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(54) **Exercise apparatus with elongated stride**

Übungsgerät mit verlängerter Schrittweite

Appareil d'exercices à foulée allongée

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US-A- 5 848 954
US-A- 5 882 281
US-A- 5 913 751

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EP 1 151 761 B1

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention:

[0001] This invention relates generally to an aerobic exercise machine. More particularly, but not by way of limitation, the present invention relates to an aerobic exercise apparatus with elongated stride and claims benefit of prior filed copending Provisional Application No. 60/201,198, filed May 2, 2000.

2. Background:

[0002] Although offered by various manufacturers under a variety of generic names, generally speaking, an elliptical exerciser is an aerobic exercise machine wherein the user's feet travel in a generally elongated elliptical path while the user walks, jogs, runs, or climbs. Many elliptical exercisers include a feature for simultaneously exercising the upper body.

[0003] There are many advantages to using a mechanical device to aerobically train rather than simply running or jogging. For example, such machines typically provide the user with meaningful feedback in regard to the exercise performed. For example, a typical aerobic exercise machine may provide the user with a real-time display of power produced by the user (i.e. Watts), as well as totalizing displays of information such as calories expended or equivalent miles run. In addition, properly designed equipment reduces the risk of injury, and, as part of a rehabilitation program, allows easy monitoring by a therapist.

[0004] Elliptical exercisers have proven to provide a quantifiable, low impact workout with meaningful results, and are, therefore, a viable alternative to treadmills, stationary bicycles, stair climbers, rowing machines, and the like. In that regard, elliptical exercisers have thus far been very popular in relation to other aerobic machines.

[0005] In a typical elliptical exercise see for example document US-A-5 882 281, the user's feet rest on individual pedals which are mounted on rails. A first end of each rail is attached to a bell crank such that the first end of each rail travels in a circular path. The left end of the bell crank is 180 degrees out of phase with the right end of the bell crank such that as one foot moves forward, the other foot moves backward and as one foot moves up, the other foot moves down. The second end of each rail, depending on the particular machine, is constrained to move in a track, over a fixed roller, or guided by a swing arm, thereby producing backward and forward motion in response to the movement of the bell crank. The resulting stride of each foot of the user follows a generally elliptical path. The exact dimensions of the ellipse are dependant on a variety of variables such as the length of the rail, the position of each pedal on its rail, the diameter of the circle traveled by the bell crank, and the path traversed by the end of the rail opposite the bell crank. The perceived level of difficulty in using an elliptical exerciser and the comfort of the user are also dependant on these variables.

[0006] A limitation of a typical elliptical exerciser is the amount of floor space occupied by the machine. Whether in a home, a health club, or a rehabilitation facility, ideally, an exercise machine will occupy as little floor space as possible, especially where such floor space is rented by the square foot. The size of an elliptical exerciser is dictated by, among other things, the length of the pedal rails and the space required to allow the horizontal movement of the rails in response to the motion of the bell crank.

[0007] Another related limitation arises from the hazzard produced by the movement of the rail end opposite the bell crank. This is especially true with elliptical exercisers where the rails move outside the footprint of the frame of the machine. A person walking near the machine may be struck by a rail or trip over a rail. Accordingly, many manufacturers provide a cover over the end of the rails, adding cost and further occupying floor space.

[0008] A further limitation of many elliptical exerciser designs is that some machines have a roller on the free end of the pedal rail or a pivot on a swing arm very close to the floor. It has been a common practice for some health clubs to place exercise machines near a swimming pool. In addition, some facilities pour excessive water on the floor during cleaning. Either of these situations will subject rollers and pivots placed near the floor to potential water damage.

[0009] It is thus an object of the present invention to provide an elliptical exerciser wherein, the back end of the pedal rails pivot from a fixed position, rather than swinging in an arc, traversing a fixed roller, or moving in a track, while still allowing the front end of the rails to traverse a circular path.

[0010] It is a further object of the present invention to locate rotating or oscillating components of the pedal rails a sufficient distance above the floor to avoid subjecting such components to water in a typical commercial or institutional environment.

SUMMARY OF THE INVENTION

[0011] The present invention provides an elliptical exerciser which incorporates a telescoping rail mechanism wherein, the back end of the rail merely pivots, rather than moving linearally or swinging in an arc. The horizontal component of the motion created by the bell crank is accommodated by the telescopic rail. The vertical component of the motion is accommodated by the pivot.

[0012] In the inventive elliptical stepper, a front portion of each rail connects to the corresponding end of a bell crank. The back end of each rail connects to a pivot which is provided on the frame, preferably several inch-

es above the floor surface. The front portion of the rail is in sliding engagement with the rear portion the rail such that the rail is rigid in regards to vertical forces but will telescopically extend or retract in response to tensile or compressive forces, respectively.

[0013] Further objects, features, and advantages of the present invention will be apparent to those skilled in the art upon examining the accompanying drawings and upon reading the following description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 depicts the inventive aerobic exercise apparatus in its general environment.

FIG. 2 provides a perspective view of the inventive aerobic exercise apparatus.

FIG. 3 provides a partial side view of the inventive aerobic exercise apparatus showing the left pedal rail in its maximum upward position and the right pedal rail in its maximum downward position.

FIG. 4 provides a partial side view of the inventive aerobic exercise apparatus showing the left pedal rail in its fully extended position and the right pedal rail in its fully retracted position.

FIG. 5 provides a cross sectional view of a left pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 6 provides a cutaway side view of the right pedal rail in its fully retracted position as incorporated in the inventive aerobic exercise apparatus.

FIG. 7 provides a cutaway side view of the right pedal rail in its fully extended position as incorporated in the inventive aerobic exercise apparatus.

FIG. 8 provides a side view of the distal end of the front rail portion of a pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 9 provides a top view of the distal end of the front rail portion of a telescopic pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 10 provides an end view of the back end of a pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 11 provides a partial end view of the back of the inventive aerobic exercise apparatus showing a pivot, pedal rail, and pedal.

FIG. 12 provides a partial top view of the inventive aerobic exercise apparatus showing the left pedal rail in its fully extended position and the right pedal rail in its fully retracted position.

FIG. 13 provides a top view of the rear portion of a telescopic pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 14 provides a side view of the rear portion of a telescopic pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 15 provides a partial top view of the end of the rear portion of a telescopic pedal rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 16 provides a partial cutaway side view of an alternate embodiment of a telescopic side rail as incorporated in the inventive aerobic exercise apparatus.

FIG. 17 provides a cross sectional view of an alternate embodiment of the rear portion of a telescopic pedal rail as incorporated in the inventive aerobic exercise apparatus which includes wear strips thereon.

FIG. 18 provides an end view of the back end of an alternate embodiment of a telescoping pedal rail as incorporated in the inventive aerobic exercise apparatus which includes wear strips therein.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] The preferred embodiment of the inventive aerobic exercise apparatus **20** with elongated stride is shown in its general environment in FIGS. 1 and 2. Aerobic exercise apparatus **20** comprises: frame **22** supported by front leg **24** and rear leg **26;** left cover **28** enclosing the left side of the upright portion of frame **22;** likewise, right cover **30** enclosing the right side of the upright portion of frame **22;** bell crank **32** extending through an aperture (not shown) provided in left enclosure **28** and aperture **34** provided in right cover **30**; handrail **36** secured to frame **22**; electronic console **38**; left telescoping pedal rail **40**; and right telescoping pedal rail **42**.

[0016] Bell crank **32** is in mechanical communication with a brake assembly under the control of electronic console **38**. Such breaking systems are known in the art and not a part of the present invention.

[0017] Preferably, right telescoping pedal rail **42** includes front portion **44** and rear portion **46.** As best seen in FIGS. 3 and 4, bushing **48** extends through front portion **44** for rotatably attaching telescopic pedal rail **42** to bell crank **32.** Similarly, as best seen in FIGS. 13 and 14 in combination with FIG. 1, rear portion **46** includes bushing **50** for pivotably attaching telescopic rail **42** to a pivot **52** on rear leg **26**.

