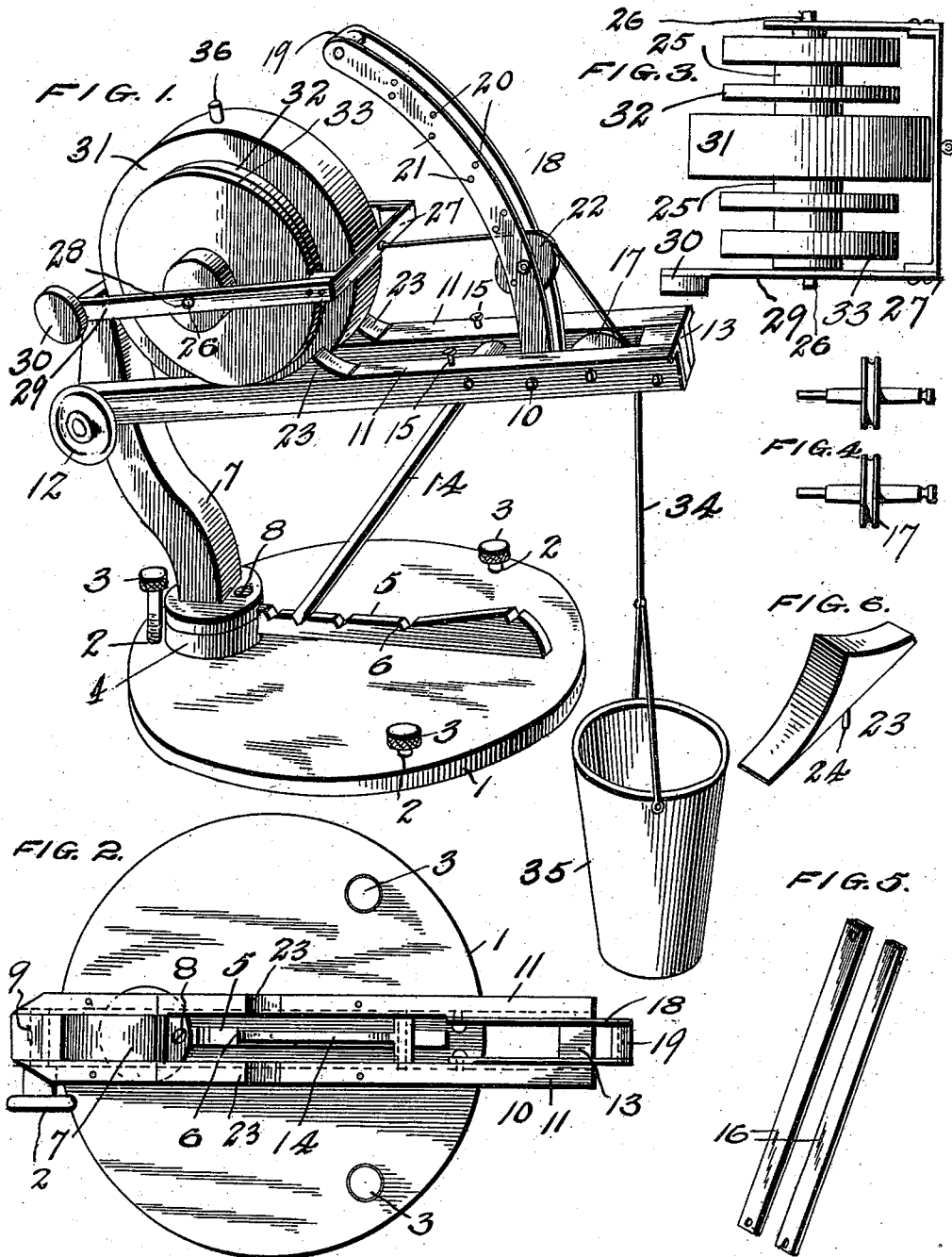


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EDUCATIONAL APPLIANCE.
APPLICATION FILED APR. 26, 1909.

