July 16, 1935. A. A. JOHNSON 2,008,356

PHONOGRAPH

Original Filed Jan. 21, 1928

Fig. 1

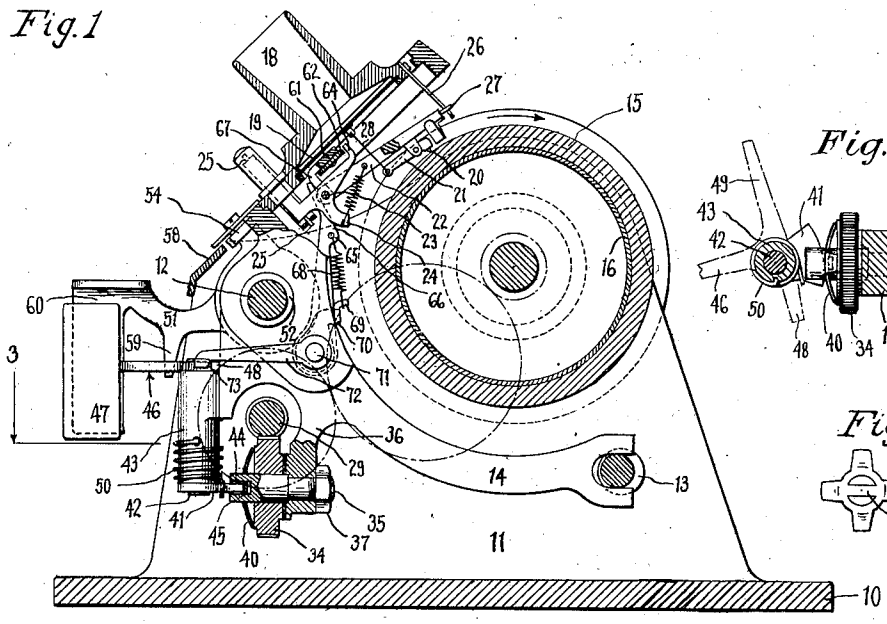


Fig. 3

Fig. 4

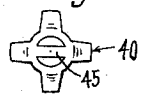
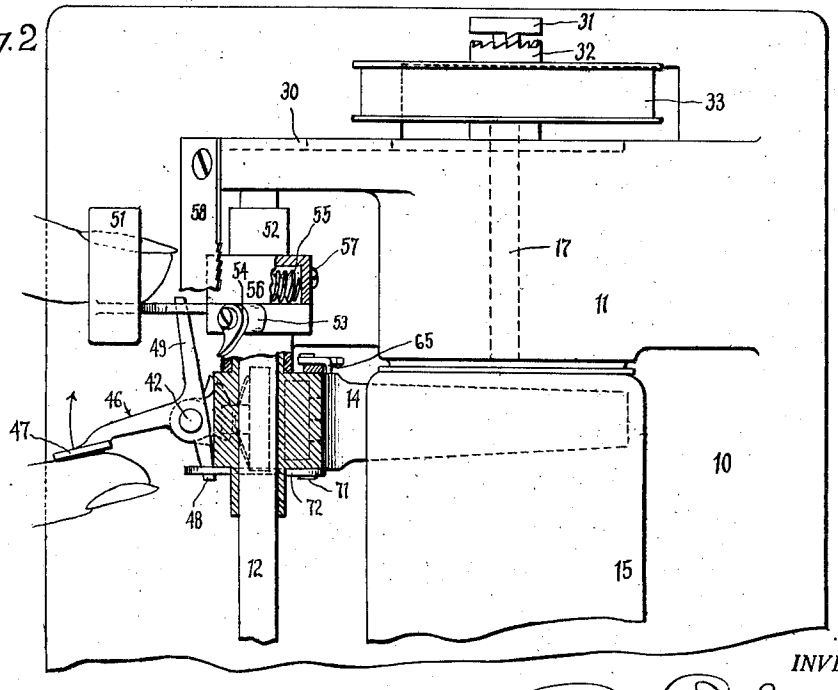


Fig. 2



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UNITED STATES PATENT OFFICE

2,008,356

PHONOGRAPH

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Renewed September 29, 1934

15 Claims. (Cl. 274—21)

This invention relates to dictating machines, and more particularly to carriage feeding and spacing means therefor.

