Jan. 28, 1964 B. W. ROSE ETAL 3,119,218

BAG VALVE CLOSING APPARATUS

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FIG_1

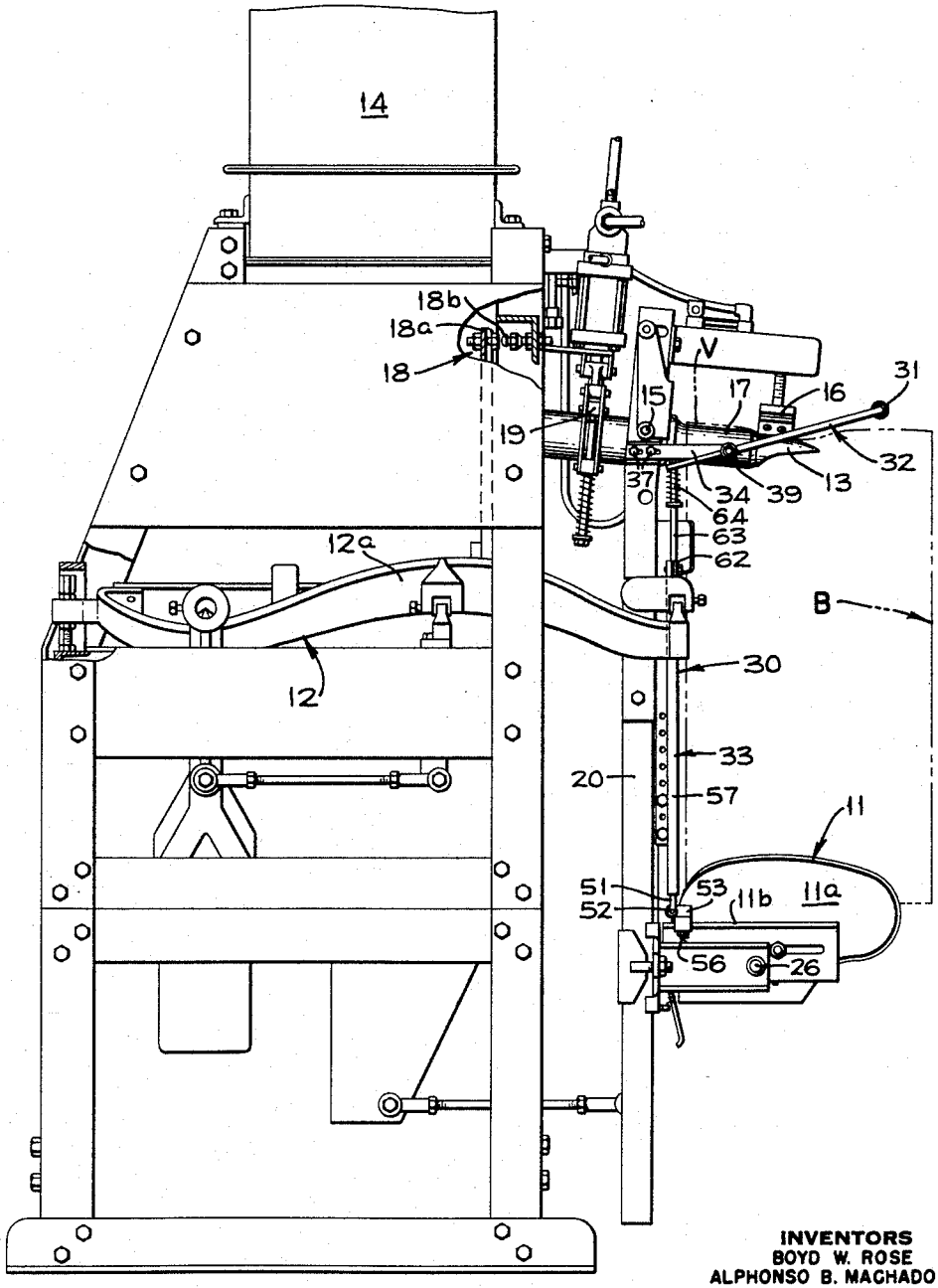