977,793.

Patented Dec. 6, 1910.



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EDUCATIONAL APPLIANCE.

977,793.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM D. GIBBS, a citizen of the United States, residing at Durham, in the county of Strafford and State of New Hampshire, have invented certain new and useful Improvements in Educational Appliances, of which the following is a specification.

The object of my invention is the provision of an appliance or apparatus generally for demonstrating to students and others the principles of draft where rolling and sliding friction are involved, and, in particular, for demonstrating the effect on draft of different diameters of wheels; different widths of tires or treads; different angles of incline; different angles of hitch; and obstructions upon the bed or way.

The invention consists in an apparatus having certain novelties of construction and combinations and arrangements of parts, as hereinafter set forth, and which shall be adapted for manipulation to experimentally demonstrate the several accepted theories relative to rolling and sliding friction in draft.

The accompanying drawing illustrates one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principle.

Figure 1 is a view in perspective of the entire appliance. Fig. 2 is a view of the base, upright, and tracks, the wheels and draw bar being removed. Fig. 3 is a view of the wheels and draw bar removed from the track. Fig. 4 shows the two anti-friction wheels or pulleys. Fig. 5 shows the leather strips. Fig. 6 illustrates one of the obstructions.

Referring to the several figures, the numeral 1 designates a base consisting of a flat casting circular in outline, having three threaded holes 2 therethrough, leveling screws 3 in the holes, a projecting boss 4 with threaded holes in its top surface, and a projecting ridge 5 having notches 6 therein each at different heights from the surface of the base; 7, an upright of metal secured to the boss 4 by screws 8 and provided with a perforation 9 adjacent its top end, as shown; 10, the road bed made of two steel angle bars 11, 11 arranged parallel, the webs of each perforated at adjacent ends to receive a large brass clamp screw 12 which is also passed through the hole 9 in the upright; 13,

a filling or spacing piece between the free ends of the angle bars; 14, a prop pivoted between the webs of the angle bars and its free end adapted to engage the several notches 6 in the ridge so that the road bed can be inclined at angles of 5°, 10°, 15° and 20° to the plane of the horizon; 15, threaded steel pins which may removably hold in place leather strip 16 adapted to be used in "soft road" tests; 17, a grooved anti-friction wheel or pulley; 18, two polished steel segments secured at their lower ends to the webs of the angle bars, provided with a spacing thimble 19 at the free ends, and having two series of holes 20 and 21 spaced as shown; 22, an anti-friction wheel or pulley adapted to be repeatedly journaled in the series of holes 20 and 21 preparatory to the several experiments; 23, steel obstructions each one-twentieth of an inch high at the ends and having curved surfaces inclined to form an upper portion whereby the said curved surfaces may engage the wheels and prevent racing after the ends have been surmounted; 24, projecting pins to be seated within holes in the flanges of the angle bars and anchor the obstructions; 25, the two small wheels each about an inch and a half in diameter; 26, journals at the ends; 27, a draw bar of a U shape; 28, holes in the same serving as bearings for the journals 26 at the centers of the small wheels; 29, an extension of the draw bar; 30, a counterweight on the extension to balance the draw bar each side of the bearings; 31, a large cast iron wheel between the two small wheels said wheel being secured to said wheels in any suitable way so the wheel 31 will revolve with said small wheels; 32, the two relatively narrow inner rings or wheels each four inches in diameter and located upon opposite sides of the cast iron wheel and upon the small wheels and which can slide longitudinally thereof; 33, the two outer rings or wheels each four inches in diameter and of greater width or thickness than wheels 32, these wheels also being adapted to slide longitudinally of the small wheels; 34, a cord secured at one end to the draw bar and passed over the anti-friction wheels; 35, a bucket attached to the opposite end of the cord; and 36, a removable projecting pin in the periphery of the cast iron wheel.