An object of the present invention is to permit the carriage to be freely spaced in either direction longitudinally of the machine independently of the operation of the feed mechanism, while cooperating parts of the feed mechanism remain engaged.

Another object of the present invention is to so hold the feed-nut against rotation that the carriage will regularly feed under the influence of the feed-screw and to release the holding means incidental to and during the operation of forward or back-spacing the carriage.

A feature of the invention is the provision of means which automatically locks the stylus against free tracking movement and releases a rotatably mounted circular feed-nut incidental to the operation of back-spacing the carriage which operation is preferably accomplished by merely pushing against a lever or carriage handle.

Another feature of the invention is the provision of means which holds the stylus against free tracking movement during back-spacing and releases the circular feed-nut for free rotation, and allows the carriage to be freely spaced in either direction longitudinally of the record by the simple expedient of grasping parts on the carriage and pushing the carriage in the desired direction.

And yet another feature of the present invention is the provision of means whereby the carriage feeding means is automatically made operative immediately after the operator stops spacing the carriage.

A still further feature of the present invention is the provision of means whereby the operator may freely space the carriage a large extent by merely grasping and pushing the carriage or may freely back-space it a small and predetermined extent by manipulation of an auxiliary lever.

These and other objects and advantages have been obtained by the present invention, according to the present preferred embodiment, by the provision of a circular feed-nut or worm-wheel which is rotatably mounted directly on the carriage and is constantly in engagement with the feed-screw, the mounting of which is such that the feed-nut is normally held against rotation by friction but freely rotates and is freed of said friction either by movement of a carriage handle operable when it is desired to manually space the carriage in either direction longitudinally of the machine large extents or when a lever is operated to automatically back-space the carriage a small and predetermined extent.

Referring to the drawing—

Figure 1 is a side sectional view of the upper parts of a dictating machine and shows the present invention as applied thereto.

Fig. 2 is a top plan view of parts of the dictating machine shown in Fig. 1.

Fig. 3 is a top sectional view taken on line 3—3 in Fig. 1.

Fig. 4 is a top view of the friction imparting spider made in accordance with the present invention.

The phonograph shown comprises the usual top plate 10 having formed integral therewith a housing 11 which forms a support for carriage rods 12 and 13 upon which a sound-box carriage 14 is adapted to travel longitudinally of the machine over the surface of a record 15, mounted upon a record-support 16 which is fixed on a shaft 17 having a bearing or support in the housing portion 11 of the top plate.

Mounted in the carriage 14 is a sound-box 18 which, as usual, contains a diaphragm 19, a stylus 20 mounted in a pivoted lever 21 supported by a weighted carrier 22 mounted on a pivot rod 23 carried by a bracket 24 mounted on trunnions 25 for movement in a plane at right angles to the plane of movement of the carrier 22 on the pivot rod 23. The pivot rod 23 and trunnions 25 permit the stylus 20 to have free vertical and lateral movement respectively relatively to the record within limits of a guide plate 26 on the sound-box confining a pin 27 fixed in the end of the carrier 22. In accommodating itself to records of various thicknesses and to inequalities in the record-surface, the stylus 20 with the carrier 22 moves up and down on the pivot 23, and for free tracking of the record moves horizontally about the trunnions 25. For the purpose of imparting sound impulses to the diaphragm 19 from the sound-waves on the record 15, the stylus lever 21 is connected to the diaphragm 19 by a wire 28. While an acoustical reproducing device is herein shown and described, it should be understood that the present invention is not limited in its application to this or any particular form of sound-box.

In the embodiment of the invention herein shown, the carriage 14 and related sound-box 18 are caused to advance over the record-support 16 under the influence of a rotatable feed-screw 29 cooperating with parts on the carriage 14. This feed-screw 29 is caused to rotate coordinately with the record-support 16 by means of a

gear train 30 as shown by dotted lines at the end of the housing portion 11 of the top plate. As usual, rotation of these cooperating parts is accomplished when a toothed clutch member 31 is brought into engagement with the toothed member 32, part of the rotating driving pulley 33. This form of feed-mechanism has been selected for the present embodiment of the invention because this feed-screw type has proven to be the most satisfactory and only practical feeding means known to the art.

