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— *of inventorship (Rule 4.17(iv))*

**Published**:

— *with international search report (Art. 21(3))*

— *with amended claims (Art. 19(1))*

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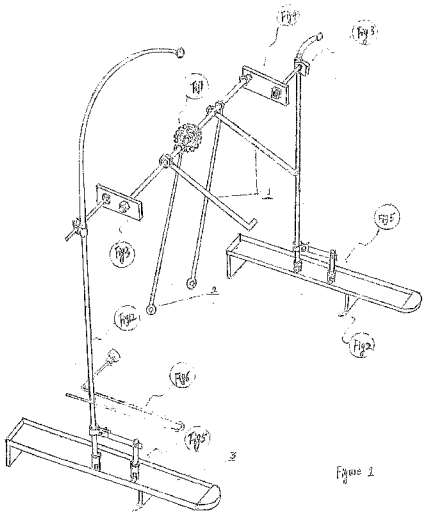
(54) **Title**: MULTI-FUNCTIONAL BIKE FOR FARMING AND GARDENING




(57) **Abstract**: The said invention shows a multi-functional bike for farming and gardening. It comprises an ordinary bike which is combined with a set of two accessory floating, slide boards (3), each on the left and right side of the bike. The pair of floating slide boards have its own convey system (1, 2, 7) which is installed on the rear wheel (12). Over the pedal and chain system (11, 12, 13) a part of the force will be transferred to a rolling arm plate (7) and drive further the floating slide board mechanism, so that each board has alternating contact to the ground, like a walking mechanism. There exists different type of boards (3), depending on the task in the seasonal farming. Another small slide board (16) is installed on the down tube of the bike frame. The multi-functional bike can be used in a mud or water rice paddy to plant rice seedling for example.

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Multi-functional Bike for Farming and Gardening

# DESCRIPTION

## The background of the invention field

To do farming work in the field especial in the wet rice paddy is an extremely hard labor work. The farmer's feet need to step into the muddy rice paddy, the body needs to have a bow position frequently, as well as exist for a long time. This invention is trying to provide a better solution for the farming and garden work such as by having a good and comfortable position design, skilled force using and mechanical principles etc. Nowadays, there are some agriculture engine drive machines to do such job in the current market. However, considering the cost and size, this device has its advantages of simple, lower cost and suitable for family using, as well as convenient product because it can ride on either field (dry/wet) or very small banks in the farmland. Especially suitable for those remote, mountain area or natural reserved area where is not suitable for large engine oil/gasoline drive tractor.

## The function of the multi-function bike accessory parts

Considering the cost, the said multi-function bike machine can be an ordinary bike combine with some different designed accessory parts become a multi-function bike to carry out "throw seedling rice plant", useless grass removal, normal checking work in the water rice paddy etc. Most of the parts are plug-and-use, it means easily install and removal parts. A specific design multi-function bike is recommend for getting better effective, but the removable accessory parts are same. In order to make the bike ride on the wet or water rice paddy and further to do the farming operation, two set of floating slide boards are prepared accessories. When the spring season comes, the farmers need separate and plant small rice seedling in the mud rice paddy. The two set of "plug-and-ride" floating slide board can manual install on the bike (figure 1, 8) to do such plant work. Usually, a bike's weight is 10-15kg, a person weight about 60kg, when a person ride ordinary bike in the rice paddy that fill with water and mud, the wheels will go downwards about 120mm-150mm height, and could not make balance due to the stick mud in water rice paddy; It will go downwards about 20 mm height in relative dry grown rice field. In order to ride on the surface field, there are a set of floating slide board and

supporting slide board that will be installed, and length of rolling arm plate is designed to at least 65mm for the rear wheel floating board based on above measurement data (Figure 7). Since the distance of two groups of rice plant is average 350mm (a group of rice plant usually have 10-15 rice plants, the group's distance is around 260mm - 400mm). To avoid overwhelming the planted rice seeding or grown rice plants, the distance of the floating board to the rear wheel are: left 290mm, right 230mm and the distance of centre gear of the convey system to the rolling arm plate are: left 210mm, right 180mm. The distance of bolt stanchion to the rolling arm is 100 mm long (Figure 6. & 7). The path (small country road between the rice paddy field) usually around 400 - 550 mm width. Since the whole width of multi-function bike will around 460 mm. It can ride on the small country road, and the rolling arm plates are only loading self floating board weight, hence it is empty rolling. Once the multi-function bike step into wet rice field, the floating board touch water and mud, the bike can "walk" or "jump" in the mud field powered by man force or by manually operate a small motor. Combine the carrying basket in front of the handlebar which fills with rice seedling, the farmer can carry out the "throw rice seedling" work in the empty paddy field. And when the summer, autumn come, the other accessories such as a "harrow- like" floating board (figure 11) and other possible accessories can fixed into bike to do remove useless grass, normal check, etc without step farmer's feet into the mud field.

