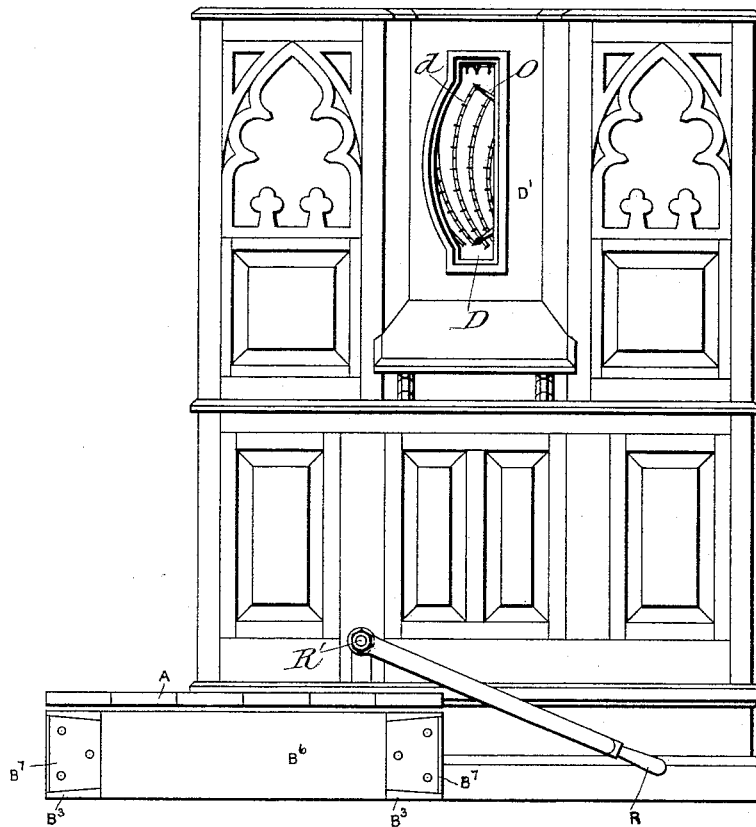


E. WÖLNER.
WEIGHING MACHINE.

No. 384,659.

Patented June 19, 1888.

Fig 1.