[0018] Likewise, as shown in FIG. 2, left telescoping pedal arm **40** includes front portion **54** and rear portion **56**. Front portion **54** rotatably attaches to bell crank **32** and rear portion **56** pivotably attaches to pivot **58** on rear leg **26**.

[0019] As will be apparent to those skilled in the art, left telescoping pedal rail **40** is the mirror image of right telescoping pedal rail **42** and any discussion with reference to either rail applies equally to the other rail. For the sake of convenience, the discussion of the construction and operation of inventive telescoping pedal rails **40** and **42** will be addressed primarily with respect to the right telescoping pedal rail **42**, and it is to be understood

that such discussion also applies to the left telescoping pedal rail **40**.

[0020] Referring now to FIGS. 8 and 9, preferably front portion **44** is tubular and includes: pedal support **60** extending upward therefrom; first roller support **61** rotatably securing rollers **62** and **64** such that roller **64** extends through notch **70** in front portion **44**; and second roller support **72** rotatably supporting rollers **66** and **68** such that rollers **66** and **68** extend through aperture **74** provided in front portion **44**. When telescoping pedal rail **42** is assembled, rear portion **46** is slidingly received in front portion **44** such that rollers **62**-**68** support rear portion **46** (FIGS. 6, 7, 8, and 10) to constrain the vertical movement of rear portion **46** relative to front portion **44**.

[0021] Continuing to refer to FIG. 10, front portion **44** includes horizontal roller supports **78** which rotatably support rollers **80** such that rollers **80** will rollingly contact the sides **81** of rear member **46** when such contact occurs. Referring now to FIG. 15 in conjunction with FIG. 10, rollers **96** are rotatably supported on the end of rear portion **46** such that rollers **96** will rollingly contact the inside side wall **82** of front portion **44** to the extent such contact occurs. Rollers **96** operate in conjunction with rollers **80** to maintain horizontal gap **98** between the side walls **82** of front portion **44** and the sides **81** of rear portion **46**.

[0022] As best seen in FIG. 11, preferably, pedal **84** is pivotably attached to support **60** and includes: stop **86** to limit mechanical travel of pedal **84**; bottom plate **88**; and pad **90** to receive the users foot.

[0023] Referring again to FIG. 1, in operation, a user prepares for operation of the inventive aerobic exerciser **20** by first stepping onto pedals **84**. The user begins operation of the machine by shifting her weight to one foot which provides a downward force on that pedal which in turn presents a downward force on the bell crank **32** which causes bell crank **32** to begin rotating. As the front end of a pedal rail passes the bottom of its circular path, as shown by the position of the right telescoping pedal rail **42** in FIG. 1, the user shifts her weight to the other pedal, thereby continuing to force bell crank **32** to rotate.

[0024] As bell crank **32** rotates from the position shown in FIG. 1 to the position shown in FIG. 2, the front portion of each pedal rail is simultaneously subjected to vertical movement and horizontal movement. The vertical component of the movement causes pivotal movement of telescoping pedal rails **40** and **42** at pivots **58** and **52,** respectively. The horizontal component of the movement results in the extension and retraction of telescoping pedal rails **40** and **42**. As shown in FIGS. 6 and 12, when bell crank **32** is rotated to the point where the front portion **44** is at its rearmost position **92**, telescoping pedal rail **42** is fully retracted. Conversely, when bell crank **32** is rotated to the point where the front portion **44** is at its most forward position **94** (FIG. 7), telescoping pedal rail **42** is fully extended. The resulting stride which is presented to the user at each pedal **84** follows a generally elliptical path.

[0025] As will be apparent to those skilled in the art, an aerobic exerciser which incorporates the inventive telescoping pedal rail does not require additional space beyond the back of the machine to accommodate motion of the pedal rail. It will also be apparent that there is no movement outside of the frame of the exerciser thereby reducing risk to other people near the machine.

[0026] In an alternate embodiment, as shown in FIG. 16, rollers **100** are rotatably supported on rear portion **102** and roll along the inside walls of front portion **104**. Roller **106** maintains a gap to prevents side-to-side contact between rear portion **102** and front portion **104**. Front portion **104** includes roller support **108** and roller **110** to provide additional vertical support between front portion **104** and rear portion **102**.

[0027] In another alternate environment as shown in FIGS. **17** and **18,** guides **200** are attached to rear portion **46** with fasteners **202.** When telescoping pedal rail **42** (FIG. 1) is assembled such that rear portion **46** is slidingly received in front portion **42,** guides **200** will contact the inside side walls **82** of front portion **46** to the extent such contact occurs. Preferably, guides **200** are formed of a plastic material which is naturally self lubricating with respect to front portion **44**.

[0028] As will be understood by those skilled in the art, although the above-described preferred embodiment of the inventive apparatus has been explained with reference to a tubular front portion which receives a rear portion, the invention is not so limited. The inventive aspect of the pedal rail being the telescopic relationship between the front portion and the rear portion. Thus, by way of example and not limitation, the rear portion could be formed of tubular material and receive the front portion, or the front or rear portions could be formed of channel rather than tubular material. By way of further example, the pedal rail could be round comprising a round shaft which telescopes within a tubular portion having a linear bearing along the interface between the shaft and tube.

[0029] As will be further understood by those skilled in the art, although the above preferred embodiment of the inventive apparatus has been discussed in regard to a pedal which is pivotably attached, a rigid pedal attachment could be incorporated in the inventive device.

[0030] Thus, the present invention is well adapted to carry out the objects and attain the ends and advantages mentioned above as well as those inherent therein. While presently preferred embodiments have been described for purposes of this disclosure, numerous changes and modifications will be apparent to those skilled in the art. Such changes and modifications are defined by the appended claims.

Claims

1. An aerobic exerciser (20) comprising:

a frame (22);
a bell crank (32) having a left side and a right side, said bell crank (32) rotatable mounted to said frame (22);
a left and a right pivot (52) mounted to said frame (22);
a left and a right pedal rail (40, 42) having a front end and a back end

characterized in that
said left and right pedal rails (40, 42) are telescopic pedal rails, each including a front portion (44, 54) and a rear portion (46, 56),
said rear portions (46, 56) being in sliding engagement with said front portions (44, 54),
said front portions (44, 54) being rotatable attached to said left and right side respectively of said bell crank (32) at the front end, such that said front ends of said telescoping pedal rails (40, 42) move in a circular path in response to rotational movement of said bell crank (32), and
said back portions (46, 56) are pivotable attached to said left and right pivot (52) respectively at the back end.

2. The aerobic exercise apparatus of claim 1 further comprising:

a left and a right pedal (84), said pedals (84) being pivotably attached to said front portions (44, 54) of said left and right telescoping pedals rail (40, 42), respectively.

3. The aerobic exercise apparatus of claim 1 or 2 wherein at least one roller (62, 66) is rotatable supported by either said front portion (44, 54) or said rear portion (46, 56) and in rolling contact with the other of said front portion (44, 54) or said rear portion (46, 56).

4. The aerobic exercise apparatus of claim 3 wherein said front and rear portions (44, 46, 54, 56) have a top and a bottom;
at least a second roller (62, 66) is rotatable supported by either said front portion (44, 54) or said rear portion (46, 56) and in rolling contact with the other of said front portion (44, 54) or said rear portion (46, 56),
wherein, said first roller (62) is in rolling contact with the top of said front portion (44, 54) or said rear portion (46, 56) and said second roller (66) is in rolling contact with the bottom of the other front portion (44, 54) or said rear portion (46, 56), respectively.

