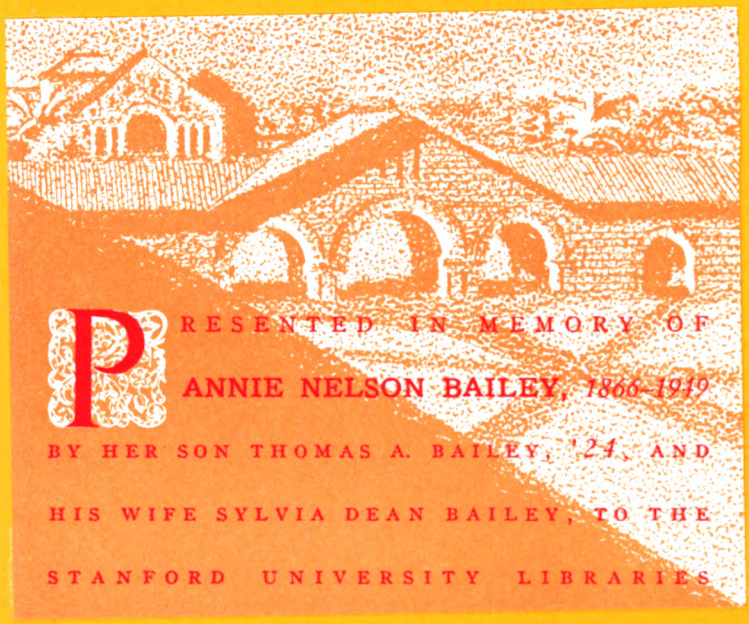
THE

VELOCIPEDE;

ITS HISTORY AND HOW TO USE IT



THE

VELOCIPEDE:

ITS HISTORY,

AND PRACTICAL HINTS HOW TO USE IT.

BY AN EXPERIENCED VELOCIPEDIST.

(REGISTERED AT STATIONER'S HALL.)

PUBLISHED BY J. BRUTON,
CRANE COURT, FLEET STREET.

PRICE SIXPENCE.

1869.

VELOCIPEDES

AND

MANUAL LOCOMOTIVES.

With the view of making the illustrations clearly understood they are numbered.

FACTS—HISTORICAL, PRACTICAL, AND GENERAL CONNECTED WITH LOCOMOTIVES DRIVEN BY THE FEET OR HANDS OF THE DRIVERS, OR BY BOTH OPERATING THE DRIVING PARTS OF THE MACHINE, WITH SUGGESTIONS, AND DRAWINGS, FOR IMPROVEMENTS THEREIN.

THE original inventor of the velocipede would appear to be M. Niepce as may be gathered from the following extract:—

"M. Ernest Lacan, editor of the *Moniteur de la Photographie*, in a recent allusion to M. Victor Fouque's new work, "Truth respecting the invention of photography," mentions the circumstance of all the correspondence of Nicephore Niepce relating to the photography in that volume having been published, but that M. Fouque had since forwarded to them extracts from the correspondence, which, as they did not relate to photography, were not included in his book. They, however, show conclusively that Nicephore Niepce was the originator of the velocipede, though, as is the case with photography, the original invention has been very much improved upon by those who in later years turned their attention to it.

"Many persons," says M. Lacan, "are ignorant of the fact that Niepce was the inventor of photography; thanks to this other invention, his name will obtain that popularity which is due to it." We do not imagine, nor does M. Lacan state it as his opinion, that the name of the great discoverer of the art of photographing will derive much additional lustre from being identified with the invention of the velocipede; but it certainly demonstrates that while pursuing with the utmost ardour the solution of a problem which had previously baffled all his predecessors, he yet could find leisure to construct a machine which, after the lapse of half a century, has become the rage of Paris and elsewhere.

The extracts given in the *Moniteur de la Photographie* are from

letters written by Claudele Niepce, then residing at Hammersmith, to his brother Nicephore, and are dated respectively 19th November, 1818; 21st December, 1818; and 24th August, 1819.

In the first letter he thanks his brother for the description given to him of the new machine (the velocipede), upon which he was surprised to learn he had already been exercising, and which he (Claude) thought would succeed admirably in a country where the roads were level and kept in good order; but he imagined there must be an air of drollery about the individual thus mounted. He also incidentally alludes to Nicephore's son, Isidore, who, being longer in the leg, would be able to attain great speed therewith, showing that the velocipede of Niepce was propelled by the feet.

In the second letter the writer states that he is pleased his brother entertains the idea, which he (Claude) had suggested, of sending some over to England, where he thought they might be turned to good account.

In the last letter he alludes to the fact of their being in England, but states that, being a foreigner, he had not yet purchased one, as he was fearful of exciting the raillery of his English friends—Claude was evidently a bashful young man—and, besides, the cost, he adds, would be a material increase of the expenditure he was obliged to incur just then, so he would rather defer doing so for the present.

Next as regards the philosophy of the matter, it is certain that a weight could be rolled along a surface much easier than it could be carried over the same distance; upon the same principle it must be easier for a man to roll his weight along a road than to carry it in walking; the walking process is one in which the weight of a man is carried by either leg alternately, while he by muscular power constantly changes his centre of gravity.

The improvements which have occurred in the construction of manual locomotives since the rise and fall of the original "Hobby or dandy horse," have been few and unimportant, until we come to those which, in our own day, are creating so great a stir and excitement.

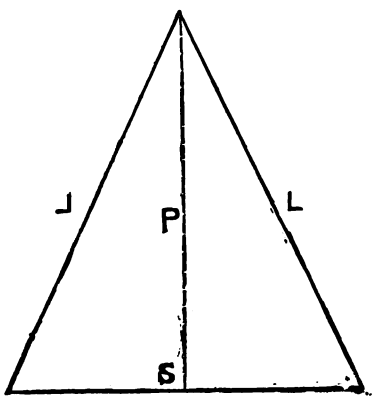
That a carriage or velocipede, with but two wheels, the one following the track of the other, and propelled by the feet of the rider (by simple crank motions), should maintain an upright position is, to the superficial observer, one of the most surprising feats of practical mechanics. When, however, we consider the law of moving bodies, and their tendency to continue in the direction of the impulse that set them in motion, and apply it to the velocipede, we have the philosophy of the whole problem. The ease of the operator to obtain his equilibrium while the machine is in motion, or rather the tendency of the velocipede to be self-sustaining, after a certain velocity is attained, is the same as that which sustains, against the effect of gravity, the spinning top, the revolving wheel, and the rolling hoop.

In experimenting upon this subject, we observe that a wheel of given dimensions will maintain its equilibrium while revolving down an inclined plane, with no greater velocity than from five to six miles an hour; and when its motion becomes sufficiently retarded to incline to either side, that the wheel does not immediately drop, as in the instance of one set upright and not in motion; but it is more retarded, it describes a spiral curve of decreasing form, and, finally, comes to the ground.

A rolling motion requires much less power to maintain it than a walking motion. Theoretically, if a road be perfectly smooth, and if friction, and the resistance of the air, were annihilated, a velocipede, or other vehicle on wheels, once set in motion, would never stop. Of course such a state of perfection is impossible, but friction can be lessened to a considerable extent, and the more this is done the greater is the power gained; hence it has been found that whilst on a gravel road each ton

requires a tractive force of 147lbs, or about 1-15th the weight, drawn on a well laid pavement the tractive force required is only 33lbs, or about 1-68th, and on a railway the force necessary to draw a ton is only 8lbs., or 1-280th part of the load. A consideration of these facts explains how a man may move 10 or 12 cwt. in a hand cart—no uncommon occurrence —a weight which he could not stand under, much less carry to a considerable distance.

A comparison of the force required in a rolling and walking motion may be arrived at if we consider that the former is the motion of a perfect wheel on its own axis, which axis does not rise or fall, consequently in theory there is no force expended; and the latter is like the motion of an imperfect wheel or the spokes of a wheel without a rim, the farther the spokes are from each other the greater would be the rise and fall of its axis, and the greater the loss of power. A man's legs may be likened to these spokes, the longer the strides he takes in walking the greater the power expended, for his centre of gravity is at every step alternately lowered and raised proportionately. If a man's legs are each 30 inches long and he strides 30 inches at every step, this rise and fall would be about four



inches, as will be understood by examining the triangle represented in the diagram, where L L represents the legs separated from each other as in the act of striding. P the perpendicular to the base line S, which latter is the length of a single stride. It is evident that the difference between the length of L and P will be the rise and fall at every step. To find the length of P, subtract the square of half the length of the line S from the square of L, the remainder will be the square of the perpendicular P. thus:—

302—152 = 262 nearly
then 30—26 = 4 inches.

Therefore, as it is necessary to lift the full weight carried 4 inches for every 30 inches of progress, it would be requisite in order to move a ton horizontally to expend 4-30ths or 2-15ths of the power required to raise it vertically, or about 299lbs., which is nine times the power requisite to move a ton in a wheeled velocipede over a well-laid pavement. A further advantage would appear of the rolling over the walking motion, if the friction of the joints was taken into account; also if the strides were longer a greater amount of power would be expended; but it must be

admitted that if the strides were shorter a corresponding gain of power, though with a corresponding loss of speed, would be the result.

From the above figures we may easily deduce the power expended in walking by a man weighing 1 cwt. for 299-20ths = 14·95lbs., and the power necessary to propel a velocipede of the best construction would be 33-20th = 1 65lbs. A man walking and pushing a velocipede would therefore expend 14·95 plus 1·65lbs = 16.60lbs; a man sitting on and driving a velocipede 33-10ths = 3·3lbs; a man sitting on and driving a velocipede containing a box of tools or other luggage weighing also 1 cwt., or altogether 3 cwt., 33-6·6 = 4·95lbs. only This advantage too is obtained without the great inconvenience of being constantly under the weight carried. If the above be a fair comparison it would not be altogether judicious to throw cold water on a subject so promising as the improvement of velocipedes.