Witnesses

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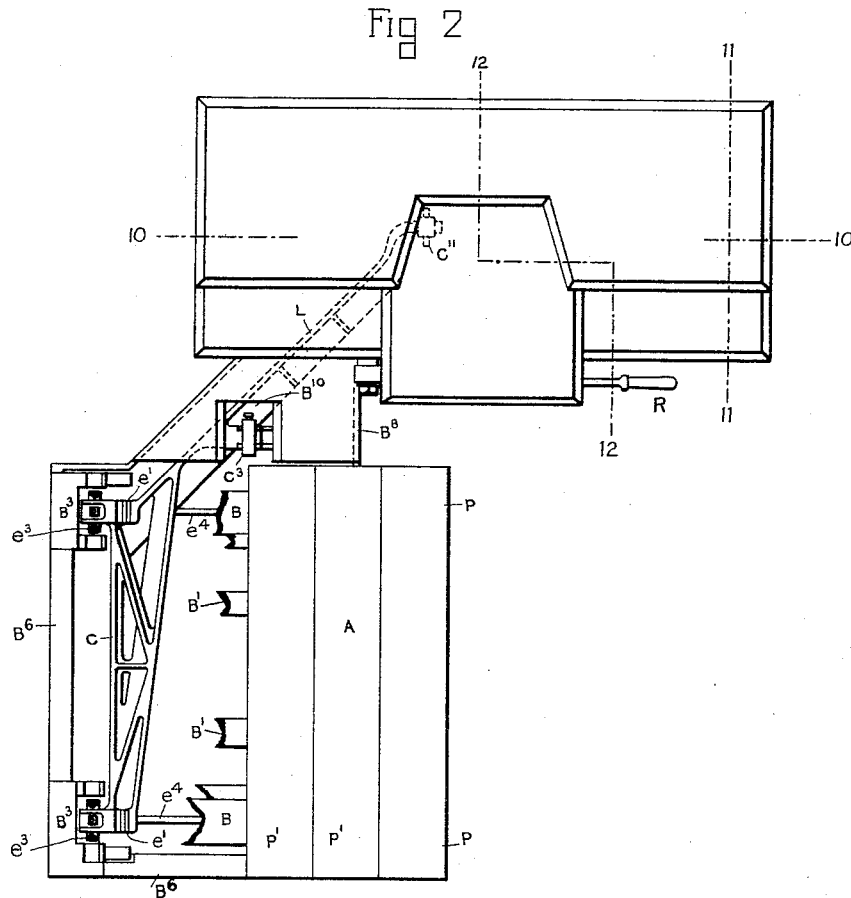
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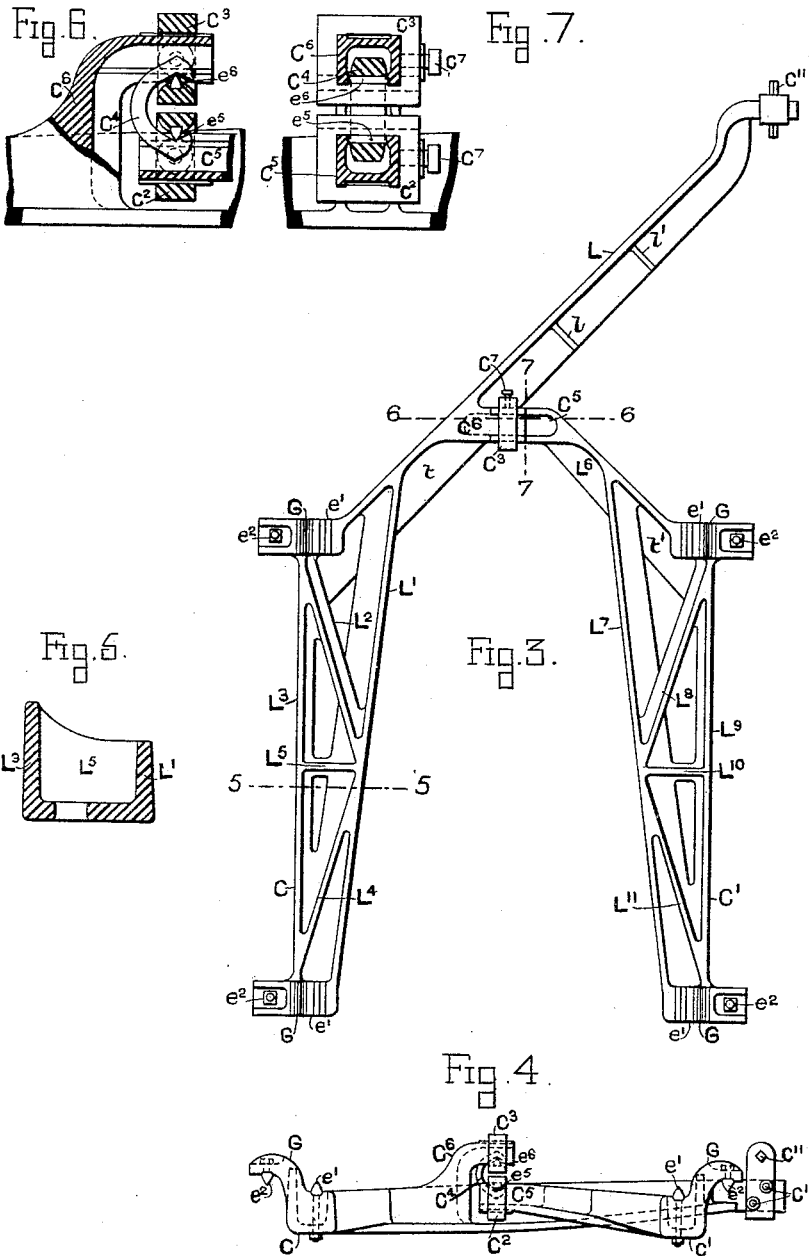