Patentansprüche

1. Aerobic-Übungsgerät (20) mit:

einem Rahmen (22);

einem Winkelhebel (32 mit einer linken und einer rechten Seite, wobei der Winkelhebel (32) drehbar an dem Rahmen (22) angebracht ist;

einem linken und einem rechten Schwenkzapfen (52), die jeweils am Rahmen (22) angebracht sind;

einer linken und einer rechten Pedalschiene (40, 42) mit einem vorderen und einem hinteren Ende,

dadurch gekennzeichnet, daß
die linke und die rechte Pedalschiene (40, 42) teleskopische Pedalschienen sind, die jeweils einen vorderen Bereich (44, 54) und einen hinteren Bereich (46, 56) aufweisen, wobei die hinteren Bereiche (46, 56) in gleitendem Eingriff mit den vorderen Bereichen (44, 54) sind,
wobei die vorderen Bereiche (44, 54) am vorderen Ende drehbar an der linken bzw. der rechten Seite des Winkelhebels (32) derart angebracht sind, daß sich die vorderen Enden der teleskopierbaren Pedalschienen (40, 42) in Reaktion auf eine Drehbewegung des Winkelhebels (32) auf einer Kreisbahn bewegen, und wobei die hinteren Bereiche (46, 56) am hinteren Ende schwenkbar an dem linken bzw. rechten Schwenkzapfen (52) angebracht sind.

2. Aerobic-Übungsgerät nach Anspruch 1, ferner mit:

einem linken und einem rechten Pedal (84), wobei die Pedale (84) schwenkbar an den vorderen Bereichen (44, 54) der linken bzw. der rechten teleskopierbaren Pedalschienen (40, 42) angebracht sind.

3. Aerobic-Übungsgerät nach Anspruch 1 oder 2, bei dem mindestens eine Rolle (62, 66) entweder durch den vorderen Bereich (44, 54) oder den hinteren Bereich (46, 56) drehbar gestützt ist und in Rollkontakt mit dem anderen, dem vorderen Bereich (44, 54) oder dem hinteren Bereich (46, 56) steht.

4. Aerobic-Übungsgerät nach Anspruch 3, bei dem der vordere und der hintere Bereich (44, 46, 54, 56) eine Oberseite und eine Unterseite haben; wobei mindestens eine zweite Rolle (62, 66) entweder durch den vorderen Bereich (44, 54) oder den hinteren Bereich (46, 56) drehbar gestützt ist und in Rollkontakt mit dem anderen, dem vorderen Bereich (44, 54) oder dem hinteren Bereich (46, 56) steht, wobei die erste Rolle (62) in Rollkontakt mit der Oberseite des vorderen Bereichs (44, 54) oder des hinteren Bereichs (46, 56) steht und die zweite Rolle (66) in Rollkontakt mit der Unterseite des an-

deren, des vorderen Bereichs (44, 54) oder des hinteren Bereichs (46, 56) steht.

Revendications

1. Exerciseur d'aérobic (20) comprenant :

un châssis (22) ;
une manivelle (32) présentant un côté gauche et un côté droit, ladite manivelle (32) étant montée à rotation sur ledit châssis (22) ;
un pivot gauche et droit (52) monté sur ledit châssis (22) ;
des longerons de pédalage gauche et droit (40, 42) présentant une extrémité avant et une extrémité arrière,

caractérisé en ce que

lesdits longerons de pédalage gauche et droit (40, 42) sont des longerons de pédalage télescopiques, incluant chacun des portions frontales (44, 54) et des portions arrières (46, 56),

lesdites portions arrières (46, 56) étant en engagement par coulissement avec lesdites portions avant (44, 54),

lesdites portions avant (44, 54) étant fixées à rotation respectivement auxdits côtés gauche et droit de ladite manivelle (32) à l'extrémité avant, de telle sorte que lesdites extrémités avant desdits longerons de pédalage télescopiques (40, 42) se déplacent suivant une trajectoire circulaire en réponse au mouvement de rotation de ladite manivelle (32), et

lesdites portions arrières (46, 56) sont fixées à rotation auxdits pivots gauche et droit (52) respectivement à l'extrémité arrière.

2. Exerciseur d'aérobic selon la revendication 1, comprenant en outre :

des pédales gauche et droite (84), lesdites pédales (84) étant fixées à rotation auxdites portions avant (44, 54) desdits longerons de pédalage télescopiques gauche et droit (40, 42), respectivement.

3. Exerciseur d'aérobic selon la revendication 1 ou 2, dans lequel au moins un galet (62, 66) est supporté à rotation par l'une des portions avant (44, 54) ou l'une des portions arrière (46, 56) et est en contact de roulement avec l'autre des portions avant (44, 54) ou l'autre des portions arrière (46, 56).

4. Exerciseur d'aérobic selon la revendication 3, dans lequel

lesdites portions avant et arrière (44, 46, 54, 56) présentent une partie supérieure et une partie inférieure ;

au moins un deuxième galet (62, 66) est supporté à rotation par l'une des portions avant (44, 54) ou l'une des portions arrière (46, 56) et est en contact de roulement avec l'autre des portions avant (44, 54) ou l'autre des portions arrière (46, 56),

ledit premier galet (62) est en contact de roulement avec la partie supérieure de l'une des portions avant (44, 54) ou l'une des portions arrière (46, 56) et le deuxième galet (66) est en contact de roulement avec la partie inférieure de l'autre des portions avant (44, 54) ou de l'autre des portions arrière (46, 56), respectivement.