In 1822 we have the earliest record; a Mr. John Dumbell, in describing his invention of a velocipede, says:—

"As in my improvements I aim at copying and imitating the works of nature, I beg leave to refer to her works as my great original rather than delude myself or others by any drawings or models, which at best must be a more feeble delineation of what I would describe, and the more so from the great extent and variety of the works of nature that are applicable to my purpose, for I substitute in the organisation and moving of carriages, feet (or millepedes) for wheels, as far as this can conveniently or profitably be done; and herein I view art as nature's handmaid; I would make mighty things from small beginnings great, and as fishes first to shipping did impart their tail the rudder and their head the prow, so I would from man himself and from the creatures which move and creep upon the earth, imitate their powers of locomotion, and prefer a carriage or vehicle made to run, walk, trot, or gallop, to wheel carriages or to the sledge or plough; and I accommodate the feet I use according to the ground I have to go over, the cloven feet being wisely adapted by nature to some soils, the webb feet to other places, the horse's hoof, &c., to other situations, where a circular motion is required. A boy rolling like a wheel along the roads and using his hands and feet as spokes of a wheel, is descriptive of my method, so also is the Manks penny with the legs of a man upon it, and likewise the spokes in a coach wheel without felfies or projecting beyond the felfies, or a given number of those spokes *(ad libitum)* projecting through the felfies, which spokes may be made more fit to pass over the highways, &c., if shod with iron or other hard body, and which, if required, may be made as horseshoes; or these shoes I attach to the felly of a coach wheel at such distances as may be required, with or without friction wheels between the respective shoes or alongside of them, and with or without springs acting at the heel and toe, in order that the shoes may move on a pivot or hinge resembling the action or motion of a man's foot, the weight being received on the heel and passing to the toe, and then delivered from the toe of one foot to the heel of the next foot. When required I make the spokes or legs with joints in them resembling the hip, knees, and feet of men or other bodies, or with what is called in mechanic's a universal joint.

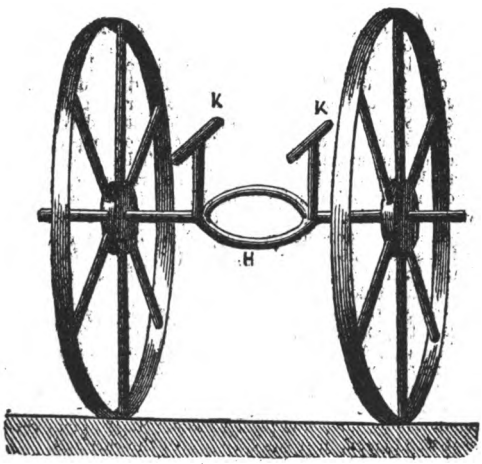
Amongst the works of art the rowal of a spur turning on an axle and touching the ground will serve to describe another method of applying my improvements, which may be made to act *per se* like the wheel of a wheelbarrow, or affixed to as many of the wheels now used for a coach as may be deemed expedient, that part of a spur which goes over a man's heel being made sufficiently strong for the purpose and attached to the felly, a sufficient number of such spurs being so fixed as will surround the periphery of the said coach wheel. I also apply stilts, crutches, and the tread wheel in moving vehicles where the labour of men can be substituted for horses; a man on stilts being able to take longer strides than without

them, can consequently move over a greater space in the same distance of time.

We subjoin a copy of an interesting letter to the *Mechanics' Magazine* in 1831, by "Saxula," on locomotion:—

"Sir,—Previously to my sending to your useful publication (which it is my intention to do some months hence) an essay on the new science of Locomotion, the principles of which I claim the discovery of, I request your insertion of the following problem, the solution of which will exemplify one of the leading principles of this new science:—"How can a man, without touching the ground, or having any lever or instrument in his hands or elsewhere, wheel himself up the steepest road in the kingdom in a common wheelbarrow?" This has been—and may be still—thought impossible to be done, but the assurance accompanying this letter will satisfy you that the task can be effected. There is no trickery whatever in the thing. Let a man take a common wheelbarrow, without addition of any kind, having an ordinary-sized wheel of 18 or 20 inches diameter,

FIG. 1.



and,—as very steep ground may not be near—let a square bar, of one inch thick, be put before the wheel, under it, upon hard level ground, which will be equivalent to a hill rising more than one in three; then let him mount the barrow, and, without his touching the ground, cause it to wheel, with him in it, over the bar. The mode of doing it will be a solution of this problem."

The following is the solution of this problem:—"A medium effect will be produced by sitting on the fore-board of the barrow, with the wheel between the legs, and pushing the wheel round with the hands. But as the problem is a maximum, it can only be solved by standing astride on the side bars of the barrow, a little in advance of the axle, with the face towards the barrow, laying hold of the wheel by its felloes and pulling—or rather throwing—all the weight of the body backward, which will draw the wheel, and all with it, over the bar."

In 1824, a Mr. Jameson, writing to the "Mechanics' Magazine," describes

a velocipede, similar in construction to a bath chair, with a long guiding pole attached. In the same year a velocipede is described worked by levers and treadles; it went eight miles an hour when carrying three persons. In 1825, we notice a description of a self-acting carriage, moved by means of compressed air.

The two-wheel velocipede is not quite a new idea, one is described which was moved by means of a large screw connected to various cogged wheels, set in motion by the rider turning a handle. The carriage itself was of peculiar construction—*there were only two wheels*, one before and one behind; but at each side were four iron rods, with small wheels attached to the ends.

In 1833, a new velocipede was made, having a circle wide enough to admit the traveller's person, and encompassing his waist. To a horizontal shaft proceeding from each side of this circle, a pair of wheels of light construction, and about 6ft. in diameter, were fixed; and close to the ring, to support the arms, were two short crutches; the body in this manner was so supported that the feet could just touch the ground to make a stroke. The machine was guided by a lever, on which the hands rested. The speed was stated to be nine miles an hour. The drawing Fig. 1 represents this machine, which has been reinvented and proposed within the last few months as of superlative excellence: this quality does not, however, seem to have been discovered in former times, and certainly has not been in our own.

Some years later, in 1839, a velocipede was invented by a Mr. Baddeley; it consisted of a framework of wood, suspended from the axles of two driving wheels, one end of the framework supported a seat, the other end was occupied by a guide wheel. The axle of the driving wheels was formed into two cranks, either at right angles or opposite each other; the party using the machine occupied the hinder seat, and by turning round the cranks with his hands, drove the carriage forward. There was a cross-head on the vertical spindle of the guide wheel, from which proceeded two lines, which, passing over the pullies, were attached to either end of a balanced lever; the feet rested on this lever and effected the guidance of the machine; the depression of the right foot would incline the wheel and turn the carriage to the right, the depression of the left foot would incline it to the left.

In the same year there is a description of Mr. Merryweather's Pedomotive Carriage. It consisted in a strong light frame, mounted on a pair of wheels 6ft. in diameter, with a smaller guiding wheel in front. The axle of the large wheels was bent into a three-throw crank, beneath which three treadles were suspended, one from either crank, the fulcrum being placed at the hinder part of the machine. A seat, wide enough for two persons to sit side by side, was placed upon springs; just over the cranks another seat was placed, near the fore part of the carriage. The persons, occupying the first seat caused the progression of the machine by the impulses of their feet alternately upon the three treadles, one person taking the near, the other the off-side treadles, while the central one was common to both. The party occupying the front seat guided the machine. It was said to go six or eight miles an hour, and to have done a mile in three minutes.

A curious letter turns up in the "Mechanics' Magazine" of 1841 (vol. xxxiv.) It states the first velocipede was introduced in France (*L'Histoire se repete*). This velocipede consisted of two wheels, about 2½ or 3ft. in diameter, connected by a pole, one wheel being in front and the other behind; the rider sat on a seat across the pole, and propelled himself by striking the ground alternately with his feet. The second made consisted of two wheels, 5 or 6ft. in diameter, between which the rider balanced himself on a seat propelled as before. A velocipede, coming nearer to the one now in use, is also described in the same volume. It is

a velocipede which had two whee's of about 6ft. in diameter, of the lightest construction, placed three or four feet apart, and connected by an axle-board carrying a seat properly balanced and arranged. From both the back and front of the seat, a bar passed obliquely downward; at the end of these bars a wheel was placed 12 or 18 inches in diameter. The wheels reached within six or eight inches of the ground, and the rider had two stilts, made of bamboo or other light material, 18 to 30 inches below the feet, provided with flat stirrups to support his feet.

A suggestion for an improved velocipede in 1841 is thus described:—"Let a carriage be constructed, with two wheels 5 or 6 feet in diameter, and with a third wheel of smaller diameter placed behind, moving a pivot, as in a garden chair. The axle of the front wheels is to be cranked; stirrups are to be attached to the cranks, on which the weight of the body is to be thrown alternately."

In 1845, Dr. E. Cartwright (the inventor of the power-loom) describes a velocipede consisting of a lightly-made frame; on the axles of the driving-wheels of which were two treadles, worked by the feet of the driver; there was also a kind of shoe on each treadle, in which the feet of the driver were inserted, so that he was able to pull as well as push, thus rendering each crank double-acting and continuous.

In 1845, a Mr Jones, of Carnarvon, invented a new railway velocipede, made wholly of iron, weighing about half a ton, and capable of carrying twelve persons.

On the 16th of February, 1865, Frederick Parker applied for a patent for "Apparatus for affording exercise to the human body." He states that his invention consists in connecting together certain levers, treadles, wheels, springs, and weights, and combining them with a seat, whereby exercise may be taken in a room as on horseback, and for use out of doors the apparatus is to be mounted on wheels.