Additional accessory part is a pair of specific application shoes, it has a height adjustable heel in order to fit the using situation such as in case farmer need step into the mud field by feet, then adjust heel length to longer, otherwise, keep the heel in normal height or temporarily remove it from the shoes in order to step on the bike.

## The description of the structure of the invention

The invention is a kind of bike machine with a set of the "plug-and-ride" floating slide board and a supporting slide board based on the using situation. It is designed to fit ordinary bike because of cost. However, it is recommended use a specific multi-function bike in order to improve the effective. For example the two main wheels has a special design in order to ride on the both dry field and wet rice plant paddy, the wheel tire is more thick with the deep rim than normal bike wheel; the spoke of two wheel are made

of rust resistant material, the axle for the two main tires are much longer than the ordinary bike in order to fix with the different farming tools to carry out the farming or garden mission. Usually combined a specific handle bar blanket is necessary and ordinary. In order to carry and satisfy the farming or gardening operation. Here, it does not display it.

The two set of "plug-and-ride" accessories are slide board that have different design and function (figure 1 and figure 8). The small set of accessory can install at the down tube which located behind the fore-wheel (figure 9), a pedal clamping apparatus (figure 10) will regularly push it when bike move forward. When multi-function bike stop, the small slide boards has supporting function to avoid the fore wheel turn over. So it has supporting and balance function when the bike is ride on the wet mud field. Another big set floating slide board has its own mechanical convey system which concludes a gear with axle (transmitting shaft) and a chain-set connect with bike main chain-set it is installed on the rear wheel and support by a pair of fixed stainless steel tube and a pair of additional removable steel tube (figure 1),. When bike move forward, it also supported by the "leg-like" bolt stanchion (Figure 12). A part of man power force on the pedals through the main gear will be transmitted to the said accessory floating board by the convey system and rolling arm plate. (figure1, 2, 3, 4, 5). The said big longer floating slide board has another import function except the floating function. Under the floating board, there are two thin, curves, rectangle structures (Figure 2), it can be dig into the mud soil and propel the bike "walk" and "jump" on the mud field by man power or plant oil driven small motor (further study) through the bike pedals.

Alternative floating board can be apply that have more rectangle curve structures, like harrow, can dig and removal useless grass in the rice filed (figure11).The other accessory utensils also can be designed. Its can be installed in the both side of the wheel axle based on seasoning farm work.

## The description of the drawings

Figure 1: The whole view of the "plug-and-ride" floating slide board on the rear wheel has its own convey system: axle (transmitting shaft), gear and chain which connected with the main chain-set, and powered by pedaling force or with a small plant oil drive

motor. Reference sign explain: 1. A pair of fixed steel tube. 2. A pair of removable support tube. 3. The floating slide board beside the rear wheel.

Figure 2: The "hoe-like" curve rectangle plate to support floating slide board.

Figure 3: connect parts including bolts, nuts and rolling arm plate. Reference signs explain: 4. Long screw nut and square bolts. 5 a cap screw nut with external stripe lines. 6. A round clamp with an internal gasket.

Figure 4: rectangular rolling arm plate. Reference signs explain: 7 the irregular hole to connect with transmitting shaft and cap nut as well as push forward the rectangle arm plates to rolling with gear shaft.

Figure 5: industrial using specific long nuts fix with plate and screws. Reference signs explain: 8, specific long industrial screw nut compatible to the supporting long bolt stanchion. 9, fix plates with screws.

Figure 6: the restrict frame formed by a Φ5mm metal pole. It restricts the direction of the rear floating slide board.

Figure 7: floating slide board convey system and rolling arm plates. Reference signs explain: 10. The rolling arm plate parts. 11, convey system includes a 16 teeth gear, transmitting shaft, chains, a 26 teeth gear, nuts etc. 12, main convey system chain-set for the bike 13, floating slide board's lower chain-set (26 teeth gear) connect with convey system gear (16 teeth gear). 14, fix tube connect with rear wheel and pedal, it can put behind of the bike rear wheel main gear or behind the lower level floating slide board gear.

Figure 8: The whole view of the bike machine with accessory parts. Reference signs explain: 15, a pedal clamping apparatus. 16, the small "plug-and-ride" slide board. 17, the fore-wheel mechanical parts of the ordinary bike can be a further development.

Figure 9: the detail of the plug-and-ride floating slide board fixed at down tube behind the fore-wheel. Reference signs explain: 18, the steel plates with screw nuts. 19, the small supporting slide board can support fore wheel as well as can be pushed forward by a pedal clamp apparatus.

