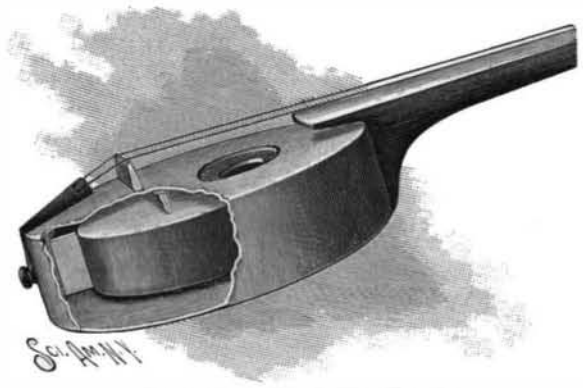
AN IMPROVED MUSICAL INSTRUMENT.

The illustration represents an instrument of a banjo or guitar type, but having two connected sound boards, from which are obtained tones designed to blend and afford music of an altogether superior quality. The improvement has been patented by Mr. Henry I. Holcomb, of Centerville, South Dakota. The body of the instrument has an interior chamber, with the usual tone opening in the sounding board, and within the



HOLCOMB'S BANJO OR GUITAR.

body is a second hollow auxiliary body of similar contour, the end blocks of the two bodies being connected at the front and rear by strips or pins of wood. An interior bridge connects the main or outer sounding board with the outer face of the sounding board of the auxiliary body, the latter also having a sound opening registering with the opening in the main sounding board, although of smaller diameter.

HIGH SPEED NAVIGATION.

A boat placed upon water sinks until the weight of the water that it displaces is equal to its own weight. In order to give it a horizontal speed, it is necessary to overcome the resistance that the water offers to the vertical section of the immersed part. If such boat is flat bottomed and if one succeeds in giving it a sufficient speed, the gravity that keeps it immersed, entering more into composition with the horizontal force that carries it along, it sinks less deeply, is lightened and is lifted until it glides over the surface of the liquid. The resistance to progression is then greatly reduced. The boat is immersed anew as soon as the horizontal propulsion ceases to act. We have a sensation of this composition of gravity with a horizontal force when, in traveling upon a railway, our train running at full speed suddenly slows up. It seems to us at this moment as if our weight increased and as if we sank into our seat, just as a bird in full flight would fall if its horizontal velocity were arrested.

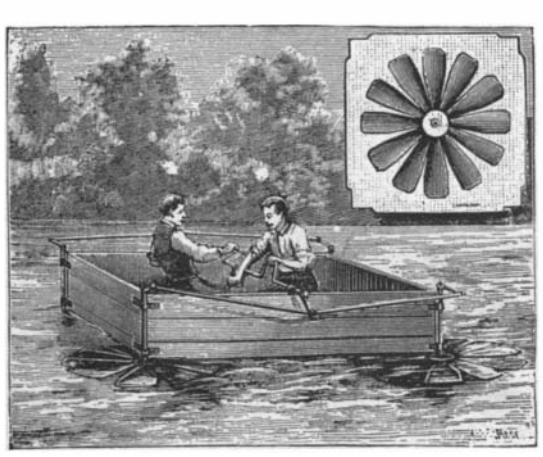
It is not very easy, practically, to give a boat, through a motor that it carries, a horizontal speed sufficient to allow it to raise itself upon the water: but such a result can be reached indirectly. The following is an experiment dating back to 1876, but not before published, that realizes it.

The apparatus is a rectangular boat placed upon four horizontal screws whose blades are slightly inclined upon the horizontal plane. A cranked shaft toward the center of the boat receives the action of one or two men and transmits it to the four screws.

As soon as the latter are set in motion, the apparatus rises, and at a sufficient rotary velocity easily attained, the box forming a boat is held out of the water.

As will be understood, the blades, slightly inclined upon the horizontal, realize the condition of a horizontal plane gliding at great speed upon the surface of the liquid. If a forward motion be given the float, we shall find ourselves in the condition favorable to such gliding.

The resistance to the rotary motion does not increase with the speed of the forward motion because the relative current that results from such speed, contrary upon a half diameter of the screw, is favorable upon the other half of the same diameter. By this process it might be possible to attain the limit of the speeds permitted to man upon the surface of the earth. The velocities produced by our motors, under the laborious conditions in which we are placed, are not very great. It would be necessary, in order to realize the displacements that our imagination dreams of, to be able to dispose of a horizontal component of the gravity.—La Nature.



APPARATUS FOR THE STUDY OF HIGH SPEED NAVIGATION.

A PROPELLER LIFE BUOY.