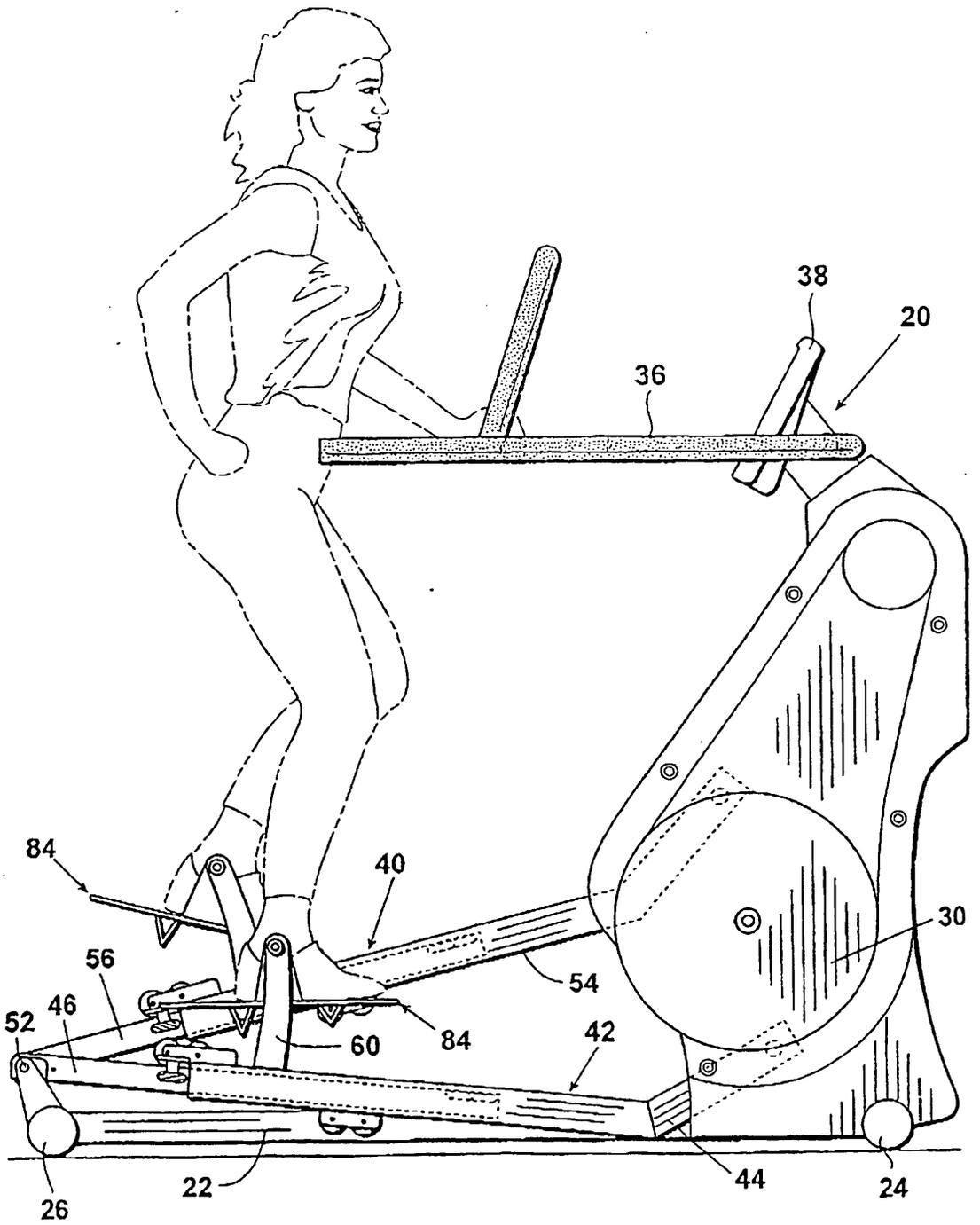


Fig. 1

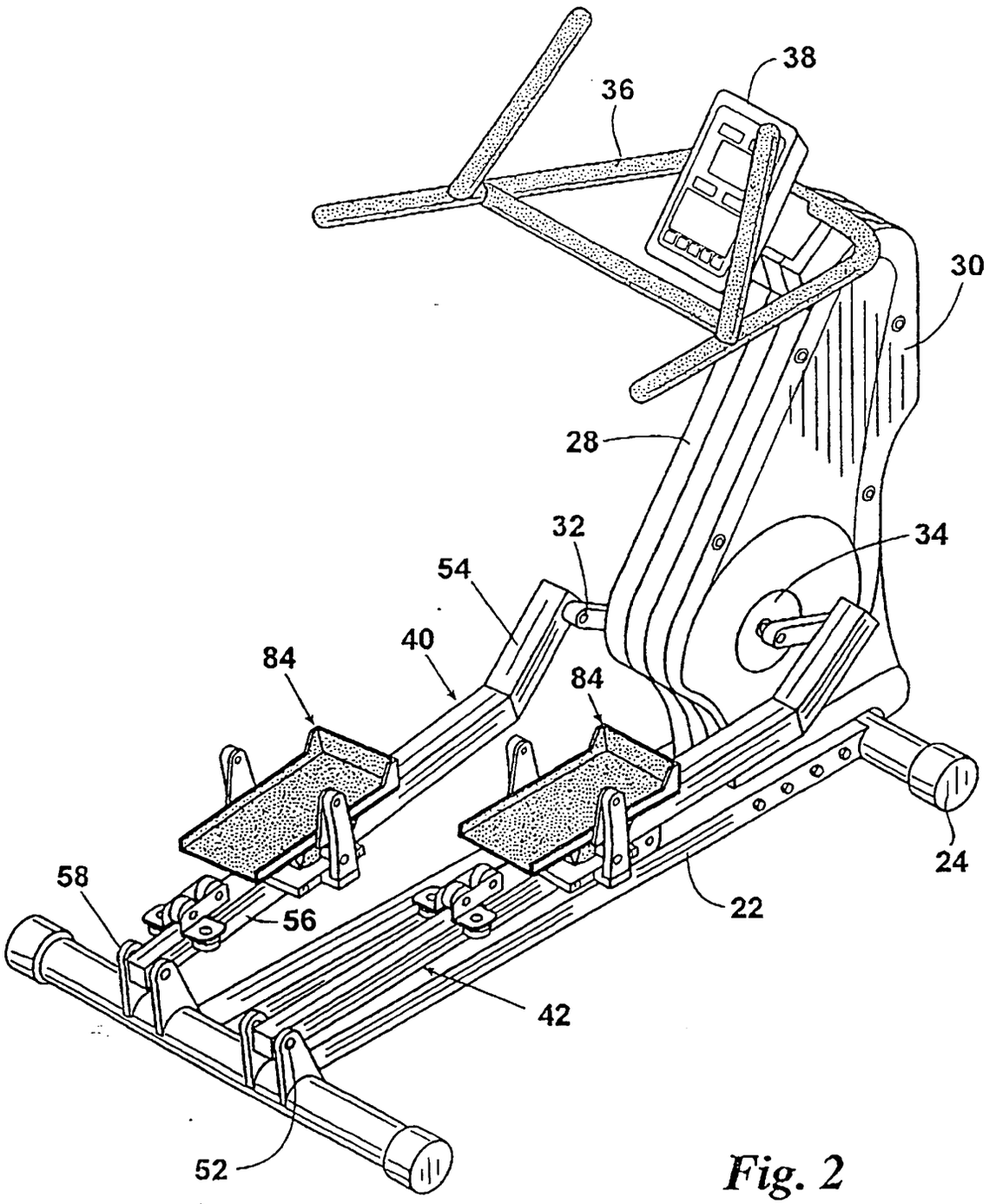
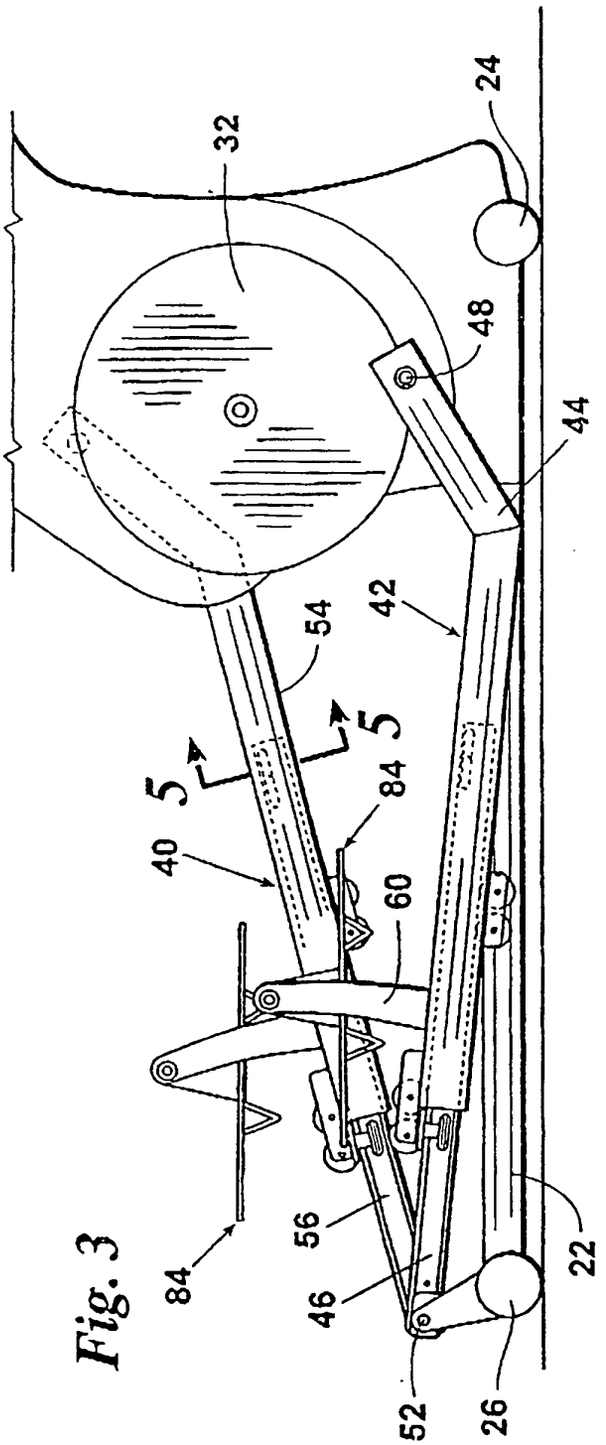