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FIG_2

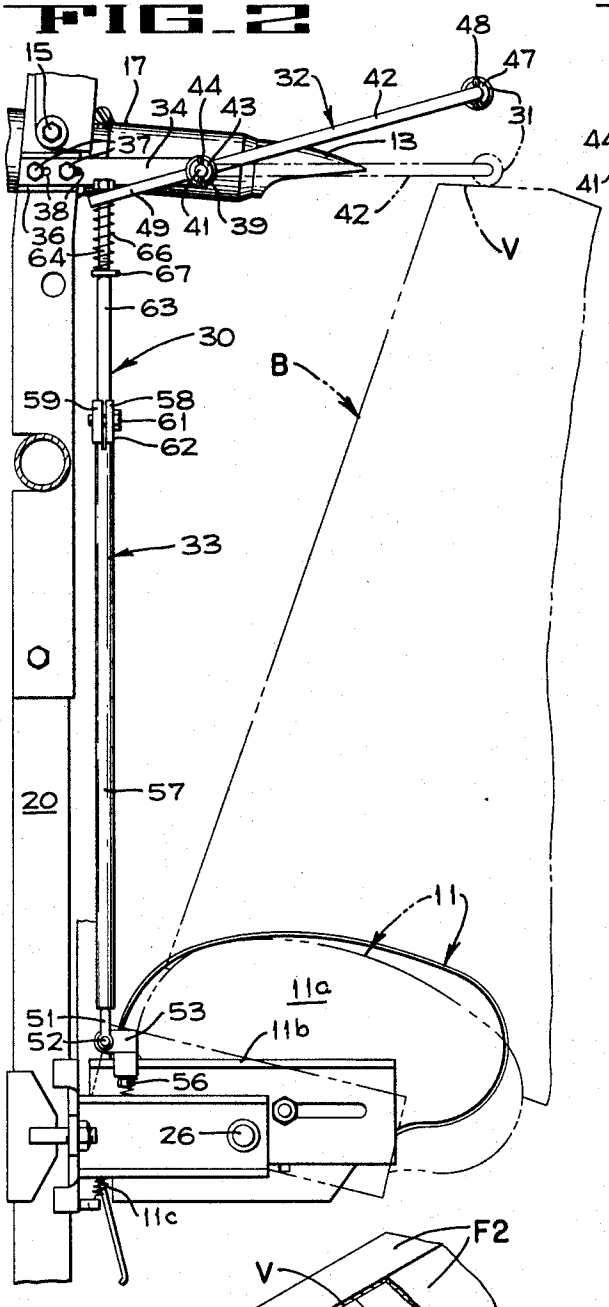


FIG_3

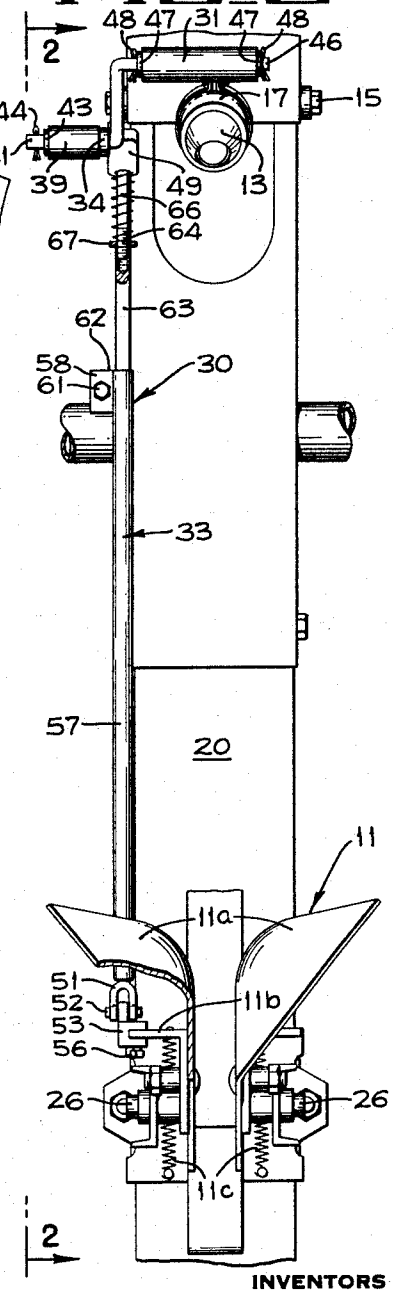
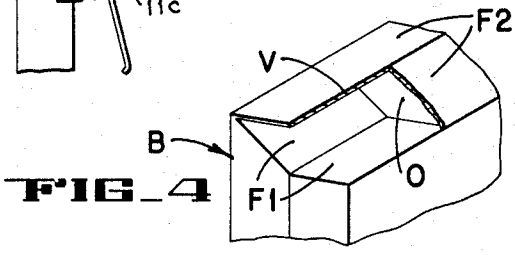