In an inflatable rubber bag forming at once a seat and a buoy, as shown in the illustration, is a metallic bearing sleeve for a shaft on whose outer end is a screw or paddle wheel, waist and shoulder straps preventing the person using the buoy from being washed off. The forward end of the bearing sleeve is forked, the forks being pivoted to an air-tight casing or buoyant chest, against the rear side of which the seat may be folded up. The casing also forms a partial support, and contains the mechanical propelling devices, having at its under side bearings for the horizontal propeller shaft and on its front side bearings for a vertical shaft on whose lower end is a screw whose operation is adapted to uphold the buoy in the water. On the casing is stepped a mast, on which a sail may be set, and a downwardly extending frame supports a pedal shaft, by which may be operated, through a sprocket chain connection, a crank shaft having a bevel gear meshing with a bevel pinion on the vertical shaft, the latter shaft also having a bevel pinion meshing with a bevel gear on the forward end of the horizontal shaft, both shafts and their screws or paddles being thus operated by the pedals and by hand cranks at each side of the casing. There is a rudder on the forward side of the casing, and a compass is mounted just below a lantern supported on a rod in front of the mast. The pedals and crank handles are arranged to be folded, and the blades of the screws fold down upon their shafts, all parts of the device being designed to occupy as small a space as possible when not in use. This device forms the subject of a patent recently issued to M. Francois Barathon, Sr., 21 Boulevard Poissonniere, Paris, France.

BARATHON'S PROPELLER LIFE BUOY.

THE WHEEL VERSUS THE PEDESTRIAN.

The great distance covered by bicyclists with ease shows conclusively that the human walking apparatus although it may be the best possible contrivance for all the uses for which it was designed, is not to be compared with wheels, for the one purpose of getting over the ground. A single observation of a wheelman going at moderate speed shows that, with an effort which in walking would result in two steps of say two feet each, or a total advance movement of four feet, with the wheel the advance movement would be two bicycle steps, or downward pressures of the feet, each resulting in a forward movement of seven and one half feet, or fifteen feet for one entire revolution of the pedal shaft, and this with less exertion than is required to take two steps. In fact, it would be easier for the bicyclist to make the fifteen feet on a level with one pressure of one foot than to take two steps.

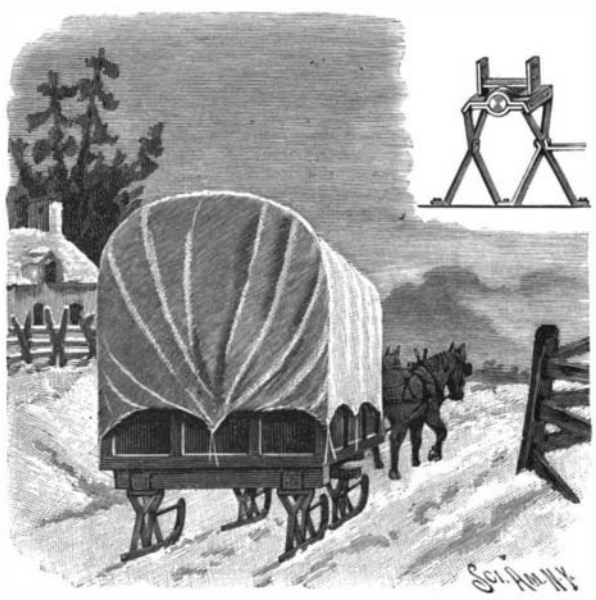
Now, in view of these magnified steps made by the bicyclist, it would be interesting to know what the stature of a man must be, to make in walking the same distance made by the bicyclist, with the same number of movements of the feet. Clearly the steps in this case must be seven and one-half feet each, which, at the lowest estimate, represents three steps

"A STEP," IN WALKING AND ON THE WHEEL.

of an ordinary man. It would perhaps be nearer the mark to say four steps, but to be on the safe side we call it three, and have made an illustration showing the comparative size of a wheelman and a pedestrian built to keep step with him. The pedestrian must at least be eighteen feet high. The man with this great stature would, after all, fall far short of making the speed of the bicycle. There is nothing like rotary motion; the wheel would be the winner in any race. While the bicycle has the advantage over the extremely tall pedestrian, it is obvious that the tall wheelman has no advantage over the short one.

AN IMPROVED BOB SLEIGH.

The attachment of the knee to the bolster of a bob sleigh is, by the improvement shown in the accompanying illustration, made very strong, while the runners have free oscillatory movement, the movement of each runner being independent of the other. A patent has been granted for this invention to Harvey L. Eastman, Wahpeton, North Dakota. The bolster plate, one of which is secured near each end on the bolster, has at its center a transverse depression, forming in its bottom a semicircular socket, the plate being adapted to engage with a knee plate, or knee socket plate, which has two side bars and a semicircular socket with convexed upper faces, the sockets of the knee plates being faced the reverse of the sockets in the bolster plate. In placing the knee plates beneath the bolster the depressed or socket sections of the bolster plates are located between the side bars of the knee plate, and a pintle or short shaft is journaled in the socket sections of the plates, as shown in the small view, the socket section of each knee plate resting upon this pintle. Each knee is made of a single piece of Y-shaped metal, the upper portion of each knee being bolted to the end bars of the knee plates, and braces connect the standards or members of the knee.



EASTMAN'S BOB SLEIGH.