Fig. 2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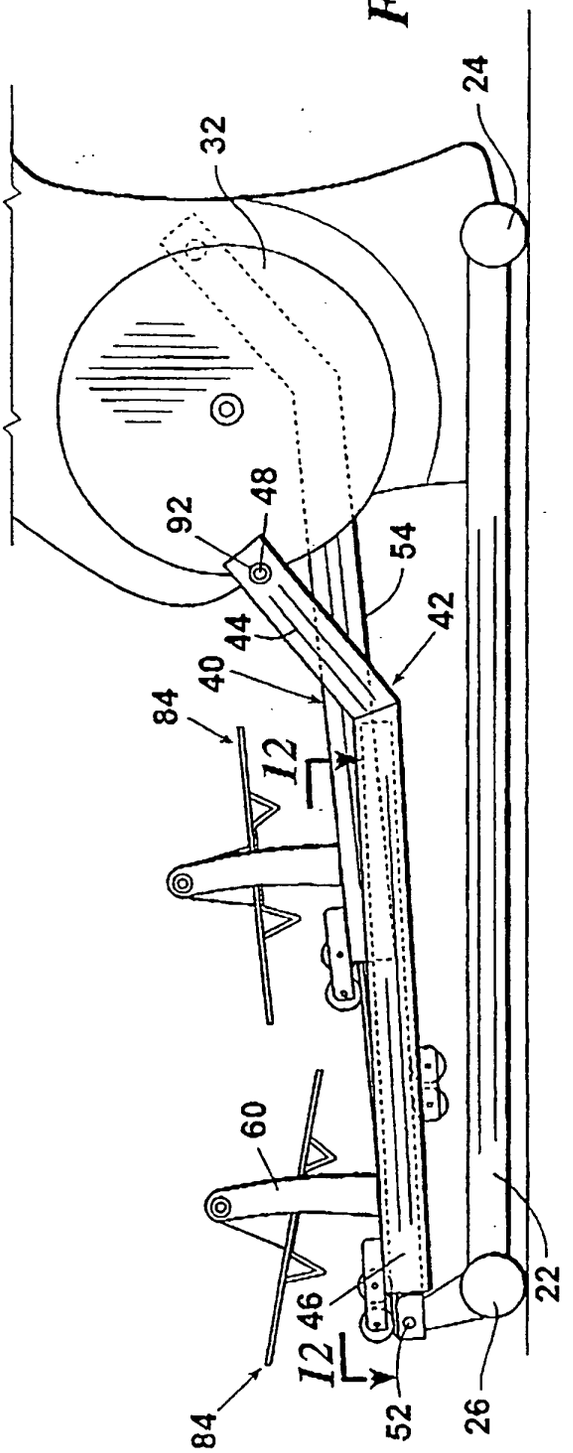
84