FIG_4



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BAG VALVE CLOSING APPARATUS

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This invention relates to an apparatus for filling bags with fluids or fluidized solids and more particularly relates to an apparatus for closing a bag valve after the bag has been filled but before it has been released by the apparatus.

In the patent to Rose, No. 2,866,484 entitled "Apparatus for Filling Bags" which issued on December 30, 1958, is disclosed a bag filling machine of the type referred to herein. The present invention constitutes an improvement of the machine disclosed in the Rose patent.

After the bags have been filled with powdered material they are automatically discharged onto a conveyor by being allowed to rotate away from and fall free of the filling apparatus as explained in the above mentioned patent. Heretofore, the bag valve remained open until the bag was advanced to a pasting machine which permanently sealed the bag valve. As a consequence, when the open bag fell onto the conveyor the impact caused some of the powdered material to spill out of the open valve with the result that the outside of the bag and the conveyor were soiled with the material.

It is, therefore, an object of this invention to provide an apparatus, for use with a bag filling machine, that will automatically close the bag valve after the bag has been filled and while the bag is being pivoted away from the filling spout but before the bag is allowed to fall free of the bag support portion of the machine.

Another object is to provide an apparatus having resilient means to maintain a cushioned contact between the bag valve closing apparatus and the bag without danger of overstressing and tearing the bag.

Another object is to provide a bag valve closing apparatus in the form of an attachment that can be readily placed on a bag filling machine to become an integral part of the machine without changing the operation of the machine.

These and other objects and advantages of the present invention will become apparent from the following description and accompanying drawings, in which:

FIG. 1 is a side elevation of a bag filling machine having the apparatus of the present invention mounted thereon, certain parts of the machine being broken away.

FIG. 2 is an enlarged section taken along lines 2—2 of FIG. 3 showing the bag closing apparatus in two operative positions, certain parts of the filling machine being broken away.

FIG. 3 is an enlarged front elevation of a portion of the machine of FIG. 1 showing the bag closing apparatus in detail, certain parts of the machine being broken away.

FIG. 4 is a perspective of a portion of a bag with a part of the bag valve cut away to show its internal construction.

As set forth in Patent No. 2,866,484 a bag B (FIG. 1) is placed on a bag support unit 11 which is, in turn, mounted on a scale 12. The bag B is of the type wherein the material enters the bag through a generally tubular portion V (FIG. 4) that is known as a bag valve. It is to be understood that the valve V as shown in FIG. 4 illustrates only one form of a bag valve, and that other similar forms of bag valves may be sealed with the apparatus of the present invention. The particular valve V shown in FIG. 4 includes lower flaps F1 and upper flaps F2 which are forced together by the apparatus of the present invention to close the valve opening O.

In order to fill the bag B, a filling spout 13 (FIG. 1) which is in communication with a supply tank 14, is inserted within the opening O (FIG. 4) of the valve V of the bag B and is pivoted upwardly about a pivot 15 against a stationary clamping structure 16 to clamp the bag in filling position. A fluidized material contained in the supply tank 14 (FIG. 1) is then directed into the bag B through the filling spout 13. In order to prevent a portion of the fluidized material flowing into the bag from escaping between the inner walls of valve V and the filling spout 13, a tubular pneumatic bag seal 17 is formed around the filling spout 13 and, when inflated, seals this opening. As the bag B is being filled, the bag and its contents are continuously weighed by the scale 12. When a desired weight of material is reached, the scale automatically activates a pneumatic control system 18 whereby to close a valve mechanism 19 which stops the flow of material into the bag B. Immediately thereafter the bag seal is deflated and the filling spout is swung about the pivot 15 downwardly away from the clamping structure thereby releasing the upper end of the bag B.

