terwards applied to the more reputable ſervice of weigh­ing loaded carriages.

Fig. 5. is a plan of the machine. KLMN is the plan of a rectangular box, which has a platform lid or cover, of ſize sufficient for placing the wheels of a cart or waggon. The box is about a foot deep, and is ſunk into the ground till the platform cover is even with the ſurface. In the middle of the box is an iron lever ſupported on the fulcrum pin i *k,* formed like the nail of balance, which reſts with its edge on arches of hardened ſteel firmly faſtened to the bottom of the box. This lever goes through one side of the box, and is furniſhed at its extremity with a hard steel pin *l m,* alſo formed to an edge below. In the very middle of the box it is croſſed by a third nail of hardened ſteel *g h,* alſo formed to an edge, but on the upper side. Theſe three edges are in one horizontal plane, as in a well made balance.

In the four corners A, A', E', E, of the box are firmly fixed four blocks of tempered ſteel, having their upper ſurfaces formed into ſpherical cavities, well polihed and hard tempered. ABODE repreſents the upper edge of an iron bar of conſiderable strength, which reſts on the cavities of the ſteel blocks in A and E, by means of two hard ſteel ſtuds projecting from its under edge, and formed into obtuſe angled points or cones. Theſe points are in a ſtraight line parallel to the side KN of the box. The middle part C of this crooked bar is faced with hard-tempered ſteel below, and is there formed into an edge parallel to AE and KN, by which it reſts on the upper edge of the ſteel pin *g b* which is in the lever. In a line parallel to AE, and on the up­per fide of the crooked bar ACE, are fixed two ſtuds or points of hardened ſteel B and D projecting upwards above half an inch. The platform-cover has four ſhort feet like a ſtool, terminated by hard ſteel ſtuds, which are ſhaped into ſpherical cavities and well poliſhed. With theſe it reſts on the four ſteel points B, B ,D',D. The bar ACE is kneed in ſuch a manner vertically, that the points A, B, D, E and the edge C are all in a horizontal plane. Theſe particulars will he better underſtood by looking at the elevation in fig. 6. What has been ſaid of the bar ACE muſt be underſtood as alſo ſaid of the bar A' C E'.

Draw through the centre of the box the line *a b c* perpendicular to the line AE, BD. It is evident that the bar ACE is equivalent to a lever *a b c,* having the fulcrum or axis AE reſting with its extremity C on the pin *h g* and loaded at *b.* It is alſo evident that *a* C is to *a b* as the load on this lever to the preſſure which it exerts on the pin gh, and that the ſame proportion ſubsiſts between the whole load on. the platform and the presſure which it exerts on the pin g h. It will alſo appear, on an attentive consideration, that this proportion is nowiſe deranged in whatever manner the load is placed on the platform. If very unequably, the two ends of the pin h may be unequally preſſed, and the lever wrenched and ſtrained a little; but the total preſſure is not changed.

If there be now placed a balance or ſteelyard at the side LK, in ſuch a manner that one end of it may be directly above the pin *l m* in the end of the lever EOF, they may be connected by a wire or ſlender rod, and a weight on the other arm of the balance or ſteel­yard may be put in equilibrio with any load that can be laid on the platform. A ſmall counterpoiſe being first hung on to balance the apparatus when unloaded, any additional weight will meaſure the load really laid on the platform. If *a b* be to *a c* as 1 to 8, and EO to E F alſo as 1 to 8, and if a common balance be uſed above, 64 pounds on the platform will be balanced by one pound in the ſcale, and every pound will be ba­lanced by 1/4th of an ounce. This would be a very con­venient partition for moſt purpoſes, as it would enable us to uſe a common balance and common weights to com­plete the machine : Or it may be made with a balance of unequal arms, or with a ſteelyard.

Some have thought to improve this inſtrument by using edges like thoſe of the nails of a balance, instead of points. But unlefs made with uncommon accuracy, they will render the balance very dull. The ſmall de­viation of the two edges A and E, or of B and D, from perfect paralleliſm to KN, is equivalent to a broad ſurface equal to the whole deviation. We imagine that, with no extraordinary care, the machine may be made to weigh within 1/2000th of the truth, which is ex­act enough for any purpoſe in commerce.

It is neceſſary that the points be attached to the bars. Some have put the points at A and E in the blocks of ſteel faſtened to the bottom, becauſe the cavi­ty there lodged water or dirt, which ſoon deſtroyed the inſtrument with ruſt. But this occasions a change of proportion in the first lever by any ſhifting of the crooked bars ; and this will frequently happen when the wheels of a loaded cart are puſhed on the platform. The cavity in the ſteel ſtud ſhould have a little rim round it, and it ſhould be kept full of oil. In a nice machine a quarter of an inch of quickſilver would effectu­ally prevent all theſe inconveniences.

The ſimpleſt and moſt economical form of this ma­chine is to have no balance or ſecond ſteelyard ; but to make the first ſteelyard EOF a lever of the first kind, viz. having the fulcrum between O and F, and allow it to project far beyond the box. The long or outward arm of this lever is then divided into a ſcale of weights, commencing at the side of the box. A counterpoiſe muſt be choſen, ſuch as will, when at the begin­ning of the ſcale, balance the ſmalleſt load that will probably be examined. It will be convenient to carry on this ſcale by means of eke-weights hung on at the *extremity* of the lever, and to uſe but one moveable weight. By this method the divisions of the ſcale will have always one value. The beſt arrangement is as follows: Place the mark O at the beginning of the ſcale, and let it extend only to 100, if for pounds ; or to 112, if for cwts.; or to 10, if for stones ; and let the eke-weights be numbered 1, 2, 3, &c. Let the loweſt weight be marked on the beam. This is al­ways to be added to the weight ſhown by the opera­tion. Let the eke-weights ſtand at the end of the beam, and let the. general counterpoiſe always hang at O. When the cart is put on the platform, the end of the beam tilts up. Hang on the heavieſt eke-weight that is not sufficient to preſs it down. Now complete the ba­lance by sliding out the counterpoiſe. Suppoſe the confiant load to be 312 lb. and that the counterpoiſe ſtands at 86, and that the eke-weight is 9 ; we have the load= 986+312,= 1298 lbs

STEELE (Sir Richard), was born about the year 1676 in Dublin ; in which kingdom one branch of the family was posseſſed of a conſiderable eſtate in the