Fig. 3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84

Fig. 4

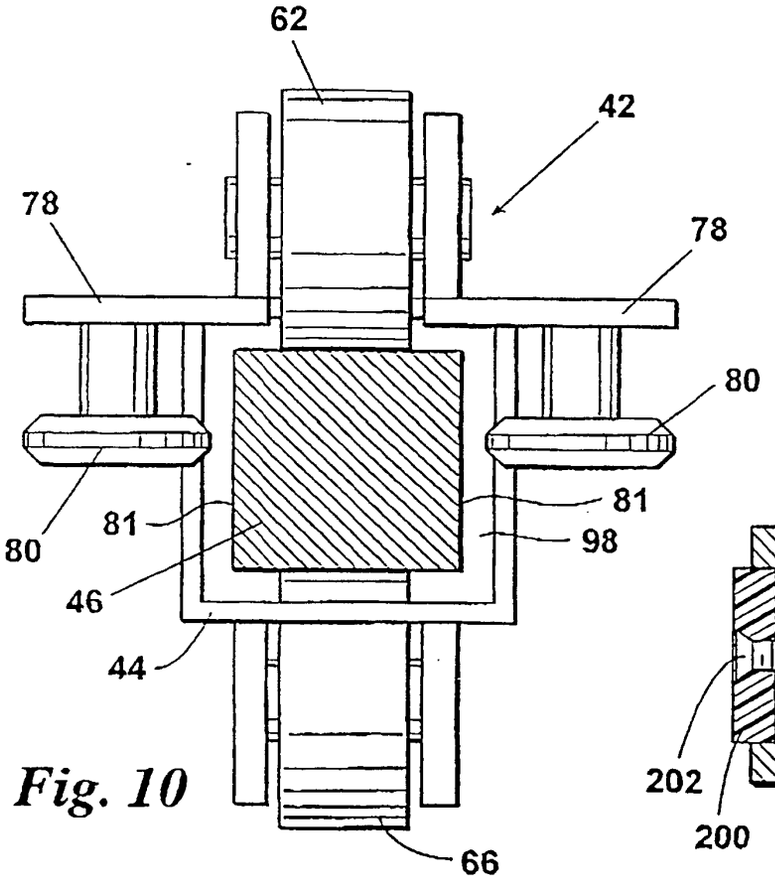


Fig. 10

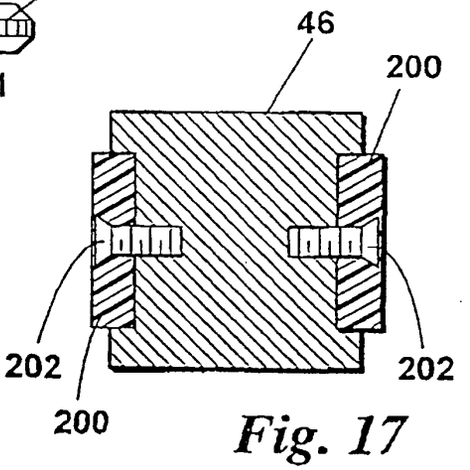


Fig. 17

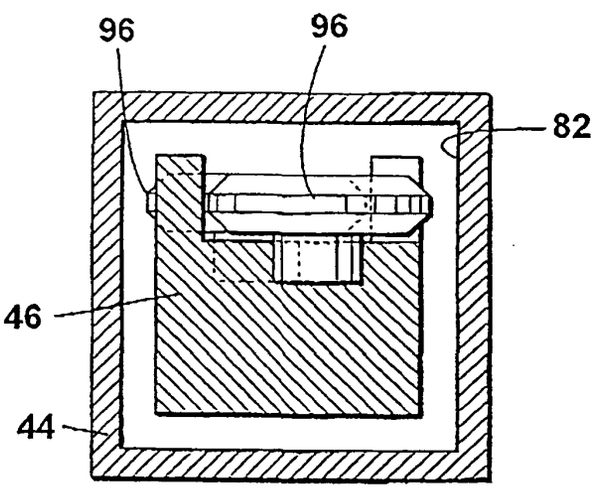


Fig. 5

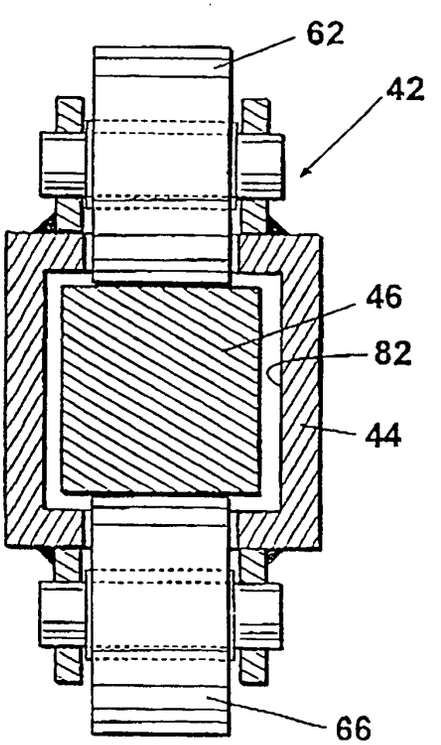
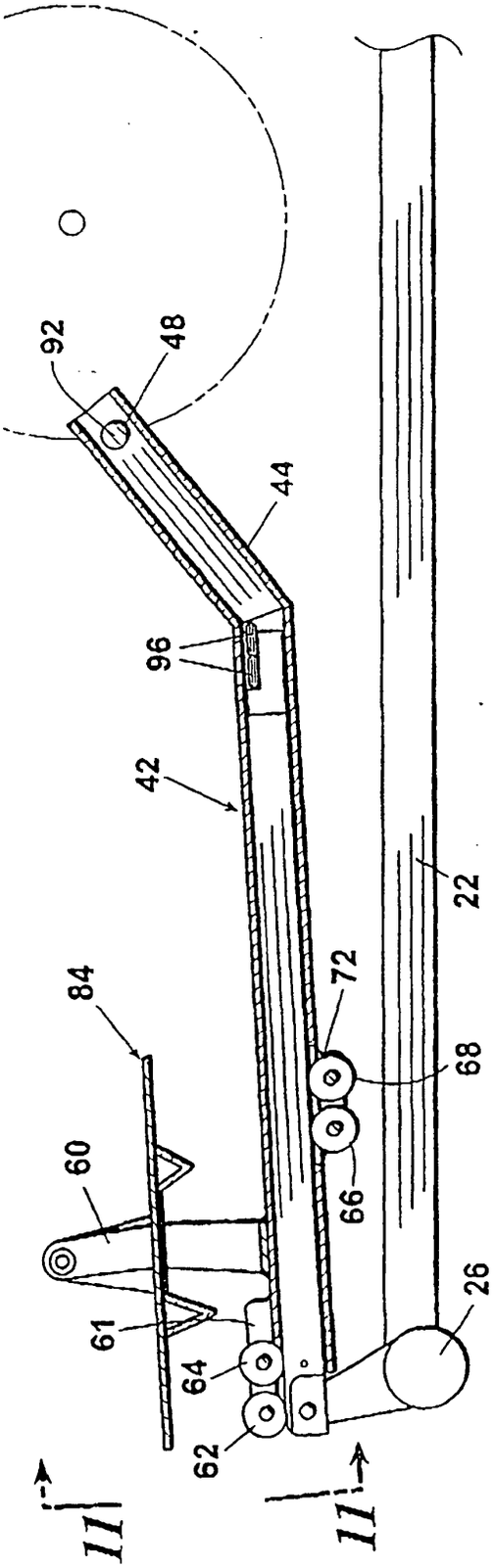


Fig. 18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62
26
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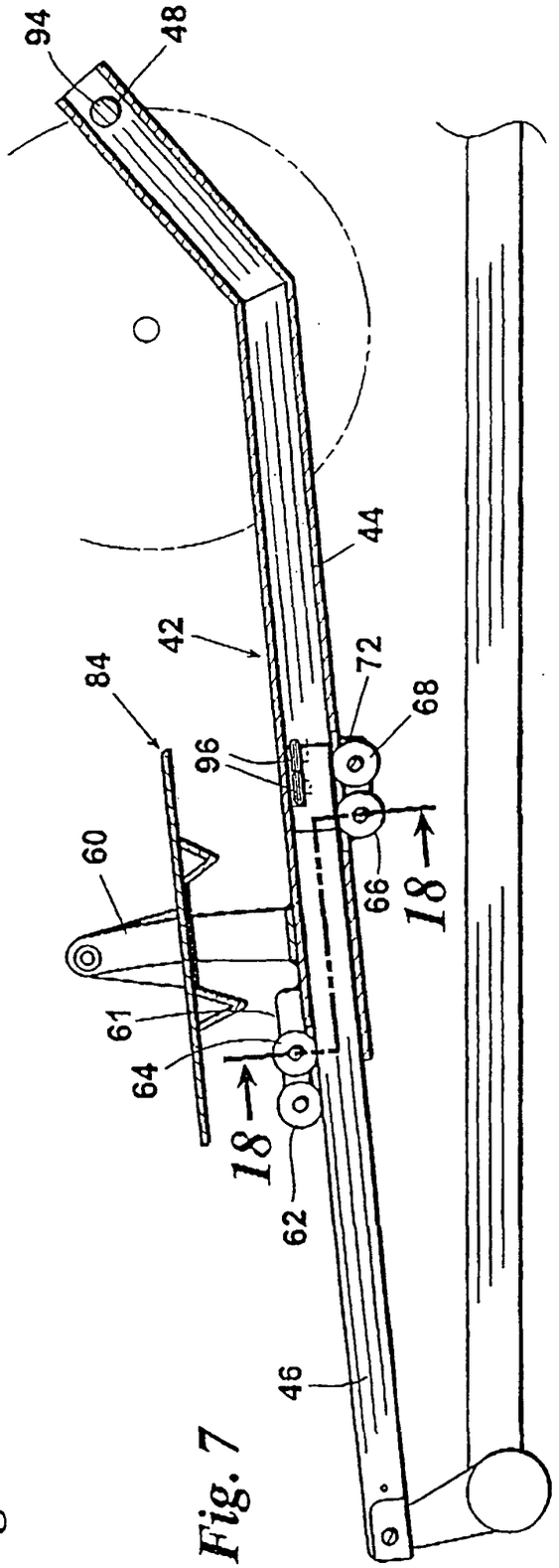
11

Fig. 6


94
48
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84
72
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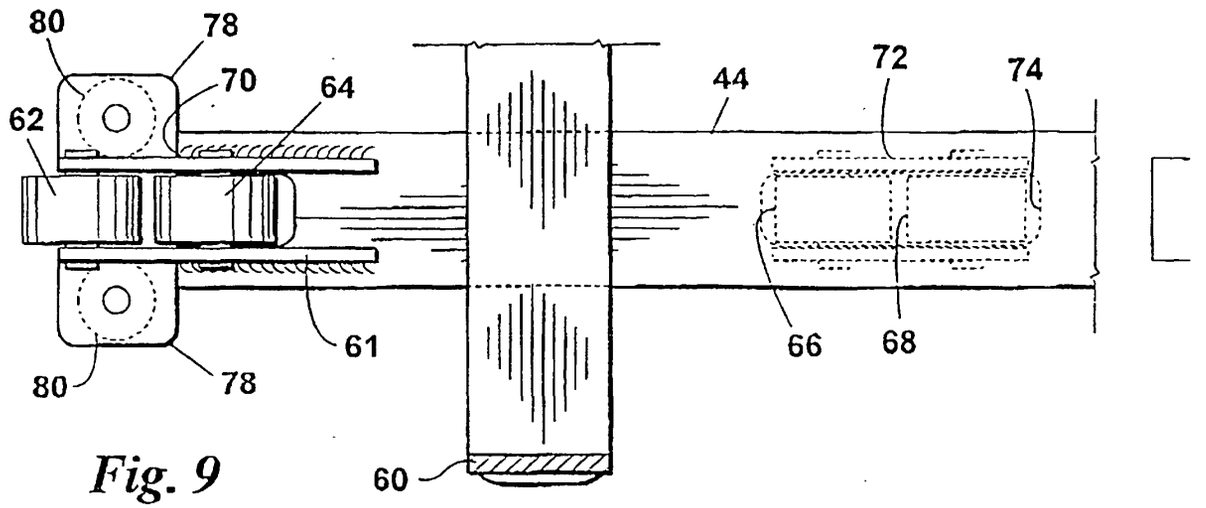
96
60
66
18
18
61
64
62
46