The elements of the apparatus will now be described more fully.

In order to accurately weigh the bag B, a cradle assembly 11*a* (FIG. 1), as well as the filling spout 13 as mentioned above, are both pivotally supported by a vertical column 20 of the support unit 11 while the bag clamping structure 16 is rigidly secured on the column. Accordingly, after the bag B is filled to the desired weight as determined by the scale 12, the entire unit 11 including the filling spout 13, the cradle assembly 11*a*, the bag clamping structure 16, and the column 20 move downwardly causing the scale beam 12*a* to pivot and activate the control system 18. The resultant motion of the scale beam brings an arm 18*a* that projects upwardly from the scale beam against a bleeder valve 18*b* that forms part of the control system 18, the details of which form no part of the invention. As mentioned, actuation of the control system results in three operations. The filler valve 19 is closed, the spout 13 is lowered from clamp 16, and the rubber sleeve 17 in the bag valve is deflated.

Due to the fact that the center of gravity of the bag is disposed outwardly of the pivot point 26 of the cradle assembly 11*a*, when the upper end of the bag is released from the spout 13 upon actuation of the control system, the filled bag swings outwardly and falls free of the apparatus onto a conveyor or any other suitable means (not shown) provided to remove the bag from the area. While the bag is falling to the conveyor, the bag valve is closed by apparatus 30 of the present invention.

The bag valve closing apparatus 30 of the present invention is designed to become an integral part of the bag filling machine just described and performs the step of closing the bag valve during the sequence of operations just recited.

Referring now to FIGS. 2 and 3, the bag valve closing apparatus 30 comprises a bag valve engaging roller 31 journalled on one end of a lever 32 which roller 31 is normally disposed in spaced relation above the bag B. An adjustable linkage 33 is connected between the lever 32 and the pivotal cradle assembly 11*a* and serves to resiliently urge the roller down upon the bag valve V to close the valve when the cradle is pivoted to the phantom line position shown in FIG. 2.

In order to pivotally support the lever 32 on the column 20 for horizontal adjustment, a bracket 34 (FIG. 2) is connected to a spacer block 36 which is welded to the column 20. Cap screws 37 extend through slots 38 in the bracket 34 and are screwed into holes in the block 36 to adjustably mount the bracket. A bushing 39 rigid with the bracket 34 extends laterally away from the filling spout 13 and receives a pivot arm 41 of an S-shaped rod 42 which is held in the bushing 39 by a washer 43 and cotter pin 44. The roller 31 is journalled on an arm 46

of the S-shaped rod 42 which arm 46 extends over the upper end of the bag B. Washers 47 and cotter pins 48 which extend through holes in the arm 46 prevent axial displacement of the roller 31 from the arm 46. A flat actuating arm 49 is notched and welded to the S-shaped rod 42 to form a rearward extension thereof, as shown in FIG. 2, and the arm is apertured to receive one end of the adjustable linkage 33.

The adjustable linkage 33 is provided to actuate the lever 32 in response to the pivotal movement of the cradle assembly 11*a*, and to adjust both the closing force of the roller 31 against the valve of bag B and the extreme positions of pivotal movement of the roller 31.

The linkage 33 includes a yoke 51 which is pivotally connected at its lower end by a pin 52 to a C-clamp 53 which is clamped to an angle member 11*b* of the cradle assembly 11*a* by a cap screw 56. The yoke is secured, as by welding, to an elongated tubular connecting arm 57 which is split at its upper end along one wall and has a pair of vertically spaced outwardly projecting flanges 58 and 59 which cooperate with a cap screw 61 to define a split ring clamp 62. The tubular arm 57 telescopically receives a rod 63 which is locked in adjusted position in the tubular arm 57 to control the range of movement of the roller 31 by controlled adjustment of the cap screw 61 which extends through an opening in the flange 58 and is screw into the flange 59.

In order to provide a resilient bag valve closing force, the upper end of the rod 63 is bored and internally threaded to receive a cap screw 64. The cap screw 64 extends through the opening in the flat actuating arm 49, a coiled helical compression spring 66, and a washer 67 which seats on the upper end of the rod 63. The bag closing force is regulated by adjusting the cap screw 64 in the rod 63.