Figure 10: the detail of pedal clamping apparatus, it can regularly push the "plug-and-ride" slide board when move forward. Reference signs explain: 20, the pedal steel tube connected with bike. 21, the clamp handle side with a curve shape has pushing functions.

Figure 11, alternative rear floating slide board with" harrow-like" support. Reference signs 22, the main rear floating slide board made of light, strong, rust-resistant compound metal. 23, a few "harrow-like" supports under the floating slide board.
Figure 12, Two "leg-like" bolt stanchion installed in the floating slide board. Reference signs explain: 24, Stanchions made of the industrial specific long steel bolt. 25, connect and fixing plate.

## The extension of possible further development

A small floating slide board also can be installed with air/oil suspension fork [2]. Extend the fork-tube combine to a small slide board by oil/air pneumatic principle to improve the convenient of the current small slide board.

Since manpower force is limited for the loading weight and speed combined a small motor, electronic generator and a small rechargeable battery can reduce consuming the force of rider that is required in the short time. When farmers at home, he/she or his/her family member can do some exercise work to recharge battery. However, it may rise up the cost of the machine when it is produced in factory. And once use oil motor it will cost and consider environmental pollution problem. The plant oil is recommended to drive the small motor because it is more convenient natural resource in farm area.

MISCELLANEOUS DOCUMENT

Two experiments were set up.
An agriculture field data measurement

A measurement experiment is set up. The location was chosen in the agriculture rice paddy field nearby a small city. The data are collected and used in the description.
Mechanical experiment:

These are some of mechanical experiment photos. It includes the rear wheel's "plug-and-ride" accessory mechanical parts, its "leg-like" support bolt stanchion made of steel. The floating slide board initial made of iron alloy, shape is correct, but it is two heavy for the rolling arm plates, after re-strong the rolling arm plates, add one more plate, the connect part, and re-made a lighter aluminum alloy floating slide board, it can work on

the unload situation, but the material still need be considered. It is recommended that the material use similar lighter, but stronger compound metal.

The description of photos

Photo 1, the whole view of multi-function bike includes rear and fore wheel slide board. Photo 2, the rear wheel accessory mechanical parts includes aluminum alloy slide board. Photo 3, the 16 teeth-gear transmitting shaft and fix supporting tube. Photo 4, The rear wheel convey system and rolling arm plates, additional plate added to make it stronger. Photo 5 and 6, the initial rear wheel floating slide boards made of iron alloy.

Courtesy to: family members and neighbor-hood manufactories that sold necessary tools, materials and other needs to let me finish this experiment.

REFERENCES:

*Bike repair manual* Chris Sidwells, published in 2004 by Dorling Kindersley limited ISBN 1405302534.

*Ultimate bicycle book* Richard Ballantine & Richard Grant published in 1992 by Dorling Kindersley limited, London. ISBN 986-7415-13-2.

*Improving the effective of the product of rice plant.* Xing Dan Ying. Published in 2007 by JingDun publisher. China. ISBN 978-7-5082-4384-9.

I CLAIM

1. The said multi-function bike is formed by a pair of "plug-and- ride" accessory mechanical parts installed to the ordinary bike which can be ride by personal on the water rice paddy or mud field to do farming operation. And a specific multi-function bike which has some modifications from the ordinary bike in order to better co-operate with the "plug-and-ride" accessories to ride and "walk" on the both dry land or wet rice plant paddy. It can be used by ordinary bike with a small assembly changes such as two main wheel tires are thicker with the deep rim than normal bike wheel; the spoke of two wheels are made of rust resistant material; the transmitting shafts (axles) for the two main tires are much longer than the ordinary bike in order to fix with the different farming tools to carry out the farming or gardening mission. It also has a different handle bar with a big basket in order to satisfy the farming or gardening operation.

2. The accessories mechanical parts for both ordinary bike and special modified bike in claim 1. The main accessory part is a "plug-and-ride" floating slide board. It has its own mechanical convey system that includes a gear with an axle (a transmitting shaft), a set of rolling arm plate, a chain-set connected with bike main chain-set, and combine a pair of floating slide board with the "leg-like" bolt stanchions beside the rear wheel to help support the whole bike moving system. The gear and axle of convey system is installed on the rear wheel and support by a pair of fixed stainless steel tube and a pair of additional removable steel tube. A part of man power force on the pedals through the bike main gear will be transmitted to the said floating slide board with the "leg-like" bolt stanchions by this convey system and rolling arm plate. The said big longer floating slide board has another import function except the floating function. Under the floating board, there are some "hoe like" or "harrow like", curves, rectangle structures, it can be dig into the mud soil and push the bike "walk" and "jump" on the mud field by man power driving the motive force through the bike pedals, or by oil drive small motor

The small "plug-and-ride" slide board installed at down tube behind the fore-wheel. Based on using situation it can be stored under the tube or regularly pushed to "walk" by a special pedal clamping apparatus that clamping in front of the pedal when bike move forward. The small slide board also has supporting function to avoid the fore wheel turn over when bike stops.