Fig. 7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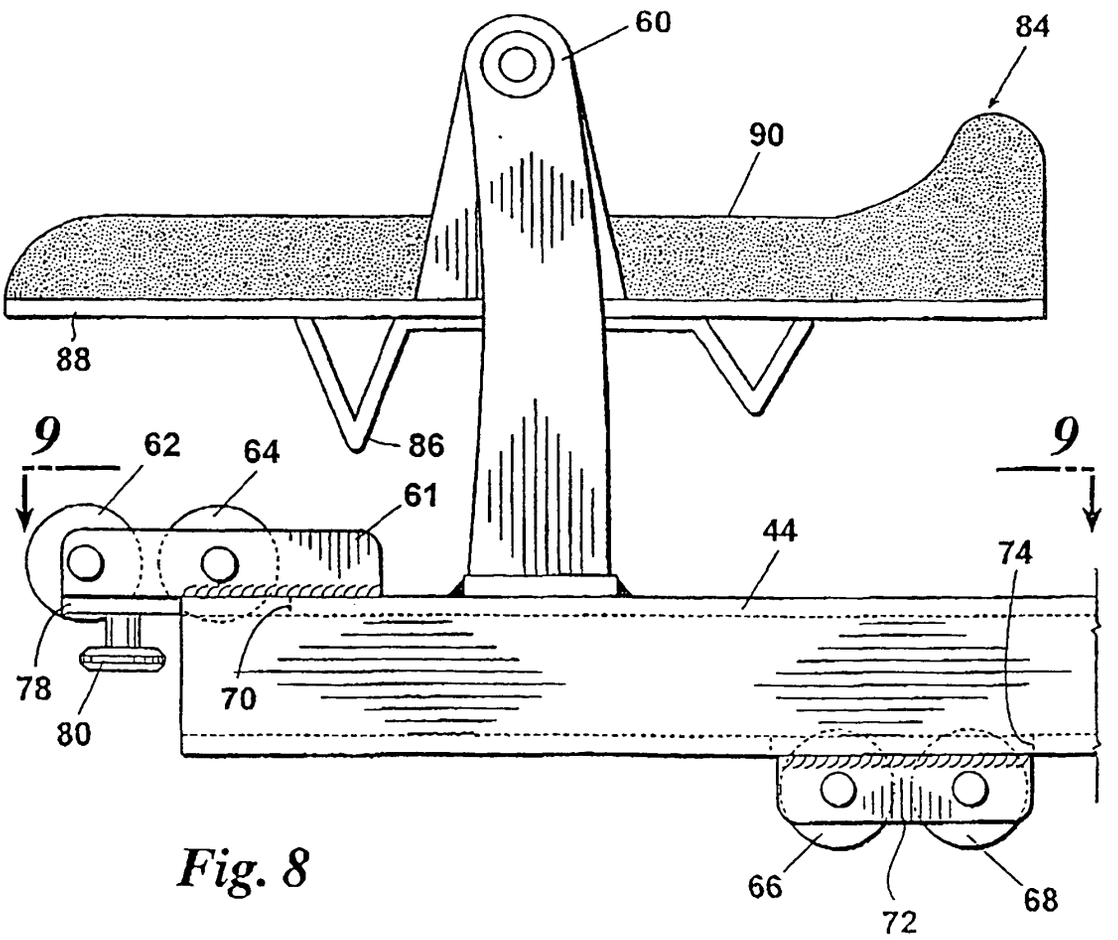
78
70
64
62
44
72
74
61
66
68
80
78
60

Fig. 9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84
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88
9
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86
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44
74
78
80
70
66
72
68