In the operation of the bag valve closing apparatus 30 of the present invention, when the filled bag B has been released from the filling spout 13 and rotates in a clockwise direction (FIG. 2), the adjustable linkage 33 is raised. This effects a clockwise pivotal movement of the lever 32 about the pivot arm 41 due to the upward movement of the spring 66 through which the valve closing force is transmitted. The roller 31 is in this way resiliently urged against the upper surface of the bag B, and as the bag continues its clockwise movement, the roller rides against its upper surface and over the valve V of the bag B thereby closing the opening O (FIG. 4). If the roller 31 moves over an unusually high bump in the bag and receives an unexpected jolt from this bump, the spring 66 is compressed and permits the left end of the lever 32 to move downward relative to the cap screw 64 thus allowing the roller to ride over the bump without tearing of the bag B or placing excessive strain on the apparatus.

After the bag B has been discharged, springs 11*c*, connected between the pivotal cradle assembly 11*a* and a non-pivoting portion of the bag supporting unit 11, return the cradle assembly 11*a* to the bag supporting position and the bag valve closing apparatus 30 of the present invention to its starting position shown in full lines in FIG. 2. At this time, the filler valve is closed, the sleeve 17 is deflated and the spout remains lowered even though arm 18*a* is moved clear of bleeder valve 18*b*. These conditions prevail because the control system is such that the operator must manually re-set the control circuit, after a new bag is in place, in order to again initiate clamping of the spout, inflating of the sleeve, and start of another bag filling cycle.

From the foregoing description it may be seen that the bag closing apparatus of the present invention provides means whereby the bag valve V can be closed safely and with a predetermined amount of resilient force while maintaining the other operations of the machine.

While a preferred embodiment of the invention has been shown and described, it is obvious that various changes may be made without departing from the spirit of the invention or the scope of the appended claims.

Having thus described the present invention and the manner in which the same is to be used, what is claimed as new and desired to be protected by Letters Patent is:

1. In a machine for filling and closing a bag of the type having a bag valve in its upper end portion, the combination of a cradle assembly mounted for pivotal movement between a horizontal bag supporting position and an inclined bag discharging position, bag closing means mounted for pivotal movement between a position spaced from the upper end portion of the bag and a valve closing position in contact with the bag valve, and a linkage system connected between said cradle assembly and said bag closing means and operable to urge said closing means into valve closing contact with the upper portion of the bag when said cradle assembly is moving from said bag supporting position to said bag discharging position.

2. In a machine for filling and closing a bag of the type having a bag valve in its upper end portion, the combination of a cradle assembly mounted for pivotal movement between a horizontal bag supporting position and an inclined bag discharging position, bag closing means mounted for pivotal movement between a position spaced from the upper end of the bag and a valve closing position in contact with the bag valve, and a linkage system connected between said cradle assembly and said bag closing means and operable to urge said closing means into valve closing contact with the bag valve when said cradle assembly is moving from said bag supporting position to said bag discharging position, said linkage system including resilient means for resiliently urging said bag closing means against the bag valve.

3. In a machine for filling and closing a bag of the type having a bag valve in its upper end, the combination of a cradle assembly mounted for pivotal movement between a horizontal bag supporting position and an inclined bag discharging position, bag closing means mounted for pivotal movement between a position spaced above the upper end of the bag and a valve closing position in contact with the upper surface of the bag, a linkage system connected between said cradle assembly and said bag closing means, resilient means interposed in said linkage system, said linkage system being operable to urge said closing means into resilient valve closing contact with the upper surface of the bag when said cradle assembly is moving from said bag supporting position to said bag discharging position, and means in said linkage system for controlling the resilient force exerted by said resilient means.

4. In a machine for filling and closing a bag of the type having a bag valve in its upper end, the combination of support means, a cradle assembly pivotally mounted on said support means and movable between a generally horizontal bag supporting position and an inclined bag discharging position, means carried by said support means for holding the upper end of the bag in fixed position until the bag is filled and thereafter releasing said bag causing the weight of the bag to pivot said cradle assembly to the inclined position, bag closing means pivotally mounted on said support means and movable between a position spaced above the upper end of the bag and a valve closing position in contact with the upper surface of the bag, and a linkage system connected between said cradle assembly and said bag closing means and operable to urge said closing means into contact with the upper surface of the bag when said cradle assembly is being moved to the inclined position.