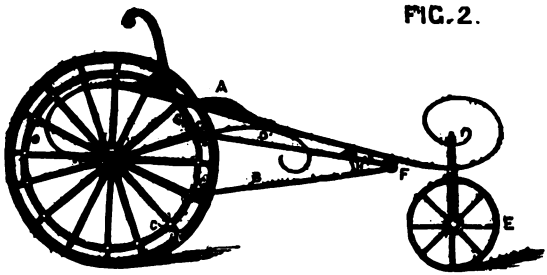
On the 15th February, 1861, Ebenezer Poulson, of Shadwell, applied for provisional protection for improvements in velocipedes. He says "that the drawback to the present velocipedes is the want of power. He proposes to overcome the difficulty by giving a much greater power, and to accomplish this he employs two levers, one on each side of the velocipede, with a connecting-rod from each lever, the levers being attached to two cranks fixed on the main axle or shaft of the driving-wheel, and these cranks are fixed at right angles, thereby giving a continuous and greater power to be worked from the end of the lever, either by manual labour or steam. The invention appears to be applicable to the propulsion of all kinds of carriages, barges, and boats."

Nothing further occurs worthy of record until the year 1862, we then meet with a patent, which was never completed, by Mr. E. Massely, of Antwerp; this contains a suggestion with regard to preventing uneasy joltings by the use of a peculiar novel spring, which we consider quite practical.

He thus relates his improvements:—"I place the crank axle of the velocipede at the back end of it, and I fix on it the main travelling wheels, which by preference I make of a large size, say about 5ft. diameter, more or less. The crank axle with the travelling wheels revolves in suitable bearings, formed one on each side of each crank, which bearings are adjusted into the main framings of the machine; these framings pass from the back to the front of the machine and carry the 'fore-carriage,' at the front end of which the guiding wheel or wheels are fixed. About midway in the main framings (which framings I place by preference about 12in. from the ground) bearings are placed, in which the centres of the treadle levers work; one end of each of the treadle levers is attached by a connecting rod to the cranked driving axle, while the other end is placed so as to receive the foot of the person using it, and it is actuated by the weight of the operator pressing

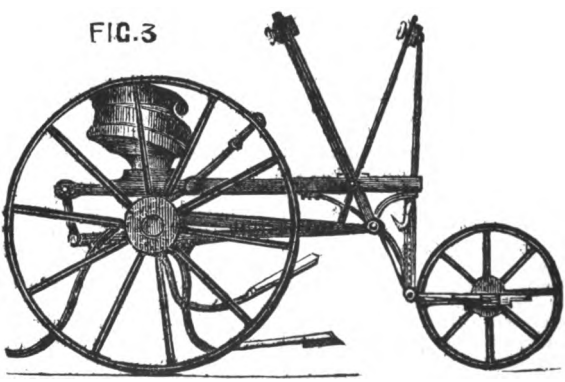
down the treadle, and thus driving the crank upwards; this operation is performed alternately by each foot of the operator. The operator in using this machine can, if desired, stand or lean against a seat, or bar of wood, properly adjusted for the purpose, by which steadiness of motion is gained. The fore-carriage may be made with one or more wheels, and is supported on suitable springs; it is guided by a lever and rod, or handle, which is under the control of the operator. The upper part of the carriage is tied

FIG. 2.



together with suitable rods and stays. The treadle ends of the levers may have springs of india-rubber under them, working against a part of the framing. The driving axle may be formed, if desired, with additional cranks, to be worked by hand suitably arranged, or velocipedes on this principle may be constructed with two or more crank axles coupled together, to be worked by two or more persons. In place of springs used

FIG. 3



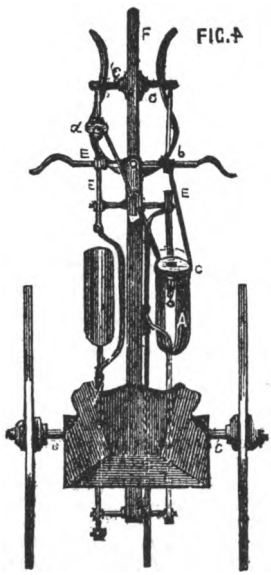
in the ordinary manner for the purpose of easing the jar of the carriage arising from passing over rough or uneven roads I make (if desired) the naves of the wheels hollow, and between the inside of the nave and the axle box I place three or more spirally-shaped, or other description of spring, connected to the axle box, and to the inside of the nave of such wheel. These springs can be applied as may be most convenient to one or more of the wheels of the velocipede."

In 1862 Mr. W. Edge patented a velocipede (Fig. 2), but never completed his patent. The arrangement of the article is thus described:—

This invention consists in constructing velocipedes, as shown in the drawing annexed. The rider or operator sits on the seat A and works the two treadles B, B1, alternately; these treadles are hinged on a common stud F, and the extremities G, G1, act upon the stud C at each downward stroke. A small portion of each treadle is hinged, as shown in the drawing, so as to prevent the back stroke having any effect on the studs. The velocipede is guided by the wheel E or other suitable means. The return or up stroke of the treadles is made self-acting by india-rubber or other springs, as at H.

In 1862 we have another patent for a velocipede, which was completed, and we may suppose, therefore, offered some prospect of successful use. It is described by the inventor, Joseph Goodman, as follows:—

FIG. 4



This improvement in velocipedes consists in connecting the treadles and hand levers to the cranked axle to which the main wheels of the carriage are fixed, and in arranging handles to the hand levers, which through chains or cords communicate with the fore carriage in which the guide wheel is fitted, and turn it in any direction required for guiding the carriage. Also in mounting the axle of the guide wheel in a groove made in the sides of the fore carriage.

The improvement in wheels consists in the following arrangements:—That is introducing the outer ends of the spokes in the felloe where felloes are used, or directly in the tyre. The hub or nave is formed in two parts, one consisting of a flange carrying an inclined ring, which is inserted under the inner ends of the spokes, and of an outer flange.

The driving in of the inclined or conical ring; tightens up the spokes, the parts of the nave are secured by bolts. Fig. 3 of the drawings is a side elevation, and Fig. 4 a plan, of the velocipede. A, A, are treadles, and B, B, hand levers, all connected to the cranked axle C of the main wheels, as shown; D, D, are handles fitted to the hand levers, and communicating through a chain or cord E, E, with the fore carriage in which the guide wheel F is fitted, one end of the chain or cord is connected to one end of the axle G of the guide wheel, it then passes under a small wheel *b*, up over a pulley *c* at the top of one of the hand levers, down round a roller *d* attached to the framing, up again over a pulley *e* at the top of the other hand lever, down under a small roller, and thence to the other end of the axle. By turning either of the handles to the right or left as required, the guide wheel is turned in the desired direction; by holding the handles parallel to the hand levers the guide will proceed in a straight line, notwithstanding any slight obstacles that may come in its way. The axle G of the guide wheel F is mounted in a groove or slot H applied to the fore carriage, the wheel F fitted loosely on its axle. The improvements in wheels for velocipedes and other carriages will be fully understood on reference to Figs. 5 and 6. The hub or nave is formed in two parts. Fig. 5 shows two views of one part, which consists of a ring or flange, I, carrying a conical or inclined ring, J. Fig. 6 gives two views of the

FIG. 5.

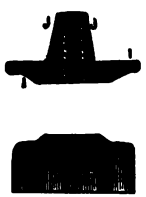


FIG. 6.

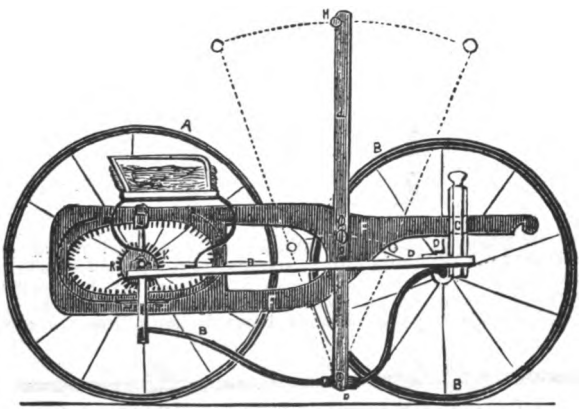
inner face of the other part, which consists of a flange or ring, K, formed with spaces, L, into which the spokes are placed. The inner ends of the spokes are tapered to fit into the spaces in the inner face of the ring. By driving the inclined ring, J, into the ring, K, the spokes are forced out and tightened up in the felloe, or where no felloes are used, in the tyre. The parts of the nave are then secured by screws, M. We have nothing to record till the year 1864, when this subject seems to have again become invested with fresh interest. Mr. Alfred Goodrich constructed a carriage to be propelled by the motion of the body instead of that of the feet, by which a large number of persons can be conveyed at a higher rate of speed and with more ease and comfort than by the velocipede. This invention consisted chiefly in applying an improved arrangement of levers to a light carriage body, and in the mechanism connected therewith for giving motion to the machine. In the front part of the body of the cart, in place of the ordinary seat, a shaft was fixed, on which were placed, so that they might receive an oscillating motion from a person sitting thereon, one, two, or three chairs, according to the size of the vehicle and the number of persons employed in driving it; on the back of each of these chairs was fixed one end of a vertical lever, the other end of which was connected by means of a horizontal lever to another vertical lever, placed some distance in front of the body of the carriage, the lower ends of the levers were jointed to the frame, so that they received a backward and forward motion. In front of these levers, and above the fore wheel or wheels of

the vehicle, was an axle with one, two, or three cranks, according to the number of chairs in the vehicle, and these cranks were connected by means of rods with the front vertical levers, the cranked axle carried at each end a large driving wheel, communicating motion by means of a chain to a pulley on the axle of the back wheels for propelling the carriage. The backward and forward motion of the front vertical levers was assisted by means of small hand levers attached to them. The vehicle was turned round at will by means of a hand lever attached to the fore wheel or wheels, as in the velocipede.