## AMENDED CLAIMS
## received by the International Bureau on 21 October 2010 (21.10.10)

1. An inventive method of the said multi-function bike is formed by a pair of "plug-and- ride" accessory mechanical parts installed to the ordinary bike which can be ride by personal on the water rice paddy or mud field to do farming operation. And a specific multi-function bike which has some modifications from the ordinary bike in order to better co-operate with the "plug-and-ride" accessories to ride and "walk" on the both dry land or wet rice plant paddy. It can be used by ordinary bike with a small assembly changes such as two main wheel tires are thicker with the deep rim than normal bike wheel; the spoke of two wheels are made of rust resistant material; the transmitting shafts (axles) for the two main tires are much longer than the ordinary bike in order to fix with the different farming tools to carry out the farming or gardening mission. It also has a different handle bar with a big basket in order to satisfy the farming or gardening operation.

2. A design method of the accessories mechanical parts for both ordinary bike and special modified bike in claim 1. The main accessory part is a "plug-and-ride" floating slide board. It has its own mechanical convey system that includes a gear with an axle (a transmitting shaft), a set of rolling arm plate, a chain-set connected with bike main chain-set, and combine a pair of floating slide board with the "leg-shape" bolt stanchions beside the rear wheel to help support the whole bike moving system. The gear and axle of convey system is installed on the rear wheel and support by a pair of fixed stainless steel tube and a pair of additional removable steel tube. A part of man power force on the pedals through the bike main gear –drive sprocket will be transmitted to the said floating slide board with the "leg-shape" bolt stanchions by this convey system and rolling arm plate. The said big longer floating slide board has another important function except the floating function. Under the floating board, there are some curves, rectangle structures act as hoe or harrow, , it can be dig into the mud soil and push the bike "walk" and "jump" on the mud field by man power driving the propulsion force through the bike pedals, or by oil drive combustion engine

The smaller removable slide board installed at down tube behind the fore-wheel. Based on using situation it can be stored under the tube or regularly pushed to "walk" by a special pedal clamping apparatus that clamping in front of the pedal when bike move forward. The small slide board also has supporting function to avoid the fore wheel turn over when bike stops.