With this feed-screw, there is provided a very simple and efficient cooperating mechanism on the carriage of the machine having several advantages which will hereinafter be referred to. This cooperating mechanism in the embodiment herein shown comprises a circular feed-nut, preferably in the form of a worm-wheel 34, rotatably mounted on a stud 35 which is fixed to the arm portion 36 of the carriage frame 14 by a nut 37 and is so arranged that it is always in engagement with the feed-screw 29. In order to cause the carriage to feed under the influence of the feed-screw 29, there is further provided means to normally hold the rotatably mounted circular feed-nut against rotation. This is accomplished, according to the present preferred embodiment of the invention, by normally frictionally holding the worm-wheel 34 against rotation by means of a spider 40 mounted on the circular feed-nut stud-shaft 35.

In the present invention, however, there is provided means to control the friction or braking action of the feed-nut 34 so that it is normally held against rotation but at predetermined times, as when it is desired to back-space the carriage, the friction is automatically relieved or entirely removed. This means, in the present preferred form, comprises a cam 41 fixed to the lower end of a shaft 42 rotatable in a boss 43 on the carriage frame 14. This cam is so proportioned that when it is in its normal position (that shown in Fig. 2), it exerts a sufficient pressure against the spider 40 to cause the latter to hold the feed-nut against rotation and thus cause the carriage to feed under the influence of the feed-screw. The cam 41 passes through an aperture 44 in the stud shaft 35 and engages a flat portion 45 on the spider 40, which flat portion is preferably made integral with the spider and of such size as to fit snugly in the aperture to thus serve as an abutment for the cam and as a spline to prevent rotation of the spider on the stud shaft. When the cam is moved away from the flat portion 45 of the spider, the latter relieves or entirely removes the braking or locking action on the feed-nut 34 so that the latter will allow free movement of the carriage.

By thus providing means whereby the spider may be rendered inoperative, it is possible to make the spider so stiff that when pressed hard against the feed-nut, all possible danger of the worm-wheel slipping when it should not is avoided. In fact, the parts may be so made as to constitute for all practical purposes a firm and rigid lock.

The cam 41 is shaped with a gradual rise so that it can be used to apply a considerable pressure against the spider 40 when it is moved to operative position. Further, because this cam has a gradual rise, it has at all times only spot contact in the center of the spider. The pressure or reaction of the spider exerts a straight line force against the cam toward the center of rotation of the cam; therefore, the spider cannot cause the cam to rotate.

When the cam 41 is moved to inoperative position, it at first moves gradually out of pressure exerting relation to the spider 40 and it may be so shaped or proportioned as to relieve or entirely remove pressure against the spider when it is fully moved to inoperative position. While the cam is in inoperative position, it allows the feed-nut 34 to rotate; and keeps the feed-nut on the stud-shaft 35, for it is proportioned to prevent longitudinal movement of the nut thereon.

To move the cam 41 to operative or inoperative position, the present invention provides a carriage handle 46 on the upper end of the shaft 42. This handle is provided with a finger-piece 47 extending transversely to the travel of the carriage so that the operator need merely push against it in order to rotate the shaft 42 and related cam 41 to move the latter to inoperative position and release the feed-nut for rotation.

This carriage handle 46 has a limited range of pivotal movement controlled by arms 48 and 49, either of which may engage the side of the carriage frame 14 dependent upon whether the cam 41 is moved to operative or inoperative position.

The cam 41 and related parts are normally rotated to the operative position (shown in Fig. 2) by a spring 50, one end of which is fixed in the boss 43 and the other end engaging the side of the cam 41, rotation being stopped by the arm portion 48 of the handle 46 engaging the side of the carriage. The spring thus obviates the necessity of the operator manually moving the handle 46 to operative position.