In 1864 another patent was issued to Thomas Du Boulay, for improvements in carriages propelled by manual power, which will be readily understood from the drawings.

DESCRIPTION OF THE DRAWINGS.—Fig. 7 shows a side elevation; Fig. 8, a back elevation, and Fig. 9, a plan of a carriage constructed according to this invention. In each of the figures the same letters of reference indicate the same parts. *A*, *a*, are the two hinder wheels; *b*, *b*, are the two

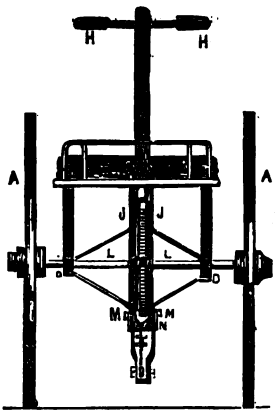
FIG. 7



fore wheels; *c* is the fore axle, which has a locked motion at the fore end of the framing, *d*, *d*, and the steering of the carriage is by means of the feet of the person in the carriage, which act against the parts, *c*1, *c*1, on the axle, and these may be plain projections as shown, or they may have flanges at each end, or they may be made like the fore parts of shoes to receive the feet of the person. By this arrangement of the fore axle it becomes the stretcher, against which the feet and legs press, as when in the act of rowing in a boat. The parts, *c*1, *c*1, may be, if desired arranged to be adjusted to and from the seat, in order to accommodate the carriage for different persons; or the seat may be arranged to be fixed more forward or more backward, whilst the parts, *c*1, *c*1, remain constant; *d*x is a lever, having its fulcrum or axis at *d*1, which may be adjusted in position by being placed in one or other of the holes shown in the under perch or framing, *e*. The lever, *d**, gives motion to a double-toothed rack, *f*, the fore end of which is guided at *g*. At the upper end of the lever are two handles *h*, *h*. The lever, *d**, is connected to the double-toothed rack, *j*, by a pin, *i*, the posi-

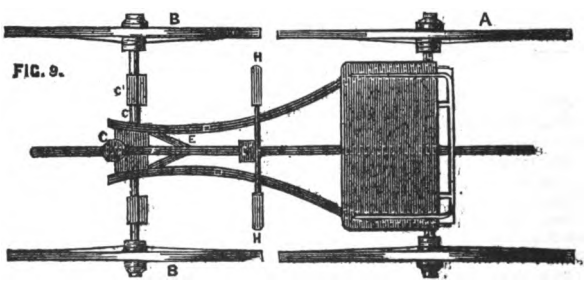
tion of which may be varied by being placed in any one of the holes, *il*, in the ever, *dx*. The hinder part of the double-toothed rack is guided by two vertical rollers, *j*, *j*, one on each side of the upper part of the toothed rack; *k* is a toothed wheel or pinion, the teeth of which alternately gear with the upper and lower toothed racks, so that when the lever, *dx*, is in

FIG. 8



action, the pinion, *k*, and consequently the axle, *l*, on which the two hind wheels are fixed, constantly turn in the same direction, and so as to give forward motion to the carriage. The double-toothed rack has on it two projections, *m*, *m*, one on each side of the lower part of such rack; these projections alternately come under and over the two rollers, *n*, *n*, carried

FIG. 9.



by the framing of the carriage. In the position of the parts shown in the drawings, the double-toothed racks are resting on the rollers, *n*, *n*, but when the fore end of the toothed racks comes to the pinion the toothed racks will drop, by which the teeth of the pinion will come into gear with the teeth of the upper rack, by which when the upper end of the lever *dx* is

moved towards the front end of the carriage, the upper toothed rack will give motion to the pinion then on the teeth. On the hinder part of the double-tooth rack coming to the pinion the projections, *m*, *m*, will rise on to the rollers, *s*, *s*, when the upper end of the lever *d*^{2} will be pulled towards the person in the carriage, and in this manner will the carriage be propelled forward by the to-and-fro motion given to the upper end of the lever, *d*. It will be evident to a mechanic, says the inventor, that provision may be made for having two pinions of different sizes to be used at different times on the axle of the hind wheels, but it is preferred to have only one pinion as shown.

The next in order is a manumotive carriage, the invention of George Read, in which he places a screw wheel on the driving axle of the carriage. Gearing into this screw wheel (as a substitute for the endless screw usually working in endless screws) is a disc having a series of friction bowls arranged round its periphery, these bowls take into the teeth of the screw, and by rotation of the bowl disc cause the screw wheel to rotate, and so propel the carriage. He places this bowl disc on a verticle or inclined shaft, and continues it upwards to any convenient position for driving by any convenient means. He places a universal joint on this driving shaft, whereby it may be inclined and adapted to any position for the convenience of driving. He steers the vehicle by means of the fore wheel, which is mounted on an axis in bearings in which the axis can be moved in the different directions required for steering the vehicle, such motion being communicated by means of a hand lever and connecting rod, or by the feet of the operator. According to this arrangement the one hand is engaged in driving the winch handle while the other effects the steering. This invention was not of great importance, we should judge, as it was not proceeded with.

Nothing further worth observation marks the record of 1865. The year 1866 is not more memorable in this particular. An improved velocipede, the invention of Edward Gilman, is the only one, and this consists primarily of a perch carried by three wheels (namely, two leading wheels and one driving wheel), the latter actuated by means of treadles and cranks. The rearward portion of the perch is divided or forked, and the driving wheel is mounted within the forked part by means of an axle, which is carried in suitable bearings attached to the perch, and is provided with a crank at each end outside the bearings, the cranks being so arranged as to alternate the motion with each other. Each of these cranks is connected by a link or connecting rod to the rear end of a treadle, the forward end of which is hinged or jointed to the forward end of the perch, which is made to curve downwards for that purpose; the forward end of the perch is supported by an axle having two leading wheels (one at each end thereof); this axle is so mounted as to be capable of swivelling on a vertical pin by means of a cross handle in front of the operator, who can thus guide the velocipede as occasion may require. The treadles (which pass between the two leading wheels and outside the driving wheel) were worked by the alternate motion of the feet of the operator, either in a standing or sitting posture, astride of the perch as near to or over the axis of the driving wheel as convenient; a seat was attached to the perch for that purpose, and such seat was capable of being raised or depressed at pleasure to suit the stature of the different persons using the velocipede. The alternate motion of the treadles communicated a continuous circular motion to the driving wheel, by means of the two links, or connecting rods, and the cranks on the ends of the driving axle. One of the principal features of novelty in this invention is the application of the cranks to one wheel (instead of two as heretofore used), whereby the anomaly of two wheels fixed to the same axle is avoided, for it is obvious that the relative motion of the two wheels so connected can never be in

unison except when running upon a perfectly smooth plane, and in a perfectly straight line, for the least irregularity in the former deviation from the latter would require corresponding difference in the speed of rotation of the two wheels. This imperfection is most apparent in turning such a machine in its course, in which case one of the wheels necessarily performs a segment of a larger circle than the other, and having more ground to go over requires to rotate proportionately faster, which is impossible when the two wheels are united to the same axle. The consequence is that either the outer wheel performing the segment

FIG. 10.

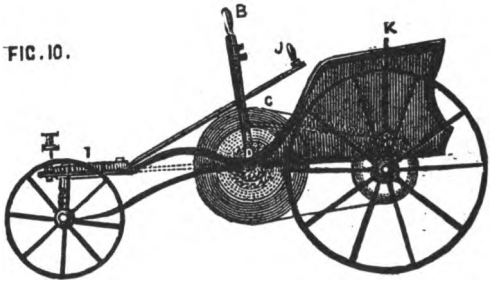
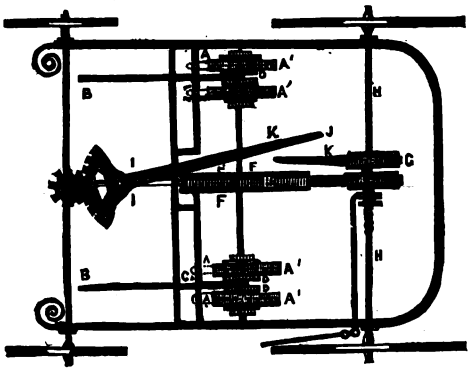


FIG. 11.



of the larger circle must drag over the surface of the ground, or the inner wheel performing the smaller segment must grind upon the surface from its forward motion, being less than the other; an evil increasing in proportion to the unevenness of the ground, and to the deviation from the straight line in the running of the machine. The difficulty of balancing the machine on the ground whilst propelled by one wheel is obviated by adop ing a pair of guide wheels in front instead of one, as is commonly the case when a machine of this kind runs upon two wheels behind. In some instances this inventor proposed to use only one lead-

ing wheel with the single driving whee', in which case the operator while in a sitting posture could start the machine by the feet acting against the ground outside the treadles, as in the old velocipede or "dandy horse." Having started and balanced the machine, he then brings his feet on to the treadles, and drives by means of them whilst still in a sitting posture, or if he stands on the treadles he adds the force of his weight to the muscular power of the legs, and thus gains a great advantage. This patent was never concluded like its predecessor to which we have called attention.