5. In a machine for filling and closing a bag of the type having a bag valve in its upper end, the combination of support means, a cradle assembly pivotally mounted on said support means and movable between a generally horizontal bag supporting position and an inclined bag discharging position, means carried by said support means for holding the upper end of the bag in fixed position until the bag is filled and thereafter releasing said bag causing the weight of the bag to pivot said cradle assem-

bly to the inclined position, bag closing means pivotally mounted on said support means and movable between a position spaced above the upper end of the bag and a valve closing position in contact with the upper surface of the bag, a linkage system connected between said cradle assembly and said bag closing means, and resilient means interposed in said linkage system, said linkage system being operable to resiliently urge said closing means into contact with the upper surface of the bag when said cradle assembly is being moved to the inclined position.

6. A bag valve closing apparatus for closing a bag of the type which has an inlet valve at the upper end for use with a bag filling machine having a scale, a support member on said scale, a cradle assembly pivotally mounted on said support member to support the bag and adapted for pivotal movement in a vertical plane, and a filling spout pivoted on said support member; said bag valve closing apparatus comprising a pivotal lever fulcrumed on said support member to oscillate in a vertical plane parallel to the plane of movement of said cradle assembly, a roller connected to one extremity of said lever to rotate in said vertical plane and positioned above said filling spout during the bag filling operation, and a connecting arm pivotally connected to said cradle assembly and to the other extremity of said lever for moving said lever in response to the pivotal movement of said cradle assembly whereby upward movement of said connecting arm effects movement of said roller into contact with the bag to roll the top surface of the valve closed.

7. A bag valve closing apparatus for closing a bag of the type which has an inlet valve at the upper end for use with a bag filling machine having a scale, a support member on said scale, a cradle assembly pivotally mounted on said support member to support the bag and arranged for pivotal movement in a vertical plane, and a filling spout pivotally mounted on said support member; said bag valve closing apparatus comprising a lever fulcrumed on said support member to oscillate in a vertical plane parallel to the plane of rotation of said cradle assembly, a roller connected to one extremity of said lever to rotate in the vertical plane of said cradle assembly, a connecting arm pivotally connected to said cradle assembly and to the other extremity of said lever for vertical movement in unison with said cradle assembly and said lever, and resilient means on said connecting arm for retaining said lever on said connecting arm for limited vertical movement relative to said connecting arm, said lever being rotated in response to the rotational movement of said cradle assembly so that upward movement of said connecting arm resiliently urges said roller downward into contact with the downwardly pivoting bag to close said valve.

8. In a machine for filling and closing a bag of the type having a bag valve in its upper end, the combination of a cradle assembly mounted for pivotal movement between a horizontal bag supporting position and an inclined bag discharging position, a lever mounted for pivotal movement and having an outer end portion disposed above the upper surface of the bag and having an opening in the other end portion, a roller journalled on said outer end portion, linkage means pivotally connected at one end to said cradle assembly and having an elongate arm extending upwardly therefrom, a clamp on the upper end of said arm, one end of a rod being clamped in adjusted position by said clamp, a cap screw having its shank extending through the opening in said lever and screwed into the other end of said rod, a washer on said cap screw and seated against the upper end of said rod, and a spring on said cap screw and disposed between said washer and said other end of said lever whereby adjustment of said cap screw is effective to vary the force with which said spring acts on said lever, said rod being locked to said arm by said clamp at a point which will position said roller in spaced relation above the bag when said cradle assembly is in the bag supporting position and which will position said roller in resilient engagement with the upper surface of the bag to close the valve when said cradle assembly is being moved to the bag discharging position.

9. In a machine for filling a bag of the type having a bag valve in its upper end surface and in which the bag is filled in an upright position and is tilted during discharge of the bag from the machine, a bag valve closing means including a roller, and means mounting said roller for movement into contact with the upper end surface of the bag during discharge of the bag from the machine, said roller being operable to roll upon said surface and close the valve as the bag moves from said bag filling position to said bag discharge position.

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