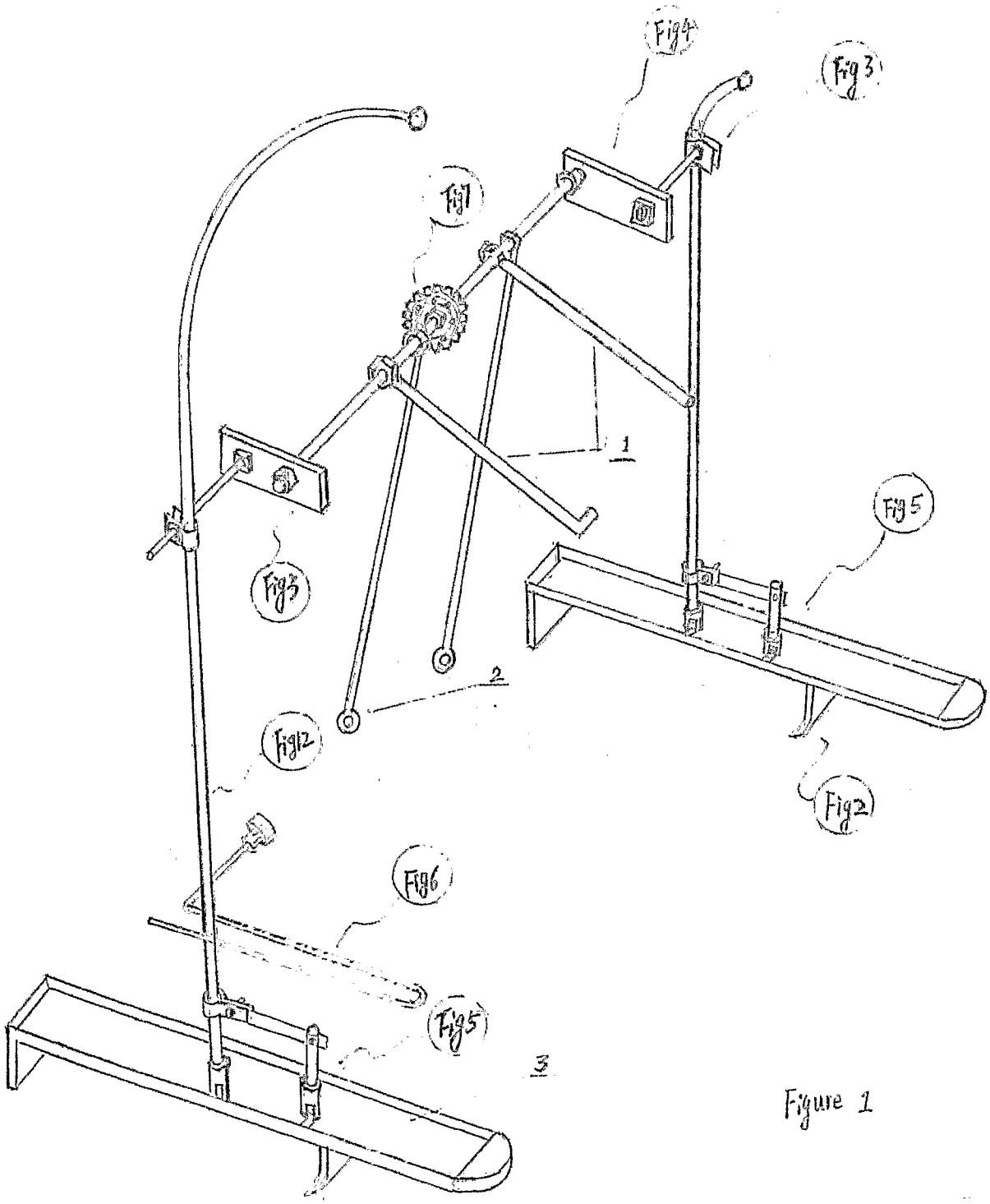


Figure 1

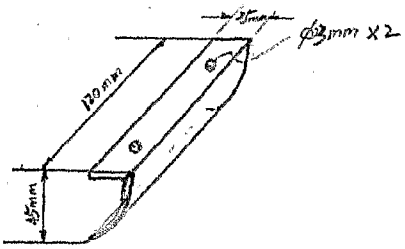


Figure 2

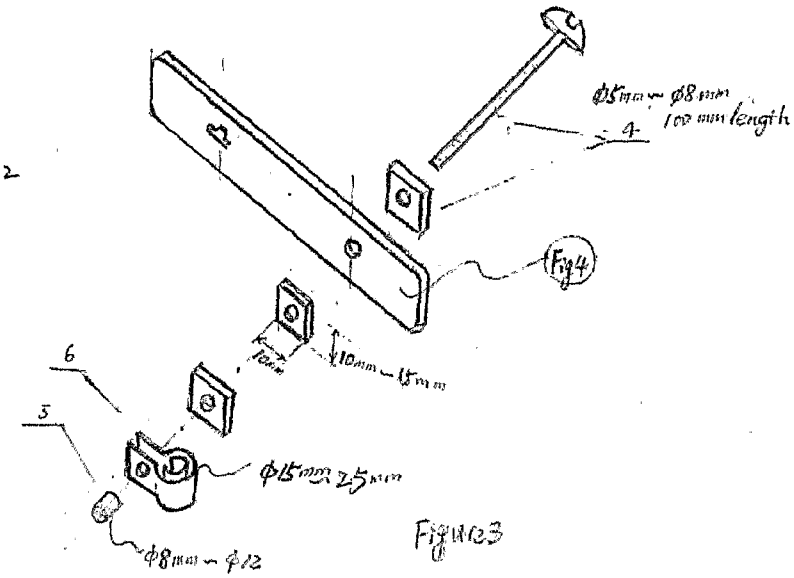


Figure3

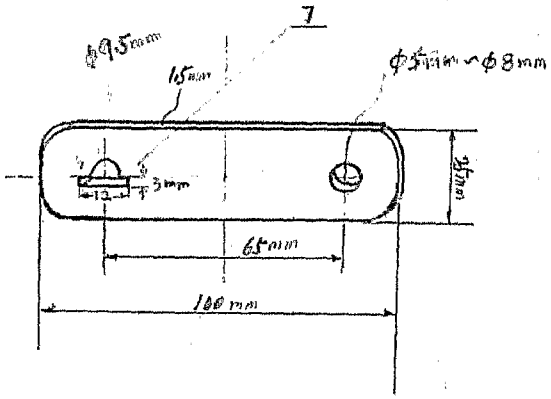


Figure 4

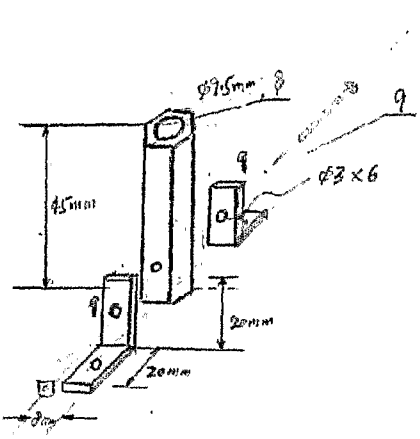


Figure 5

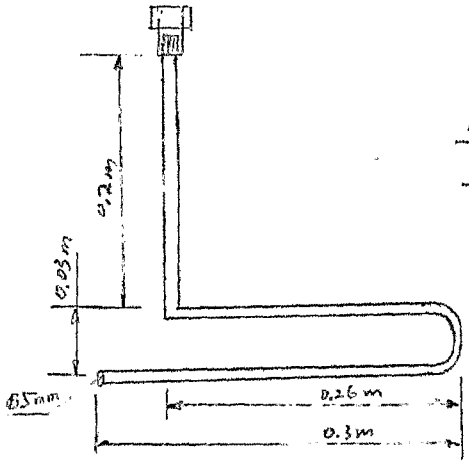


Figure 6

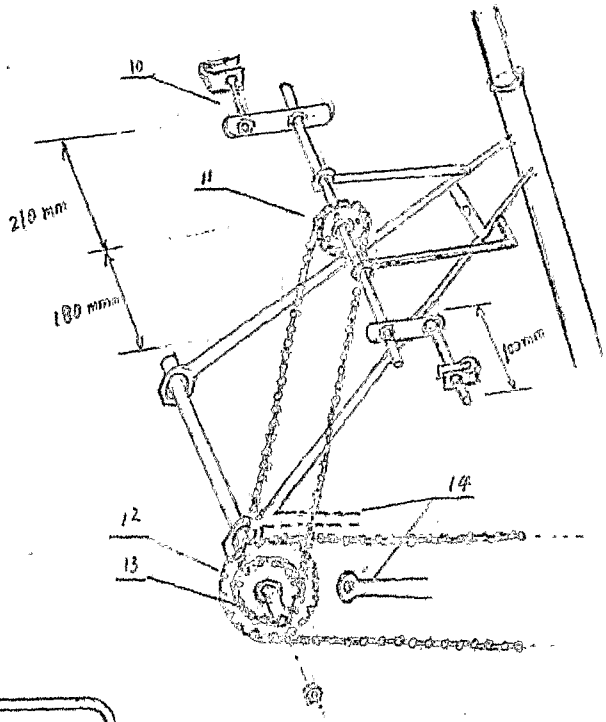


Figure 7

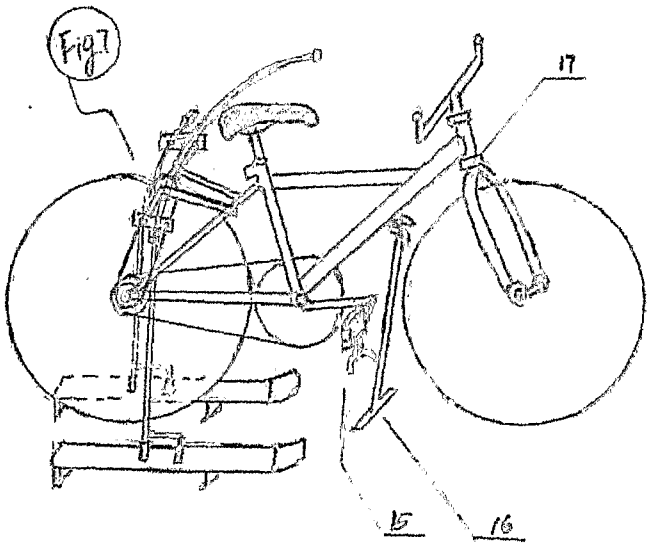


Figure 8

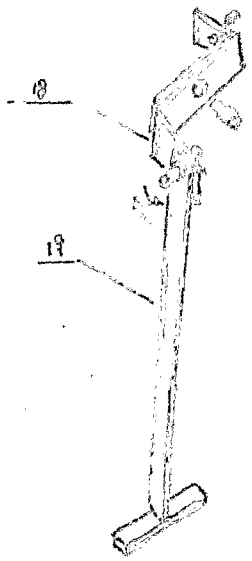


Figure 9