The year of 1867 is not more prolific in manumotive machines than its predecessors, and while velocipedes have not entirely failed from the public mind, it is evident that the thing wants that genius of construction which insures notoriety in this year. William Tribe invented a new construction of velocipede in which the power exerted by the operator, instead of being directly applied to the propulsion of the carriage in the usual way, was so utilised as to compress or coil a helical spring, in which spring was thus stored the power exerted, and the tendency of the spring to uncoil itself was employed to give motion to the wheels of a velocipede through an arrangement of tooth wheels and pinions, or an endless strap or chain. In the drawing Fig. 10 is a side elevation, and Fig. 11 a plan of a velocipede constructed according to this invention. The springs are denoted by the letter *a* and are enclosed in casings, *a*1; *b*, *c*, *d*, is the lever ratchet and pall motion; *e* is a strap or band passing over the driving wheels *f*, *g*, the latter is upon axle *h* of velocipede. The power having been stored in the springs, by working backwards and forwards the levers *b*, the velocipede is now ready for use, and the pall having been raised, so as to release the springs, motion is given to the driving wheel *f*, and by the strap or band *e* to the wheel *g* and axle *h*, thereby putting in motion the vehicle; *i*, *j*, is a quadrant and lever operating the guide wheel; *k* is the lever of a brake for stopping the machine when desired. The levers are so arranged as to work by hand, but they can be so arranged as to be operated by the feet, or by both hands and feet. The levers *b* can be so arranged as to wind either one or two springs at a time. The claim to this plan was never made good by the proper completion of the patent, and may, therefore, be considered to be the property of the public, if any good is invested in such a construction.

The year 1868 seems to be the one which most clearly indicates an active movement in the revival of velocipedes, and consequently in this year the patents recorded become more interesting therein.

Messrs. Ardrey and Beckett lodge the particulars of an improved velocipede, the peculiarity of which is, in the first place, the application of a ring of metal, on one or both sides of the wheels, to which ring the crank pin is attached. In the second place, in applying springs made of a form to give elasticity to the carriage vertically so as not to materially alter the positions of the crank pin in relation to the connecting rod pin when in action; also in the application of a hollow bush to the swivel wheel, which with a bolt passing through it allows the pillar and stirrups to be securely fastened together. Thirdly, in making the stirrups for the feet of metal with a projection through which the bolt of a swivel wheel is passed, and fifthly, in placing the spindles which connect the upper rail to the seat of the carriage at an angle therewith so as to give additional length and breadth between the rails of the carriage without increasing the length or breadth of the seat.

In thus briefly noticing these earlier inventions, we would ask the reader's attention to the specialities of each. I think he will then conclude with us that, excepting the recent American or French machine, nothing whatever has been brought forward that can be said to possess novelty over those bygone patents which have been accessible to the reading public

for many years, and even these mentioned have been contemplated, if not actually specified.

We now arrive at a contrivance which would certainly stand excellently well for a description of the "bicycle" machine of the present time; unfortunately no drawing accompanies this description, and the patentee never lodged a complete specification. In the absence of drawings the description is so clear that we might almost conclude that the modern machine was being here described. It is by a Mons. Rivière, and is an improvement upon the then arrangement of velocipede which was then well-known, and consisted in a curved bar or beam resting by means of bearings upon the axles of two wheels, and so constructed that an individual might seat himself upon it as upon horseback, yet so that his feet touch the ground. The rider propelled the machine by pressing his feet slightly against the ground, taking care to keep his balance at the same time.

According to the invention the axle of the front wheel was fixed to and rotated with the wheel itself, and passed through bearings formed in the vertical steering fork on the vehicle, and each end of the axle was provided with a crank having a balanced foot plate, so that the rider could give motion to the machine through the cranked axle which actuated the front wheel, instead of pressing his feet against the ground as in the old arrangement. The inventor further says:—

"In constructing a velocipede according to this invention I prefer that the seat or saddle should be supported by a spring, and that a cross handle should be provided for actuating the vertical steering fork of the front wheel, such cross handle being connected by a strap to one end of a lever of the first order, having its fulcrum in the main beam of the vehicle, and the lever being so arranged that by partially rotating the cross handle upon its axis the front end of the lever is drawn up, and its lower end simultaneously actuates a spring brake, which is pressed against the periphery of the back wheel of the velocipede, thus retarding its motion as desired. When not required to be used the lever is kept out of action by a spring provided for the purpose. The two wheels must be in line with each other, and I prefer that the front wheel should be somewhat larger in diameter than the back one.

From this description the novelty of the American or Parisian machine may be well questioned. It is a pity the inventor did not include drawings in his completed specifications.

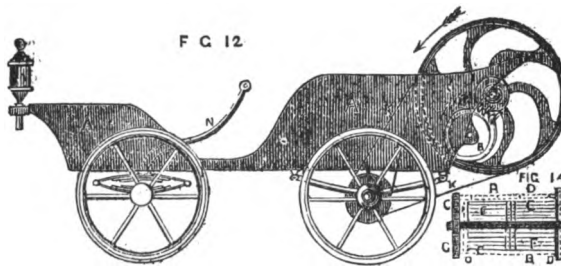
In the same year, Mr. Clark secured a patent for Obtaining and Applying Motive Power, by means of a velocipede actuated by a spring, and which is thus described by Mr. Clark in his specification. Steel springs contain a power hitherto unrecognised, it being simply necessary in order to render this power illimitable, or at least very considerable, to make the spring of sufficient dimensions, at the same time carefully selecting the material of which it is composed so as to prevent fracture and increase its elasticity. The combined effect of a number of springs possessing greater or less power may also be applied. I propose to employ spiral steel spring power as a substitute for the elastic force of steam, water, air or other fluids or material force whatsoever, the invention consisting in the mode of applying the springs as a motive power.

This improved motor may be applied to various purposes, as for moving all kinds of vehicles, such as velocipedes, invalid chairs, carriages, and even locomotives and trucks. I may also adapt this power to the propulsion of vessels or submarine apparatus, life and other boats of all kinds. The same means may be employed for the propulsion of aerial apparatus of all kinds and forms, whether balloon or other shaped. I also utilise the power of spiral springs for producing motion in all kinds of mills as a substitute for wind, water or steam power, also working sewing machines, apparatus for raising or lowering weights, or elevating liquids. It is also applicable for working ma-

chine tools, agricultural machines, and other purposes. One or more springs may be applied at each part of the machine or vehicle to be set in motion. I will here only describe one arrangement which will serve as an example. A spiral spring of suitable dimensions is enclosed in a barrel either toothed or not, which is placed in gear with toothed wheels, or the motion may be transmitted direct by means of bands, endless chains, or friction pullies.

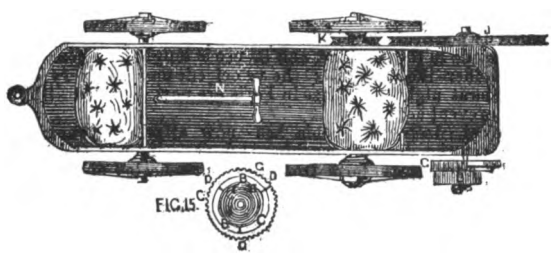
An example of this invention is illustrated in the accompanying drawing, in which Fig. 12 shows an elevation of a carriage having a spiral

FIG 12



spring applied as a motive power, although it will be understood that the mode of transmitting motion will vary according to the nature of the application; Fig. 13 is a plan of the vehicle, while Figs. 14 and 15 show longitudinal and transverse sections of the barrel containing the spring. In these figures the same letters indicate like parts. *a* is a carriage or vehicle on which is mounted the apparatus for producing the motive power, or instead of a carriage it might be applied to a balloon, boat, machine, or other apparatus; *b*, metal barrel or cylinder containing, 1st, an interior

FIG. 13



lining, *c*, held in place by metallic ribs, *d*; 2ndly, the spiral spring, *f*, of steel or other material which is to act as the motor. The barrel, *b*, is provided with a toothed wheel, *g*, which gears with a pinion, *h*, keyed to the axis, *i*. On axis *i* is also fixed a grooved fly wheel, *i*, which serves to regulate the action of the apparatus and communicates motion by means of an endless band, *k*, as shown to the pulley, *l*, and consequently to the axle, *m*, of the vehicle. The vehicle is steered by means of the lever handle, *n*, when the vehicle is required to move backwards, the band, *k*, is crossed, as shown. The barrel with its double casing and the spiral spring motor

are shown in detail at Figures 14 and 15. Two three, four, or more of these spiral springs are contained in one or more barrels made of the requisite strength to prevent the breaking while retaining sufficient elasticity. The springs may be disposed in groups, one beside the other or superposed. These springs are fitted on a common axis, on which they are simultaneously coiled or uncoiled and act all in the same direction, being held by a single catch. By disposing a number of springs in the same barrel an increase of power may be readily obtained. Brakes, pawls, and ratchets or other equivalents may be disposed for the purpose of regulating the speed or stopping the motion.

We observe that Mr. Clark refers to the propulsion of vessels on water, this is not, however, the first mention of an idea approaching a water velocipede, as we have a patent for a velocipede boat (if we may call it by such a Hibernianism) in 1867, in an interesting machine, the contrivance of Mr. George Crossley, of Cambridge, and which we shall fully describe when we consider the water velocipede or manumotive boat.

MODERN VELOCIPEDES.

Velocipedes occupy a vast deal of attention now in France. Manufactories are established on a large scale in Paris and elsewhere, and the new carriages, without horses, are constructed on very scientific principles, light and elegant, with all kinds of delicate appliances, at prices varying from ten to fifteen pounds. They are generally made with only two wheels (bicycles), while those constructed with three wheels are called tricycles; the word velocipede being too long, it has been abbreviated to "velox." The manufacturers- one in Paris, at least—have large places in which purchasers are instructed in the management of their carriages, and three or four lessons are said to be sufficient to form competent velocipedists. Many young men have adopted them, and in the country the velox may be seen awaiting its master at the railway station. In one case an economical application has been made of the tricycle, the rural postmen of the department of the Aube being provided with them, and considerable time is thereby saved in the delivery of letters in consequence. A box is attached to the machine, in which the postmen are allowed to carry parcels for customers, so that a regular parce's delivery is established in the district, and the charge for the parcels soon pays for the velocipede. The old dandy-hobbies went out of fashion on account of the numerous accidents to which they gave rise, but great improvements have been made in the machine, and its use is taught in a complete manner. The spider-like structure of the velocipede makes it very dangerous to pedestrians at night, and those in Paris are now provided with a small lantern, to prevent accidents.