In using the machine, the operator frequently desires to repeat a considerable portion of the recording and consequently must back-space the carriage and related sound-box. This is accomplished, according to the present invention, by merely pushing against the finger-piece 47 and causing the shaft 42 and cam 41 to rotate against the pressure of the spring 50 until movement is stopped by the arm portion 49 of the handle 46 engaging the side of the carriage. The cam 41 is so proportioned that in this movement it will ride out of pressure exerting relation to the spider 41 and will serve only to keep the spider 40 and circular feed-nut 34 on the stud shaft 35. This is a very advantageous feature, for after the feed-nut is released and when the carriage handle is positioned as before stated with the arm 49 against the carriage frame, further pushing against the carriage handle causes the carriage to freely move to any desired position longitudinally of the frame as there is no substantial braking action against the circular feed-nut, thus allowing it to rotate on the stud-shaft 35 and freely roll on the feed-screw 29 while the carriage is being back-spaced.

To recondition the machine for again advancing under the influence of the feed-screw after the carriage has been moved to the desired position, the carriage handle 46 and the cam 41 are merely released by the operator, when they will be automatically returned to operative position (that shown in Fig. 2) under the influence of the spring 50 to again hold the circular feed-nut 34 against rotation.

While the above manner of operating the machine is extremely advantageous for back-spacing the carriage a large extent it is sometimes desired to back-space the carriage but a very small extent to verify the reproduction or transcription of only a small portion of the record. To facilitate this, dictating machines have heretofore been, and the machine of the present invention is,

provided with mechanism to back-space the carriage small extents at each operation. The back-spacing mechanism selected for use with the present invention comprises a back-space lever 51 rotatably mounted on a tubular bearing 52 secured in the carriage 14 provided at its top portion with a lug 53 pivotally carrying a pawl 54 which has a limited range of movement. This lever 51 is normally held in inoperative position (as seen in Figs. 1 and 2) by a spring 55 which is enclosed in a collar 56 suitably mounted upon the tubular bearing 52. When the back-space lever 51 is operated, the pawl 54 engages a rack 58 secured to suitable supports on the frame and forces the carriage 14 and related sound-box 18 backwardly a predetermined extent. To further back-space the carriage, the back-space lever 51 may be repeatedly operated. The back-spacing mechanism per se above described is of usual form, such as is disclosed in the patent to Macdonald No. 1,030,740, June 25, 1912, excepting, however, that the depression of the back-space key 51 does not disengage the feed-nut from the feed-screw nor does it raise the stylus from the record.

The present invention provides means associated with said back-spacing means comprising an arm 59 of the back-space lever 51 which, when the back-space lever is operated, engages the arm 49 of the carriage handle 46 to rotate the shaft 42 and related parts, to remove the pressure of the cam 41 from the spider 40 and circular feed-nut 34. Thus, it will be seen that the braking action against the feed-nut 34 is removed by operation of the back-space lever 51 in the same manner as when the carriage handle 46 is operated.

According to the present invention, should the operator desire to forward space the carriage 14 and related sound-box 18 in order to reproduce a portion of the record which is yet to be transcribed, he need merely place his thumb on a back-space lever extension 60 and with other fingers of the same hand on the handle 46 as shown in Fig. 2, grasp and squeeze these parts together, thus rotating the carriage handle 46 until the arm 49 engages the side of the carriage frame and, in this rotation of the carriage handle, release the circular feed-nut, as hereinbefore described. When these parts are so squeezed together, and the resultant action of removing friction from the feed-nut 34 has occurred, the operator will have a firm hold on the carriage and can at will freely move the carriage forwardly any desired extent. If preferred, the operator can also use this method in back-spacing a considerable extent rather than to merely push against the finger-piece 47 as before described. Thus, it will be seen that, according to the present invention, the operator can at will and with comparative freedom either forward or back-space the carriage a large extent by merely pushing the carriage to the desired position or can back-space a short predetermined extent by separate operations, while the circular feed-nut 34 remains in cooperating engagement with the feed-screw 29 and rolls freely thereon.