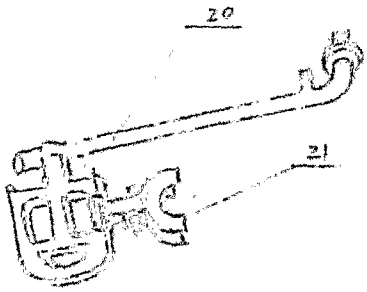


Figure 10

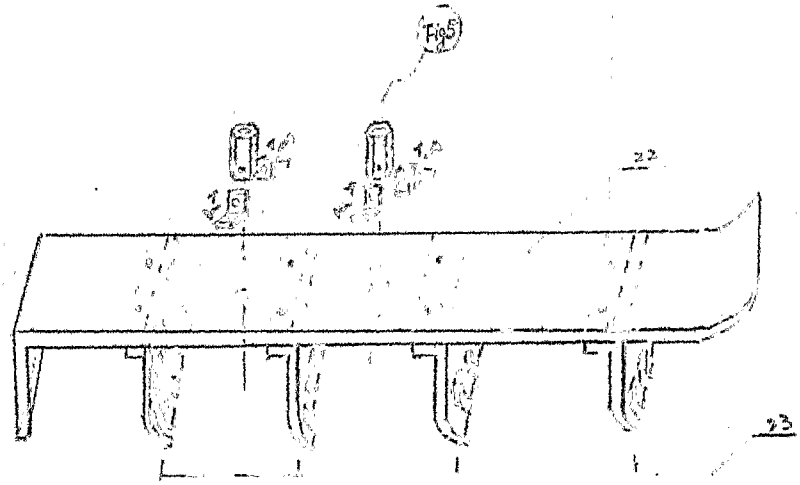


Figure 11

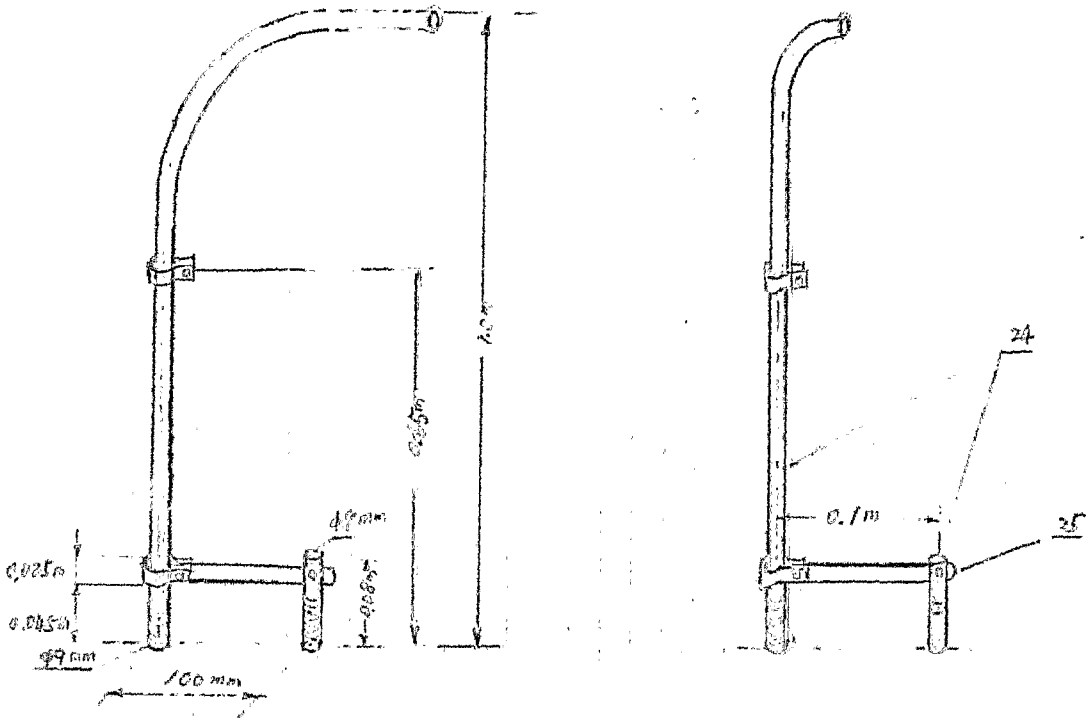


Figure 12

MISCELLANEOUS DOCUMENT PHOTOS

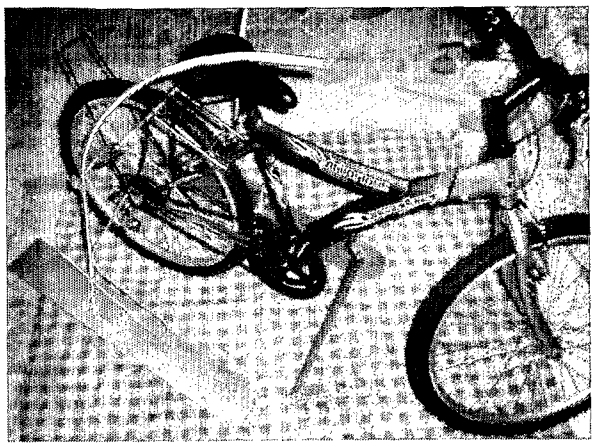

Photo 1

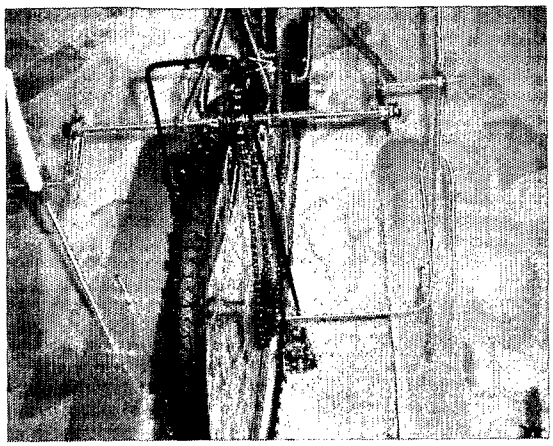

Photo 2

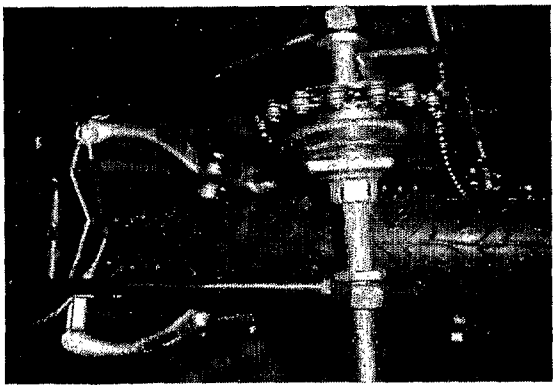

Photo 3

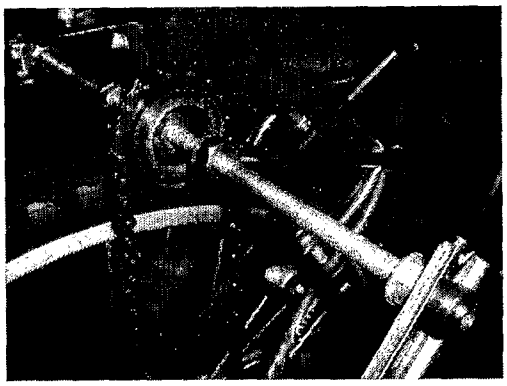

Photo 4

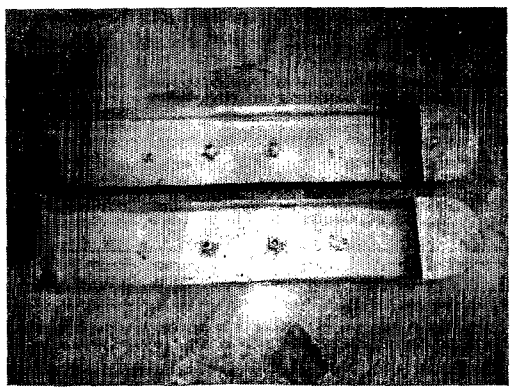

Photo 5

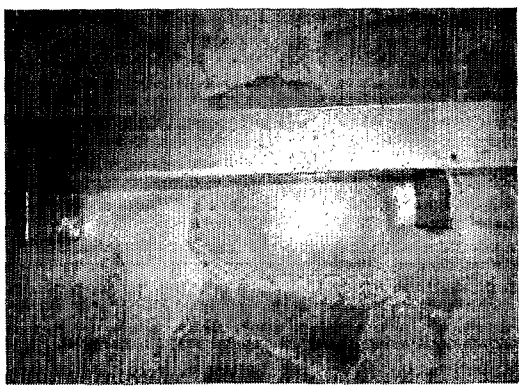

Photo 6

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/SG 2009/000357

A. CLASSIFICATION OF SUBJECT MATTER

IPC[8]: ***B62M 29/00*** (2006.01); ***B62K 17/00*** (2006.01); ***B62K 3/00*** (2006.01); ***B62J 11/00*** (2006.01); ***B62J 99/00*** (2009.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[8]: B62M, B62K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, TXTnn

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | FI 6407 A (AASBERG, V. et al.) 15 August 1916 (15.08.1916)<br>*Fig. 1 - 6, abstract*<br>-- | 1 - 2 |
| A | EP 0 799 763 A2 (CORIMBA S N C DI BETTINI CESAR) 08 October 1997 (08.10.1997)<br>*Fig. 1 - 3, figure description, description: page 1, coloums 1 - 2*<br>-- | 1 - 2 |
| A | US 5 482 302 A (YU ALFRED) 09 January 1996 (09.01.1996)<br>*Fig. 1 - 2, 4, figure description, description: coloums 2 - 4, claim 1 - 6*<br>-- | 1 - 2 |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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