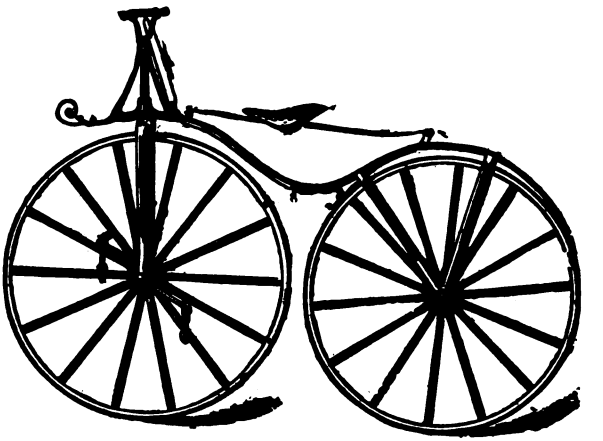
The "velocipedestrian" mania has now attacked young England. France revived the obsolete machine and gave interest and excitement to its use by altering its form from the four-wheeled species, safe as a three-legged stool, to the graceful two wheeler that demands skill and dexterity from the trundler. From our neighbours across the Channel the furore migrated to our brethren across the Atlantic, passing over us. The go-ahead vehicle is exactly suited to American ideas. Walking, say the New York wags, is on its last legs. Schools, with the imposing name of "Velocinasiums," for teaching the young idea how to gyrate, are being established; races are being relled; men and boys are being whirled here, there, and everywhere at the speed of twelve miles an hour. Inventors are improving the machines, and manufacturers are making them wholesale, the supply at present falling short of the demand. Our turn has come. There was a considerable rage for velocipedes in England some thirty years ago. There may be those living who can recollect seeing no less a man than Michael Faraday spinning one up Hampstead hill; he

was very fond of the exercise, and, we may infer, saw good in it. Did he originate his own machine? The velocipede appears to have had several inventors. Nicephore Niepce, one of the fathers of photography, has been set down as the first. But this is questioned.

An old Paris newspaper, bearing date July 27, 1779, tells of some novel feats of locomotion performed by MM. Blanchard and Masurier with a machine whereof the description exactly represents the old form of velocipede, only it was ornamented with a figure-head in the shape of an eagle whose outspread wings served as tillers to the steering wheel. But this may not have been the earliest of pedal locomotives. It is natural to suppose that the idea would suggest itself to the first man who turned alternate into circular motion—to the inventor of the crank, in fact.

The velocipede as now constructed is a modification of the old dandy-horse, which was worked by impulse from the feet pushed against the ground as a fulcrum. These efforts gave to the machine an impetus

FIG. 16.



which caused it to traverse several yards in distance on an even road. By renewing these strokes on the ground a great speed could be attained. It is needless to say that on an incline or rapid slope its own weight carried it down with considerable speed, which was moderated by breaking the speed, by touching the ground with the feet. The dandy-horse thus constructed weighed about 44 pounds. In ascending a hill the man dismounted and pulled the machine up by hand. With the modern velocipedes it is easy to go from 7 to 8 miles an hour without fatigue. The most prevailing form of the machine, and the one most favourably received by all those who have by long use learnt its value, and to enjoy this means of locomotion, is that called the bicycle, or two-wheeled velocipede. These have been for a long time much used in France and in America, and are now rapidly advancing into favour with ourselves, as they present in their improved forms advantages which render them a desirable mode of transport. The advantages are certainly very great if we consider that we are entirely independent of exterior aid in propelling

ourselves by one of these machines, and that while we indeed in doing work consume a certain amount of energy we have the satisfaction of replacing that in the desirable and pleasing shape of a pleasant feed. The velocipede eats nothing: costs nothing to preserve it in working order,

FIG. 17.

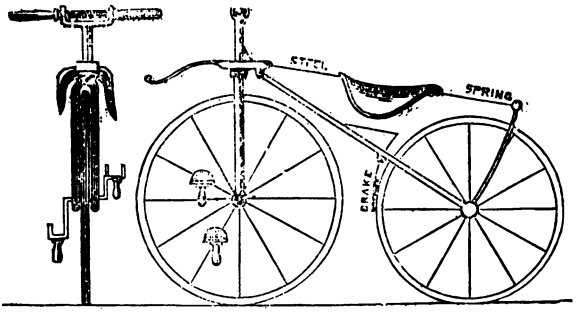
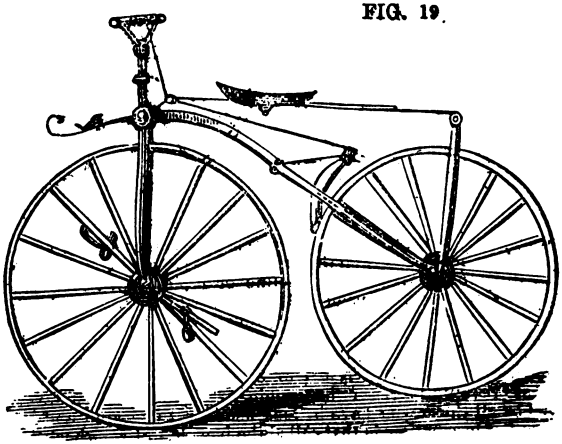


FIG. 18.

requires no extra attention or looking after, and is ready for our pleasure or necessities at a moment's notice. It embraces in itself the entire machinery out side ourselves, no small advantage compared with horses and carriages, or with railroads, in executing short or even long distances where time is not an immediate contingency of value.

FIG. 19.



THE BICYCLE OR TWO-WHEELED VELOCIPEDE.

Figure 16 represents one form of the bicycle, or two wheeled velocipede contrived with a self-brake, actuated by the handle in front of the rider. Figs. 17, 18, and 19 represent other velocipedes of the same description

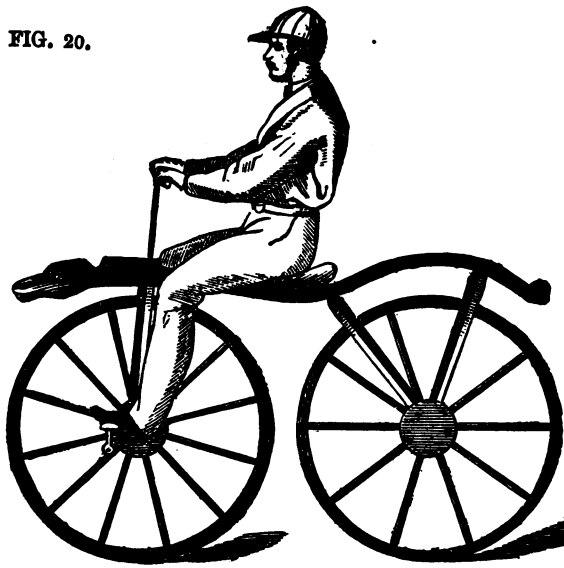
provided with somewhat different fittings, and of lighter and more elegant construction, besides being more manageable.

Fig. 20 is another modification without a brake, but velocipedists will in general prefer the use of a brake, as it gives power for instantly stopping.

THE TRICYCLE OR THREE-WHEELED VELOCIPEDE.

The three-wheeled velocipede is safer for timid persons than the two-wheeled, although in France the latter is much preferred. Owing to the graceful form of the three-wheeled—and especially owing to its easy and

FIG. 20.



safer action—it is also used by ladies, and has become quite a feature of country exercise. It is not so fast as the two-wheeled, but with skill, it can successfully compete with a carriage. The seat of it is very easy, and comfortably constructed. The hind wheels are light, graceful, and turn easily. The fore wheel is smaller, and serves to guide the machine by means of a handle, which causes it to turn at the slightest wish of the rider. The feet are placed on two pedals, shaped somewhat like a Turkish slipper. The legs act easily upon these, and the feet can be instantaneously disengaged, if required. The movement is much the same as in walking, and causes no fatigue. These velocipedes may be used by children, and are likely to supersede the old rocking horse.

Fig. 22 is a useful machine of the three-wheeled description, which has enjoyed considerable favour in this country.

The modern Parisian velocipede is represented by Fig. 23. It is a single velocipede, and is much used by ladies. On this account it is made far more commodious, and is provided with cushions to form an easy seat

for the rider. The pedals are slipper shaped, which assists the legs in their needful motions for conferring their exertion fully upon the machine, and yet so that the feet may be disengaged without difficulty. The larger of these three-wheeled machines has a lever which follows the line of the eccentrics attached to the pedals, and fits on to the axles. By assisting the movement of this lever, the speed of the vehicle is considerably increased, and a simple pressure against it checks the rotary move-

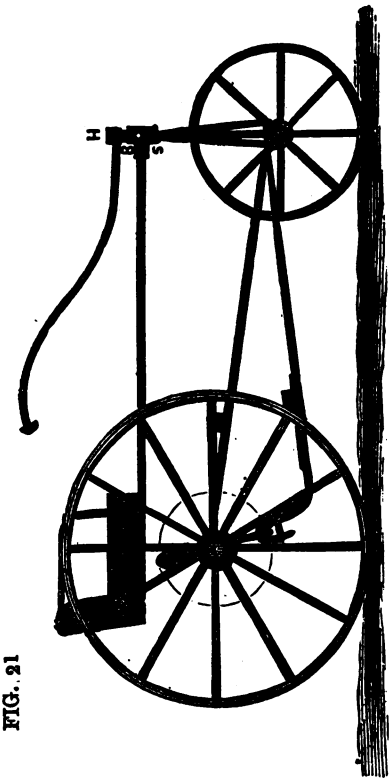


FIG. 21

ment of the wheel, and stops the motion of the machine. The lever acts both as a means of propulsion and as a brake.

