This action of the *toggle joint*, any one can exemplify for himself and bear witness to, as in ascending a flight of stairs or in fact only one stair of the flight : by raising one foot on to it, and then bending forward to bring the centre of gravity of the body over the new point of support, raise the remainder of the body to the required elevation by merely straightening the leg or bringing the knee articulation into play and without any effort of the other leg to do the lifting.

Man can again support himself as a *rigid beam* or *bridge*, in a horizontal position, with nothing but his head and toes resting on two chairs or other points of support, by thus stiffening his system ad libitum : and again, see his immense strength, *his rigidity of structure* when stretched *horizontally upon a ladder*, a clinging with feet and hands to two of the rungs, or rather pulling with the one, and pushing with the other, while a horse or pair of horses vainly endeavours to dislodge him.

And due to this same powerful action of the muscles at the knee and elbow, a man will, either in the sitting, standing or crouching position, exert great effort, when well supported from behind, in forcing in a door, keeping an enemy at bay, etc ; as, with his back, when supported from in front: he can produce a like effect.

This action of the hinge joints of the human machine, occurring as it does at the knee and elbow, is illustrative of an almost paradoxical case in mechanics, as where it requires an infinite force, acting in the direction of the *length of a string or chain or beam* horizontally stretched and thus subject to the effect of gravity, to bring it into a mathematically straight line, while of course, it similarly requires a minimum or absolutely inappreciable effort when applied at right angles thereto to bring it into line or cause it to deviate therefrom.

The body also when slightly sloped or bent forward is capable of great exertion in rectifying or straightening itself up under a heavy load upon the shoulder, thus showing the power of the hip-joint and vertebral column in assuming a rectilineal direction, under a weight of as much as almost half a ton or more.

See now the powerful leverage exercised by the tarsal bones and muscles of the foot, when a man in the sitting posture with almost any weight upon his knees, can raise them by as many inches as