or 15.

As has already been mentioned, an electromagnetic control means is used to activate and deactivate one or the other magazine 12, 13, and thus the associated feed rail 14 or 15. Hand in hand with this, the sensing device 56 of the feed rail in operation at any one time is also activated, so that it is possible to avoid fault signals from the region of the deactivated feed rail.

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This feed control also operates in dependence on the push-rod movement. Provided in this case is monitoring which is achieved by means of the movement of the cam plate 24, which actuates the push rod 20. A control clock-pulse switch 59 (merely schematically illustrated in the drawings) is provided on the cam plate 24 in order to render the signal from the sensing device 56 of the feed rails time-dependent and/or angle-dependent in relation to the application cycle. The control clock-pulse switch 59 transmits a signal, for example to an evaluation unit, as soon as the drawn-back position of the loading slide 16 is detected by way of the cam plate 24. At this point in time, signals from the activated sensing devices 56, caused by the movement of the articles, are likewise transmitted to the evaluation unit. The evaluation unit checks the incoming signals and, in the case of fault signals, preferably causes the entire applying apparatus to stop.

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As an alternative, it is also possible to use proximity switches or sensors for the purpose of sensing the cam-plate position.

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The sensing devices 56 in the region of the feed rails are positioned such that a measure of a plurality of article parts is observed between the sensing devices 56 and the loading slide 16. This ensures that the feed rails do not empty completely. There is always a

residual quantity in the region between the sensing devices 56 and the loading slide 16.

5 The operation of feeding bottom article part 7 and top article part 10 into the region of the bottom tool 5 and top tool 21 is also monitored. For this purpose a sensor 60, for example, is provided on the mounting plate, and this sensor 60 detects the front end position of the loading slide 16 and the associated
10 front end position of the lever arm 32. Should an article part, for example, skew during the forward displacement of the loading slide 16, then this results in the loading slide 16 and lever arm 32 coming to a standstill. Said lever arm thus does not reach the
15 region of the monitoring sensor 60, which, if malfunctioning takes place, supplies a signal. This signal preferably results in the applying apparatus shutting down.

20 The abovedescribed monitoring devices may be used both individually and in combination in the apparatus.

Furthermore, it is possible to monitor, in a cycle-appropriate manner, the signals for the pinch-setting-
25 dimension monitoring and the loading-slide monitoring in relation to the cam-plate position by means of the control clock-pulse switch 59.

Figures 10 to 12 schematically illustrate a further
30 embodiment of an alternative configuration for the pinch-setting-dimension monitoring. In this case, a linear displacement of a disengagement part 61 is brought about for the purpose of displacing the bottom tool 5 into the riveting position by means of a control
35 cam 42. Arranged upstream of said disengagement part is a transmission compression spring 63 which is oriented in the direction of a transmission lever 62 and, at the end located opposite the disengagement part, is supported against a plate 64 on the transmission lever.

Coaxially with respect to said plate 64, the latter has integrally formed on it a signal finger 65, which passes through the compression spring 62 and the disengagement part 61. The free end region of said
5 signal finger 65 penetrates into the sensing region of a sensor 66 provided on the machine framework.

Figure 11 shows a riveting position, in which, as a result of the permissible textile thickness, the
10 predetermined pinch-setting dimension is observed. The free end of the signal finger 65, which is connected to the transmission lever 63 directly by way of the plate 64, has moved away from the sensing region of the sensor 66. There is thus no signal.

15 The intention in Figure 12 is to apply a rivet to a textile whose thickness causes the predetermined pinch-setting dimension to be exceeded. The bottom tool 5, and thus also the transmission lever 63, yield during
20 the riveting operation as a result of the excessive textile thickness. The compression spring 62 is compressed between the non-yielding disengagement part 63 and the plate 64 on the transmission lever. In contrast, the signal finger 65, which is integrally
25 formed on the plate 64, is displaced in the direction of the sensing region of the sensor 66, which in this arrangement transmits a signal for switching-off of the apparatus, or at least for indicating this to the user.

30 All the features disclosed are pertinent to the invention. The disclosure contents of the associated/attached priority document (copy of the prior application) are hereby also included in full in the disclosure of the application, also for the purpose
35 of adopting features of these documents in claims of the present application.



CLAIMS

1. Apparatus for application of rivets, buttons or
the like, having a top tool (21) and a bottom tool
5 (5), the top tool (21) being preferably push-rod
actuatable, and one tool executing a yielding
movement during the riveting operation,
characterized in that the extent of the yielding
movement is used for the purpose of monitoring the
10 riveting operation.
2. Apparatus according to Claim 1, or in particular
according thereto, characterized in that the
extent of the yielding movement of the bottom tool
15 (5) is used for monitoring purposes.
3. Apparatus according to one or more of the
preceding claims, or in particular according
thereto, characterized in that the movement path
20 of the bottom tool (5) is sensor-monitored.
4. Apparatus according to one or more of the
preceding claims, or in particular according
thereto, characterized in that, upon exceeding a
25 predetermined dimension, the bottom tool (5)
actuates a switch (54).
5. Apparatus according to one or more of the
preceding claims, or in particular according
30 thereto, the apparatus having feed rails (7, 14,
15) on which rivet or button parts (7, 10) are
conveyed, characterized in that a sensing device
(56) for the purpose of monitoring the movement of
the rivet or button part (7, 10) is associated
35 with at least one feed rail (7, 14, 15).
6. Apparatus according to one or more of the
preceding claims, or in particular according
thereto, the rivet or button part (7, 10) being



5 conveyed from the feed rail (9, 14, 15) into the path of a loading slide (16), characterized in that the sensing device (56) is disposed in the feed rail (9, 14, 15) such that it is spaced apart from the loading slide (16) by the extent of a plurality of rivet or button parts (9, 10).

10 7. Apparatus according to one or more of the preceding claims, or in particular according thereto, characterized in that, during each riveting operation, the reaching of an end position of the loading slide (16) is monitored.

15 8. Apparatus according to one or more of the preceding claims, or in particular according thereto, characterized in that the front end position of the loading slide (16) is monitored.

20 9. Apparatus according to one or more of the preceding claims, or in particular according thereto, the riveting taking place by means of a push rod (20), characterized in that the push-rod movement is monitored.

25 10. Apparatus according to one or more of the preceding claims, or in particular according thereto, characterized in that the monitoring of the push-rod movement is effected by means of the movement of a push-rod cam plate (24) which
30 actuates the push rod (20).

35 11. Apparatus according to one or more of the preceding claims, or in particular according thereto, characterized in that a control switch (59) is provided on the push-rod cam plate (24).

12. Apparatus according to one or more of the preceding claims, or in particular according thereto, characterized in that the cycle-



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appropriate signal from the feed-rail monitoring device (56) is monitored in relation to the push-rod movement.

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