Fig. 23 represents a three-wheeled velocipede of another pattern which is exceedingly light, and of an elegant appearance; it is fitted up in the best style with cushioned seat, cane back, and the best wrought fixings, so that it combines extreme lightness with great rigidity and strength "Velocipedes de Luxe" cost almost any sum that fancy can reach,

mounting up with the accessories that accompany them to a large amount. Velocipedes do not owe their present success to their novelty. They have been known and used in years long gone by, and it may appear at first remarkable that in former years, when means of communication were more difficult than they are now, both in point of ease and expense, the velocipede, as a travelling machine, should have so fallen into entire abeyance and owe its regeneration more to a fashion than for any failure in our

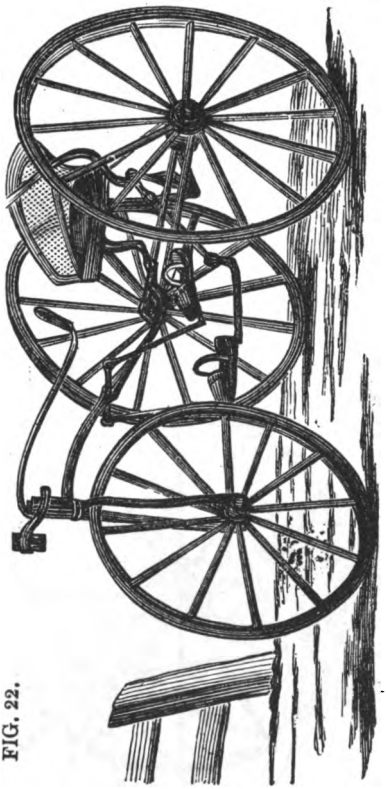


FIG. 22.

present means of conveyance. The truth is that the roads were more at fault than the machines. The velocipede, as now improved, demands a fairly constructed road to travel on, and is not of much use in very hilly districts, or on badly constructed roads. Locomotion, where any description of vehicle is employed (and we use this word to imply all locomotion other than riding or walking, of course excepting locomotion on the water), is entirely dependent on the action of wheels, and all vehicles are made

subservient to the best means of receiving the most effective motion from their action. The power employed is that of animals or of man

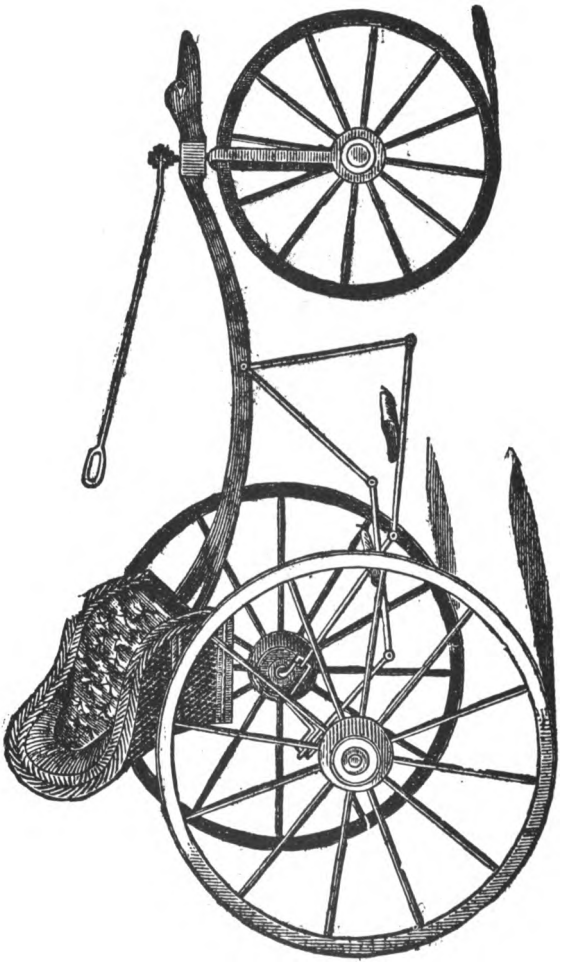


FIG. 23.

himself. When the last, the machine is called a velocipede, which is absolutely only a man guiding himself—or riding—on wheels.

PARTICULARS TO BE OBSERVED IN CONNECTION WITH VELOCIPEDES.

For men of small stature, the front wheel should be from 34in. to 36in. in diameter; for men of medium height, 36in. in diameter; for tall men the measure of the diameter of front-wheel should be 40in.

One fact proved by experience, and seemingly contrary to all reason, is this—that a small-sized man with a wheel 36in. in diameter, will be able to go as quickly as his rival of a taller stature on a velocipede with a higher wheel. The reason being that speed is not attained so much by force as by suppleness and agility. It is on this account that children often are more clever and adroit in the first steps in the management of these machines than grown persons are found to be.

The forms of velocipedes vary considerably, although in principle they remain the same. We may easily conceive that in constructing a velocipede, a few pounds gained in lessening the weight of the machine is important, as well as any improvement in the disposition of the parts by which the weight and strain is more fitly distributed, and any contrivance which gives more command or more ease to the driver of the velocipede is to be regarded as an important addition to the value of the means of locomotion.

We have arranged a few general directions in the more definite form of a few rules. Such a course our friends who are noviciates will, we are sure, be considered still more ready and useful:—

1st. Keep clear of crowded streets and thoroughfares; under all circumstances they are better avoided, and should never be driven through, unless the velocipedist has a dexterous and perfect command of the machine he is propelling.

2. Remember that the velocipede makes no noise, and consequently there is a danger, where roads cross, of vehicles coming into collision with the velocipede, unless the driver be watchful and on his guard.

3. To learn the skilful use of the velocipede, the following rules must be closely followed:—Choose a highway having a slight incline downwards to a level road. Begin by placing the velocipede 20 or 30 yards in advance (on the incline) of the level road. Then put on the brake and sit astride the velocipede. Take the two handles, let the legs hang down, and let the toes just touch on the ground or as near the ground as the length of legs will permit. Loosen the brake, and let the velocipede move gently down the 20 or 30 yards to the level. The velocipede, carried away by its own weight and that of the rider, will advance with a speed which increases with the length of the distance traversed, but which may always be moderated by the use of the brake.

4. Never put the feet upon the pedals before you have acquired a proper equilibrium by the means and in the manner already indicated.

5. Regulate your balance by the handles held in the hands.

6. Keep at this exercise until pretty perfect.

7. The task so far accomplished, place your velocipede in such a manner that the right side pedal shall be upwards. Place the left foot on the ground and the right foot on the up standing right hand pedal. Let some kind and judicious friend hold the velocipede by the hinder part of the spring, then press with the foot on the right hand pedal; it will be forced down and puts the front wheel in motion; as soon as this pedal is down the other or left hand pedal will be raised. The left foot should now meet its turn, press on the left pedal, and the right leg should mount without pressure so as not to neutralize the impulse of the left leg. The foot should be so placed on the pedal that the heel touches the rest, and so that all the front part of the foot from the instep should be in front of the pedal and not resting upon it.

8 Never mind if you have a few tumbles; you will not hurt yourself

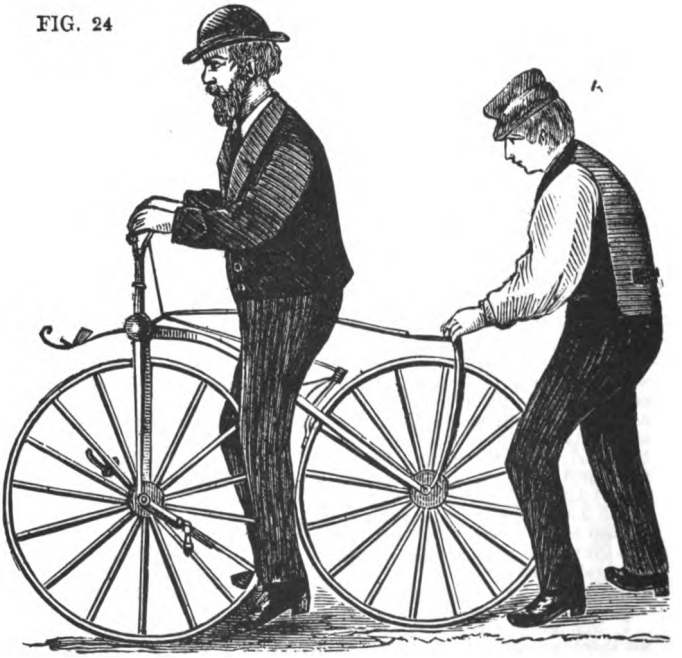
much, and after you have mastered the art, you will store them as amusing incidents of your apprenticeship.

It has been stated that one fairly practised in the use of a velocipede may traverse 60 miles daily for eight consecutive days, including a liberal allowance of time for repose, refreshment, &c., but this must be taken with all reservation.

The question has been raised as to whether velocipedes were liable to pay tolls. Recently the Southampton magistrates, after a week's consideration, have decided that a toll collector has no power, under the act, to charge for a velocipede.

At a velocipede race recently held at Liverpool, the time occupied in running rather more than eight miles was forty four minutes.