When the base has been leveled by the aid of the leveling screws and a spirit level various experiments may be performed to

demonstrate theories of draft, for example: Wheels 32 and 33 are moved outwardly to positions where they are outside the tracks, so the small wheels 25 can rest upon the tracks, the central cast iron wheel falling
 5 between the same and its weight and the weight of the other wheels being taken by the small wheels. The tracks are brought to horizontal positions. Shot or other
 10 weights are placed consecutively in the bucket until the small wheels just begin to move. The bucket and shot are then weighed and the weight recorded. Now slide wheels 32 and 33 to positions each side
 15 of the cast iron wheel and raise them upon the tracks. Add shot to the bucket until the wheels begin to move. Again weigh the bucket and shot and record the weight. The difference between the weights recorded will
 20 show the difference in draft required to move a certain load (the weight of all the wheels) over a certain road bed on wheels of different diameters, the axle friction and other conditions being constant. It will be thus
 25 demonstrated that the difference in draft of loads supported on large and small wheels on a hard road bed is not great. Now place the strips of leather on the tracks to produce a soft track, the equivalent of a soft
 30 or muddy road bed. Repeat the two experiments above specified with the small and larger wheels. It will be demonstrated that the small wheels pull much harder than the larger ones on a soft road bed.
 35 Obviously, other experiments may be made with the apparatus to demonstrate: The effect on draft of wide and narrow tires or treads on hard and soft roads. The difference between sliding and rolling friction
 40 of large and small wheels on hard and soft roads. (In this experiment the pin 36 is inserted in the periphery of the cast iron wheel 31 so that when the wheel turns the pin will engage the draw bar and cause the
 45 wheels to slide). The effect of the angle of incline for large and small wheels on hard and soft roads. (The prop in this experiment is employed to give the desired incline of the tracks.) The effect of the angle of
 50 hitch. (The anti-friction wheel 22 in this experiment is placed in holes 21 when the small wheels are used and in holes 20 when the larger wheels are used). The effect of obstructions on small wheels and large
 55 wheels on a level road and at various hitch angles. (In these experiments the obstructions 23 are employed).

It will be observed that the apparatus possesses many important and desirable
 60 characteristics, among them being the following: The wheels are so constructed and combined that wheels of different diameters and widths of tires or treads are provided without changing the combined weights, the
 65 center of gravity, and axle friction. The

prop for setting the tracks at different angles. The segment with two series of holes corresponding to the small and larger wheels. The shape of the obstructions to prevent the racing of the wheels after they
 70 have surmounted the ends of the obstructions. Moreover, the entire appliance is comprised of relatively few parts, is compact, and can easily be moved from place to place.
 75

What I claim is:

1. An educational appliance consisting of a base; leveling screws; a notched ridge in connection with the base; an upright; a track comprising two parallel bars spaced
 80 apart and at one end pivotally connected with the upright; a prop for supporting the track at different angles and adapted to engage the notches in the ridge; two segments having series of holes secured to the track;
 85 wheels adapted to be supported upon the track; a draw bar in connection with the wheels; an anti-friction pulley carried by the segments; an anti-friction pulley supported by the track; a cord secured to the
 90 draw bar and engaging the anti-friction pulleys; and a receptacle supported by the cord.

2. The combination in an educational appliance, of a base; a vertical upright; a track pivotally secured to the upright by a
 95 clamp screw; means for leveling the appliance; means for supporting the track at various angles to the horizon; an anti-friction wheel supported by the track; wheels of different diameters; means for supporting
 100 weights; and a draw bar and cord uniting the wheels and the means for supporting weights.