Fig. 8

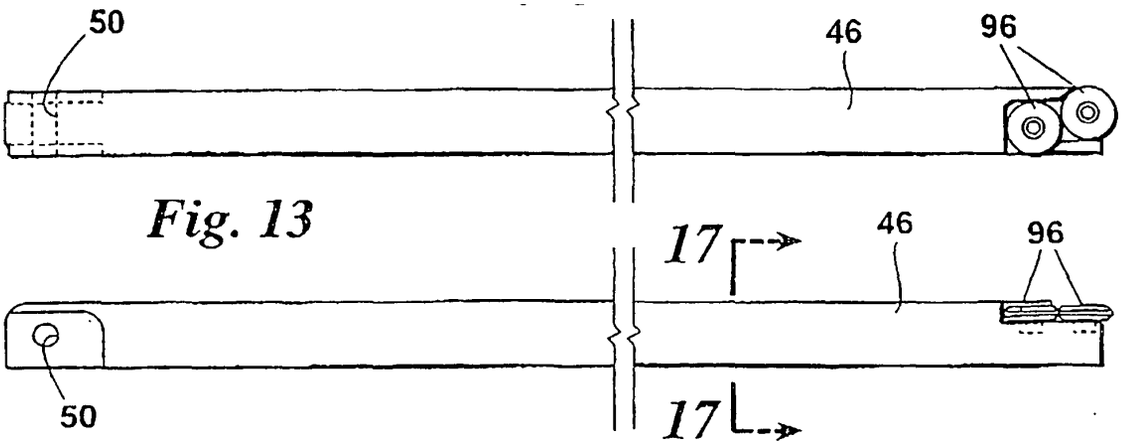

Fig. 13

Fig. 14

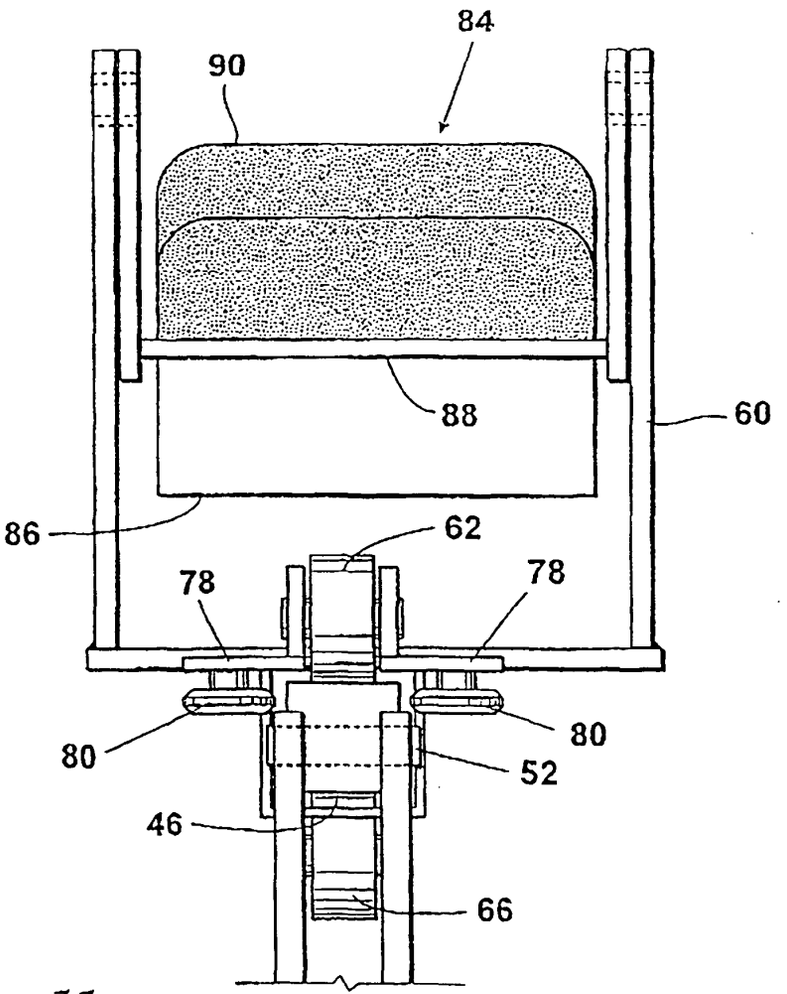

Fig. 11

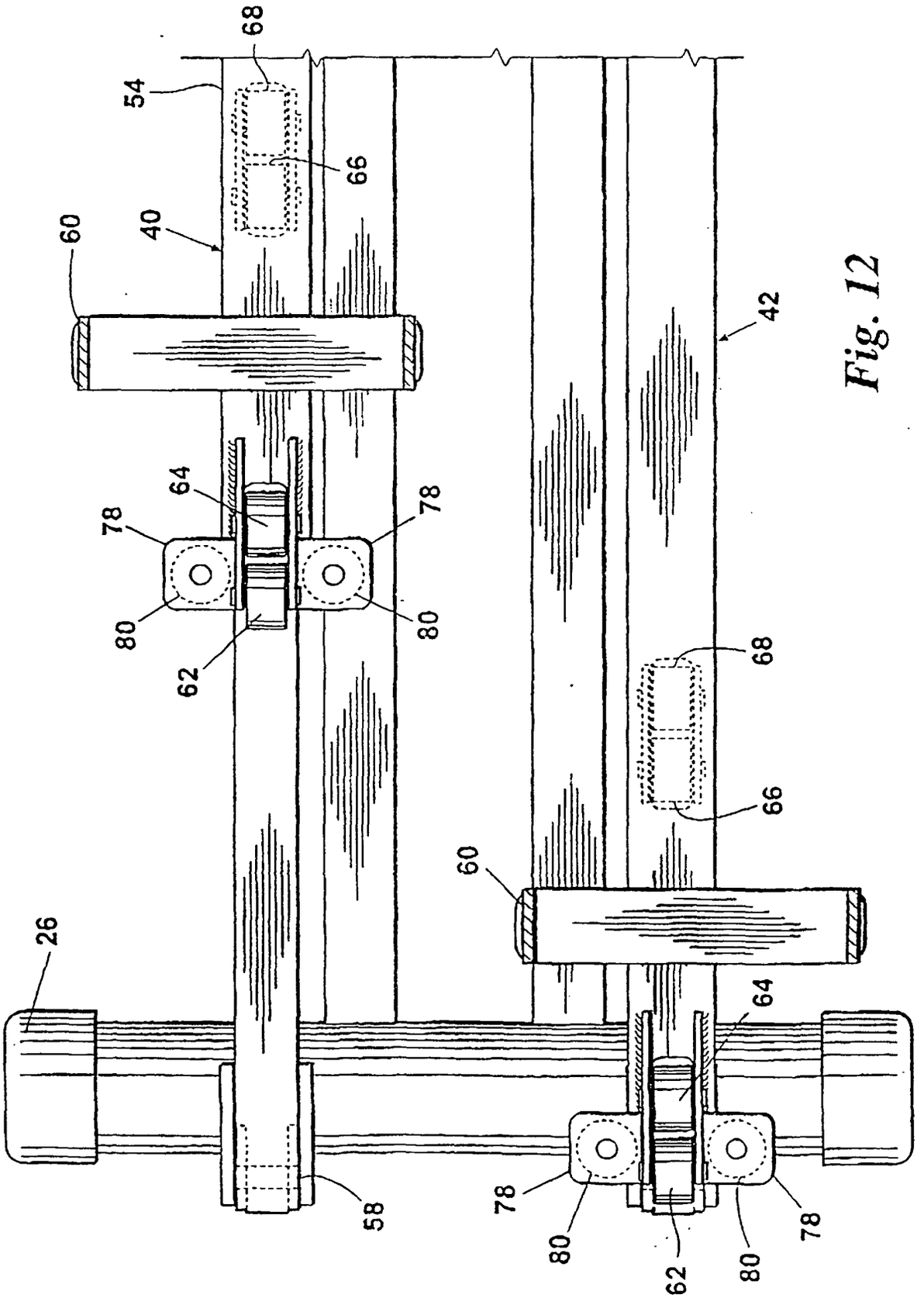

Fig. 12

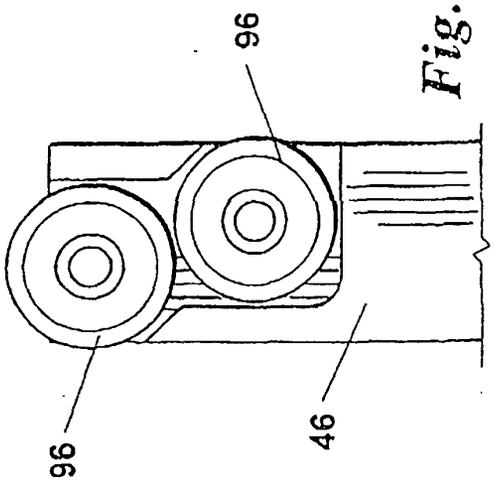

Fig. 15

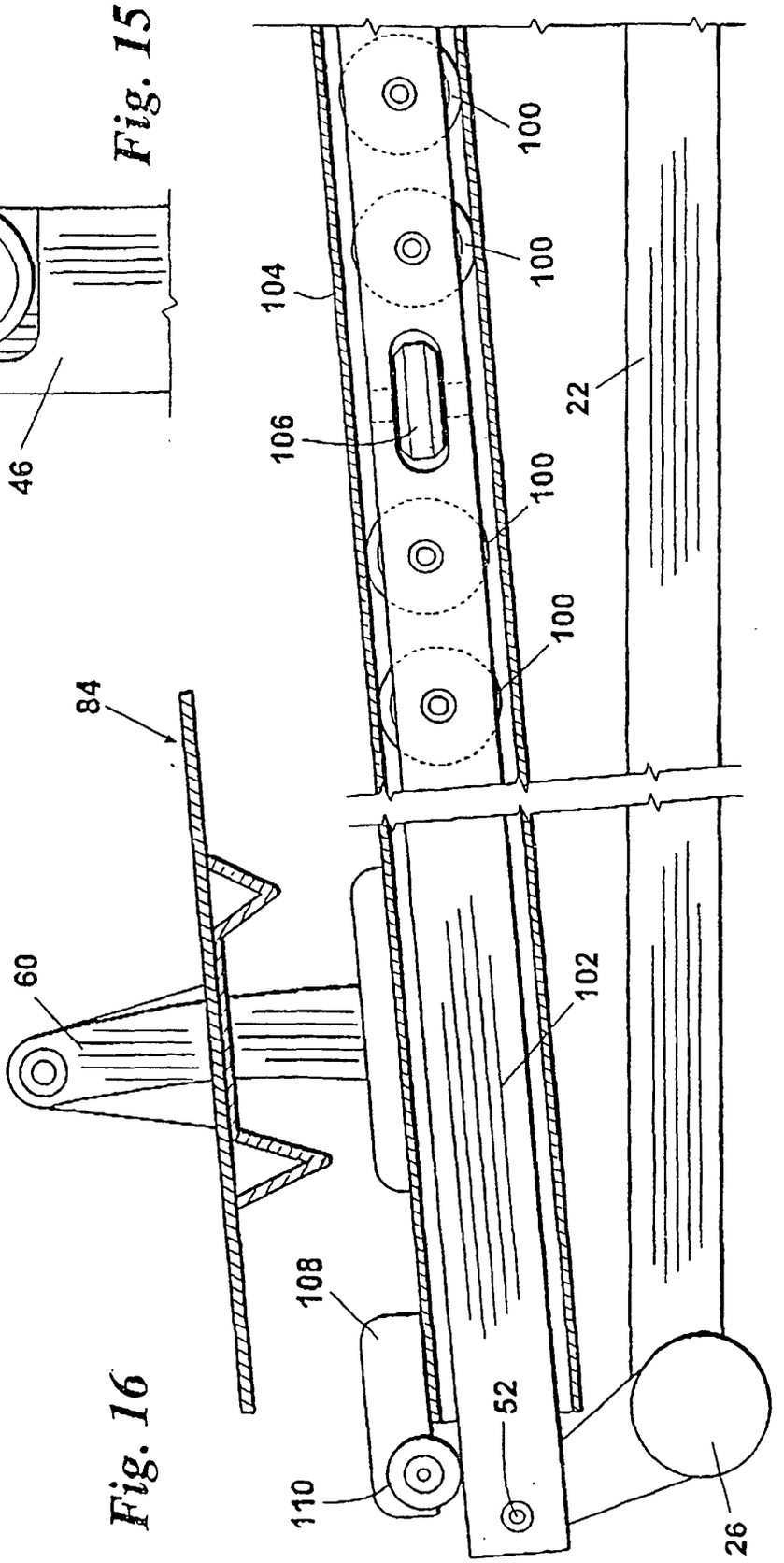

Fig. 16