FIG. 24



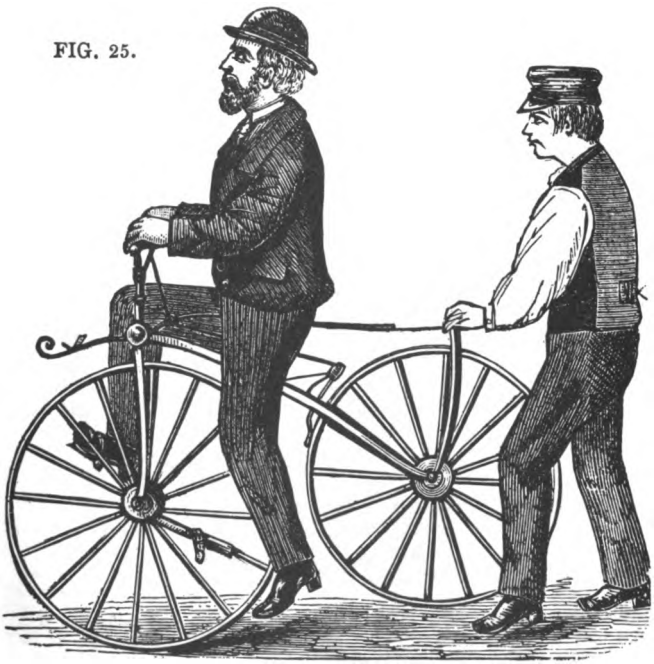
PLAIN AND EASY LESSONS FOR LEARNERS.

That there may be no difficulty experienced in following the various directions already communicated, we subjoin a few easy lessons to be carefully followed. We have illustrated these that the tyro may be fully able to follow our guidance, which will surely confirm him in the use and excellencies of this convenient mode of locomotion.

Lesson 1 (Fig. 24):—The assistant A pushes the velocipede with the rider upon it down the incline, retaining the velocipede in his hand, and steadies the machine so as to preserve its equilibrium, *but not touching the*

rider. The rider in descending, naturally for want of confidence and balance, would tumble over to the right or left. This arises from his body being inclined too much to the right or left; to correct this, if he inclines to the right side let him turn the handle in front to which he is holding to the right, which will cause the wheel to incline to the right also, and thus restore the balance, if to the left reverse the operation. Care should be observed to turn the wheel but slightly, otherwise you alter the direction and balance of the machine completely. This lesson should be repeated, say an hour a day, for three days, which will with ordinary care and perseverance make a man master of this position. We would observe that novices are apt to get discouraged at the apparent want of success in this

FIG. 25.



operation, but perseverance will lay claim to the mastery, generally in a moment, and when we least expect it.

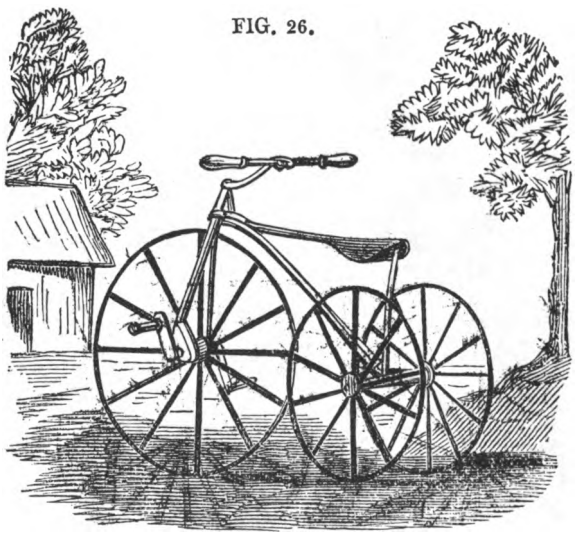
Lesson No. 2 (Fig. 25).—The learner stands on the front side of the velocipede and holding the handle places his right leg over to the right side of the machine, with the foot of his left leg just touching the ground. He places the right foot on the pedal as shown, and balances himself well in his saddle. The assistant still supporting him, again pushes the velocipede gently down the incline without leaving hold of it.—The rider's right foot descends in the course of the revolution of the wheel and the left pedal ascends to the upright position, answering to that which the right hand pedal first occupied, the rider lifts his left foot from the ground

and places it on the left pedal, he has now both feet in the pedals. The assistant still holding the machine, gently propels the learner forward, who soon, by observing these directions, will become easily able by himself to preserve his position and to—by himself—direct the velocipede.

The tricycle for gentlemen (Fig. 26) differs in its general appearance from those manufactured for the gentler sex, because the former do not require the same considerations of comfort and convenience. In this machine the front wheel is fitted with pedals for propulsion, as in the bicycle, and the levers and crank observed in the Parisian model of the lady's machine (Fig. 23) are therefore unnecessary; the machine combines in itself more lightness and elegance than the ladies velocipede, and thus contributes to the balance of the general appearance and pleasing fancies.

It is easy to see that this differs from the bicycle, in being provided

FIG. 26.



with two hinder wheels, in place of one, as is usual. Machines of this kind may be so constructed at a slight additional expense as to be interchangeable from tricycles to bicycles.

CHILDREN'S VELOCIPEDES.

Fig. 27 represents a velocipede constructed especially for children upon the rocking-horse principle. The child sits across the horse in the usual manner, with his feet resting upon the pedal as in the tricycle already described, and is of a similar construction. The steering is effected by the fore wheel and its appurtenances. In this elegant mode of recreation the muscular energies and physical development of the young locomotist become fully displaced without the slightest approach to over-tasking those energies, or of exposure to danger. This is, in fact, a most complete and finished rocking-horse, one that will enable its rider to progress and procure solid pleasure and amusement.

Another variety of youths' velocipede is in the form of the bicycle, only reduced in its proportions to meet the case of its juvenile occupant.

We have thus far gone through the general details of the velocipedes at present in vogue. To describe the numerous ideas (or to make a bad pun) the many *Cranks* brought out by sanguine inventors to assist this novel mode of "travelling on wheels" would be alike tedious and useless; but a few general closing remarks may prove interesting. To commence with the *pocket*. One great barrier to the introduction of velocipedes, as universally as they might be, is their expense; but we must caution our readers that a bad velocipede, if low in price, is yet dear, and that the money originally saved in purchasing will soon be absorbed in repairs; besides, that a good machine has all its extra money well invested in the comfort and ease of smooth working, in the lesser fatigue to the rider, and the saving of "damages to make good," so liable to the cheaper class of velocipede. Also, surely by association (a mighty lever in these days) clubs may arrange to pay for the velocipedes by instalments, or to hire them out for exercise at a slight weekly cost—say, so much in the pound

FIG. 27.

per week for hire—for example: a machine at £10 might be hired for 5s. a week, or 6d. a week in the pound, and pay its cost within the first year. The most useful forms of velocipede made hitherto are shown at pp. 30 and 31, and for the tricycle at p. 33.

The advantages to health are very apparent. Riding is beyond the means of the "many." Skating is under the most favourable circumstances a pastime to be enjoyed only during a short period of the year; but the velocipede can be used by men of small means; can be used all the year round; costs nothing to keep when in abeyance; is easily portable from place to place, and the exercise in its use is recommended by medical men for preservation of health, in lieu of horse exercise where the latter is beyond reach. It is also considered a cure for slight affections of rheumatism, or liver complaints. On the score of health, we wish to earnestly impress on our readers the advantage and advisability of wearing flannel shirts whilst riding the velocipede; and we will also, though out of place, suggest the wide a-wake, or billy-cock form of hat, instead of the old chimney pot form of head gear. How puzzled some of those with whom

we have had pleasant journeys on the velocipede looked when they first mounted the two-wheel, "dangerous looking," hoop like machine. "Oh! hold me up; I shall never master it, &c., &c." were the exclamations; but a day or two afterwards these very men rushed in on us with some such phrase, "Oh! what jolly fun; I have come from ——, and never tumbled once!" These very men have often afterwards described the easy and rapid locomotion as an enjoyment which was *positively intense.*

Therefore, let us assume the post of preacher for a few moments, and kindly addressing our readers, lecture thus—"My friends! Nothing is done without a little trouble, and nothing is worth doing but is worth doing well." Recollect the pleasure you had, you author, when you received your first cheque for your maiden essay. Recollect, grave doctor, your first fee. Recollect, bland shopman, your delight at the first coin taken over your counter. Recollect, you "man of figures," the joy at sight of your first quarter's salary. Have you not told the story of how your hearts beat at that supreme moment, scores of times to your admiring children or grandchildren, and my friends "pour revenir, a nos moutons,"—let us draw the moral as far as concerns the question on hand to-day. Never mind a few tumbles. What a glorious scratch of the hand you had—what a narrow escape with that lamp post on the road—how you thought the butcher's cart would upset you! Never mind all this—persevere—persevere—persevere—and difficulties will vanish like snow under the sun's influence. A few words of caution must close these concluding remarks. Avoid crowded streets.

Do not mount steep hills until you are sure of yourself, you might roll back, realising the application of "two steps backwards to one forward;" get off and walk up hill until master of your position. Do not wash in cold water after much exercise. Do not carry a stick or umbrella in your hands. The less luggage you carry for long trips the easier will be your progress, &c., with many other such simple rules as will suggest themselves to every one. We hope that before long, when the velocipede is *an institution* (cherished word of the British language), proper police regulations will exercise proper control over their use in crowded cities and streets, for it must be recollected that the velocipede is not a "brewer's dray," and is not meant to be used in stony or crowded thoroughfares. There is plenty of room for velocipedists in the pure open country and suburbs without running risks incident to large towns.

May you all enjoy your independent rides as much as we do ours.

This facsimile reproduction of the original (published in 1869) has been published by the Cyclists' Touring Club, Cotterell House, 69 Meadrow, Godalming, Surrey and printed by J. N. & H. Lock & Co., The Harrow Press, 66 Lower Road, Harrow, Middlesex.
March 1972

THE

VELOCIPEDE;

ITS HISTORY AND HOW TO USE IT