3. The combination with a track, of means for supporting the same at various angles to
 105 the horizon; two wheels adapted to move upon the track; journals, as 26, in connection with the two wheels; a wheel of relatively large diameter located between the aforesaid two wheels; a plurality of wheels
 110 supported by the aforesaid two wheels and movable toward and away from the wheel of relatively large diameter; and means in connection with the journals for moving all the wheels.
 115

4. The combination with a track, of means for supporting the same at various angles to the horizon; two wheels adapted to move
 upon the track; journals, as 26, in connection with the said two wheels; a wheel of relatively large diameter located between the
 120 aforesaid two wheels; a plurality of wheels supported by the aforesaid two wheels, some of said wheels being wider at the tread portion than the others; and means in connection
 125 with the journals for moving all the wheels.

5. The combination in an educational appliance having a track, and with two small
 130 wheels 25, 25, of a relatively large metallic

wheel located between the said two small wheels; two relatively narrow tired wheels 32, 32; two relatively wide tired wheels; and means for moving said wheels along the 5 track; said two relatively narrow tired wheels and said two relatively wide tired wheels being located so their axes coincide with the axes of the two small wheels.

6. The combination in an educational appliance having a track, and with two small wheels, of a relatively large metallic wheel located between the said two small wheels; two relatively narrow tired wheels; two relatively wide tired wheels; and means for 10 moving said wheels along the said track; said narrow and wide tired wheels being mounted upon the small wheels and adapted to be moved toward and away from the large metallic wheel.

7. The combination in an educational appliance having a track and with a relatively large wheel located with its lower edge between the members of the track, of relatively small wheels located at opposite sides 25 of said large wheel, wheels of larger diameter than the small wheels located at opposite sides of said large wheel and having their axes coinciding with the axis of the said small wheels, journals, and a draw bar.

8. The combination in an educational appliance having a track and a relatively large wheel and relatively small wheels at the opposite sides of the relatively large wheel and all said wheels supported by the track, 35 of a balanced draw bar connected to the wheels in line with their common axis.

9. The combination in an educational appliance, of a base; an upright supported by the base; a track pivotally secured to the upright; means for adjusting the track and supporting the same at different angles to the horizon; a segment secured to the track, said segment having a series of holes; and an anti-friction pulley adapted to be successively supported with its axis of rotation 45 in line with the holes in the segment.

10. The combination in an educational appliance, of a base; an upright supported by the base; a track pivotally secured to the upright; means for adjusting the track and supporting the same at different angles to the horizon; a segment secured to the track, said segment having two parallel series of holes; and an anti-friction pulley adapted 50

to be successively supported with its axis of 55 rotation in line with the parallel holes in the segment.

11. The combination in an educational appliance having wheels, of a track consisting of two parallel elements; means for pivotally supporting said track; two obstructions, each having a raised central portion between the ends, the top surfaces being inclined from said raised central portion to the ends and said surfaces ending above the 65 ends of the obstructions so the said extreme ends will constitute primary obstructions to the wheels, and means for detachably securing the obstructions to the track, for the purpose set forth. 70

12. A plurality of wheels adapted for use in connection with the track of an educational appliance, comprising a central relatively large wheel, two wheels of smaller diameter than the large wheel, and located 75 at opposite sides of the large wheel, and wheels slidably mounted upon the said wheels of smaller diameter, whereby experiments may be made with wheels of different sizes without changing the weight 80 of the combined wheels or changing the axle friction.

13. A plurality of wheels adapted for use in connection with the track of an educational device, comprising a central relatively large wheel, two wheels of smaller diameter than the large wheel and located at opposite sides of the large wheel, and wheels having treads of different widths mounted upon the said wheels of smaller diameter. 90

14. A plurality of wheels adapted for use in connection with the track of an educational device, comprising a central relatively large wheel, two wheels of smaller diameter than the large wheel located at opposite 95 sides of the large wheel and fixed to said large wheel, and wheels of smaller diameter than the large wheel and of greater diameter than the said wheels of smaller diameter, and said wheels movably mounted upon the 100 said wheels of smaller diameter.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM D. GIBBS.

Witnesses:

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NELLIE F. WHITEHEAD.