While obtaining these advantages, the present invention retains the previously provided advantageous means for holding the stylus against all lateral movement relative to the record during each spacing operation, so that after spacing the stylus will be in the same position with relation to the sound box 18 as it had before the spacing operation commenced. The means on the sound-box for accomplishing this, as shown in Figs. 1 and 2 in the drawing, comprises a clamping arm 61 pivoted on the sound-box 18 and having a locking surface 62 normally adapted to be disengaged from a cooperating locking surface on an arm 64 constituting an integral part of the bracket 24 for the horizontal pivot of the carrier 22. The clamping arm 61, when moved to operative position, engages the arm 64 on the bracket 24 to prevent its rotating movement and thus holds the carrier 22 and stylus 20 against lateral movement relative to the sound-box.

Means for operating the clamping arm 61 comprises an arm 65 pivotally mounted on the carriage frame 14 and having an operating face 66 adapted to engage a depending lug 67 on the clamping arm. The arm 65 is rocked by a spring 68 connected to the arm 65 and connected at its other end to an ear 69 of a lever 70 fixed to a shaft 71 which extends through the carriage frame 14, and has fixed at its opposite end an arm 72 which is adapted to be operated by either the back-space lever 51 or the carriage handle 46. This operation is accomplished by movement of the carriage handle 46 in the direction of the arrow shown in Fig. 2 when the arm 48 will move and cam up the bevel portion 73 of the arm 72, thus raising the end of this arm and rotating the shaft 71, so that the ear portion 69 of the lever 70, which limits forward movement of the arm 65 and pulls the spring 68, rotates forwardly allowing further forward movement of the arm 65 and tensions the spring 68 to pull the arm 65 against the clamping arm 61 to operate the latter and lock the stylus against movement. Likewise, when the back-space lever 51 is operated, the arm 59 engages the arm 49 to cause actuation of the arm 72 by the arm 48 and the same result is accomplished. Thus, it will be seen that upon operating either the carriage handle 46 or the back-space key 51, the stylus 20 is held against lateral movement and friction is removed from the circular feed-nut.

These parts are so proportioned and arranged that the stylus 20 is locked against lateral movement relative to the sound-box 18 before the pawl 54 engages the rack 58 and before the arm 49 engages the carriage frame, so that the stylus 20 is locked against lateral movement relative to the sound-box before and during the spacing operation by either the back-space lever 51 or the carriage handle 46.

When the carriage has been moved to the desired position and the carriage handle 46 or the lever 51 is released, the arm 48, under the influence of the shaft 42 and spring 50, moves forwardly to engage the carriage frame, and the lever 72 drops downwardly by gravity to inoperative position and moves the arm 65 out of operative position relative to the clamping arm 61, as shown in Fig. 1. Thus it will be seen that the stylus is first clamped against lateral movement and then later moved bodily with the carriage during the back-spacing operation, and that after the carriage handle 46 or back-space lever 51 is released and the subsequent release of the stylus clamping means occurs, the stylus 20 will be in the same position relative to the carriage that it was before the back-spacing operation commenced.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention, what is

claimed as new and for which it is desired to obtain Letters Patent, is:—

1. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating circular feed-nut on the carriage; means comprising a tensioned spring member to normally hold the feed-nut against rotation; and manually operable means having a limited range of movement for first decreasing the tension of said spring member and then serving as a handle to move the carriage along the frame.

2. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating rotatable feed-nut on the carriage; means to normally hold the feed-nut against rotation; means to back-space the carriage a predetermined extent upon each operation thereof; and means operated as an incident to the operation of said back-spacing means to release the feed-nut holding means.

3. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating rotatable feed-nut on the carriage; means to normally hold the feed-nut against rotation; means to back-space the carriage a predetermined extent upon each operation thereof; and means operated as an incident to the operation of said back-spacing means to release the feed-nut holding means and allow the carriage to be moved independently of the operation of the feed-mechanism while the feed-screw and feed-nut remain in cooperating engagement.

4. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating circular feed-nut rotatably mounted on the carriage; means associated with said circular feed-nut to normally hold it by resilient frictional contact against rotation so that the carriage will normally move under the influence of the feed-screw; a pivotally mounted carriage handle adapted to be grasped by the operator when it is desired to move the carriage in either direction longitudinally of the frame; and means operated by said carriage handle to decrease the said resilient frictional contact of the circular feed-nut holding means and allow the feed-nut to roll on the feed-screw when the carriage is moved longitudinally of the frame by hand-engagement with said handle.

5. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating circular feed-nut on the carriage; means comprising a tensioned spring member to normally hold the feed-nut against rotation; and means on the carriage adapted to be grasped to move the carriage and incidentally to relieve the tension of said spring member so that said feed-nut may be free to rotate.

6. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating circular feed-nut on the carriage; means comprising a tensioned spring member to normally hold the feed-nut against rotation; and a manually operable lever on the carriage which, when operated, relieves the spring tension of the feed-nut holding means.

7. In a dictating machine, a carriage; carriage driving means comprising a feed-screw and a cooperating circular feed-nut on the carriage; means to frictionally hold the feed-nut against rotation; means to back-space the carriage step-by-step at each operation thereof; and means operated by said back-spacing means to relieve the friction of said feed-nut holding means.

8. In a dictating machine, a carriage; carriage driving means comprising a feed-screw and a cooperating circular feed-nut on the carriage; means to frictionally hold the feed-nut against rotation; means to back-space the carriage step-by-step at each operation thereof; and means operated by said back-spacing means to remove the friction of said feed-nut holding means.

9. In a dictating machine, the combination of a frame; a carriage movable on the frame; carriage driving means comprising a feed-screw on the frame and a circular feed-nut rotatably mounted on the carriage; a spider to frictionally hold the feed-nut against rotation; and friction controlling means comprising a rotatable cam.

10. In a dictating machine, the combination of a frame; a carriage movable on the frame; carriage driving means comprising a feed-screw on the frame, a stud-shaft on the carriage and a circular feed-nut rotatably mounted on the stud-shaft; a spider to frictionally hold the feed-nut against rotation; and friction controlling means comprising a rotatable cam having a limited range of rotating movement and proportioned to hold the feed-nut against rotation in one limit of cam movement and allow free rotation of the feed-nut while retaining it on the stud-shaft in the other limit of cam movement.

11. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating rotatable feed-nut on the carriage; means to normally hold the feed-nut against rotation; means to back-space the carriage; and means operated as an incident to the operation of said back-spacing means to release the feed-nut holding means.

12. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating rotatable feed-nut on the carriage; means to normally hold the feed-nut against rotation; a pivotally mounted carriage handle; means operated by the movement of said carriage handle to release the feed-nut holding means; and means to back-space the carriage which, when operated, actuates the carriage handle to release the feed-nut holding means.

13. In a dictating machine, the combination of a frame; a carriage movable on the frame; a carriage driving feed-screw on the frame; a cooperating rotatable feed-nut on the carriage; means to normally hold the feed-nut against rotation; a pivotally mounted carriage handle; means to back-space the carriage; and means to release the feed-nut holding means operable incidental to the operation of either the carriage handle or the back-spacing means.

14. In a dictating machine, the combination of a frame, a carriage movable on the frame, a sound box on the carriage, a stylus mounted on the sound box having a range of free lateral movement, a feed screw rotatably mounted on the frame, a feed nut rotatably mounted on the carriage in cooperative engagement with said feed screw, means to condition the feed nut for or against rotation, means to hold the stylus against free lateral movement, means for con-

trolling the operation of said conditioning means, and means responsive to an operation of said controlling means for rendering said stylus-holding means effective to prevent lateral movement of said stylus.

15. In a dictating machine, the combination of a frame, a carriage movable on the frame, carriage driving means comprising an element on the frame and an element on the carriage arranged to cooperate with said element on the frame, friction means associated with one of said elements adapted when in action to cooperate in the drive of the carriage and to permit the backspacing thereof while said elements are in cooperation with each other, and means to backspace the carriage including means to put said friction means substantially out of action as an incident to the backspacing operation, whereby said backspacing means may be operated substantially free from resistance by said friction means and without disturbing the interrelationship of said elements.

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