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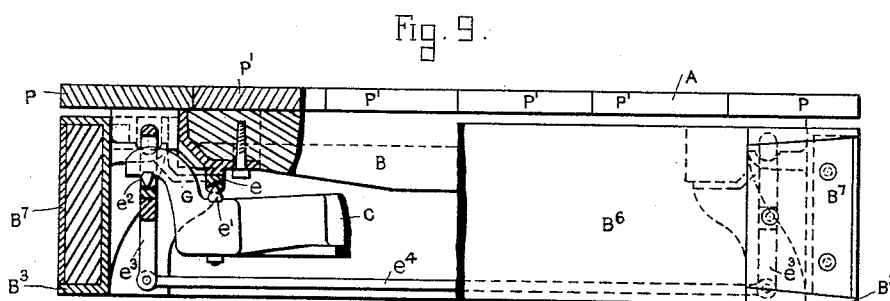
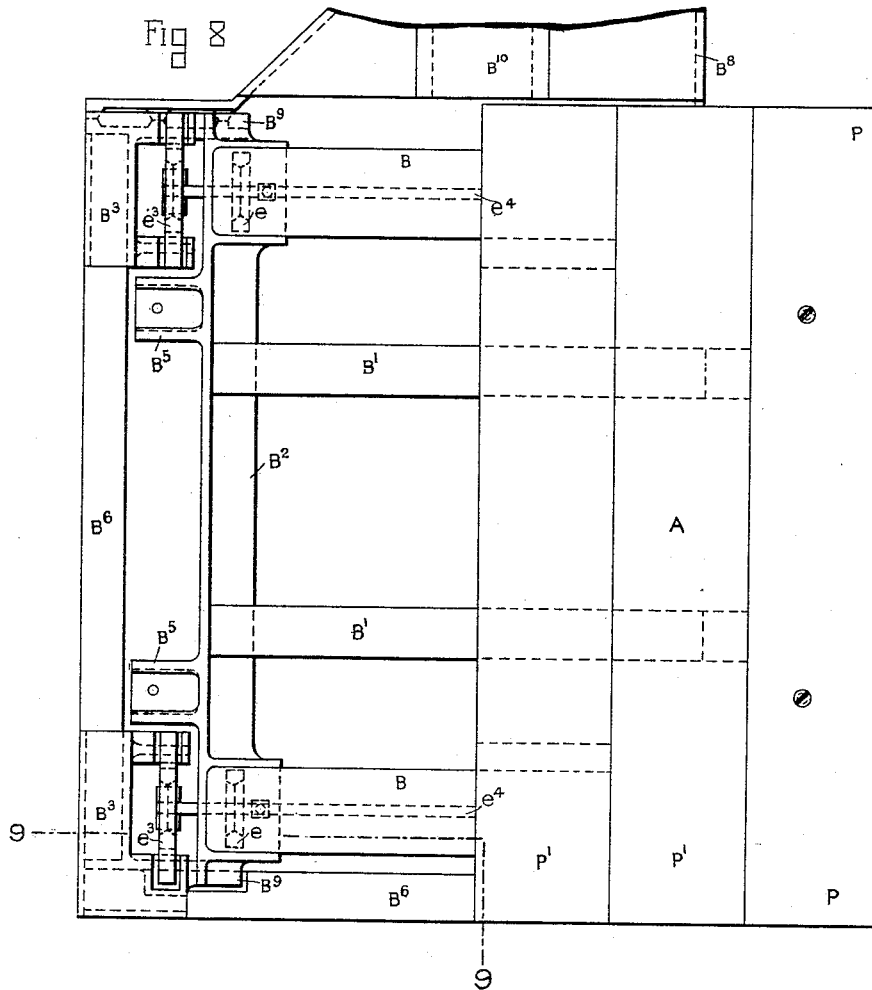
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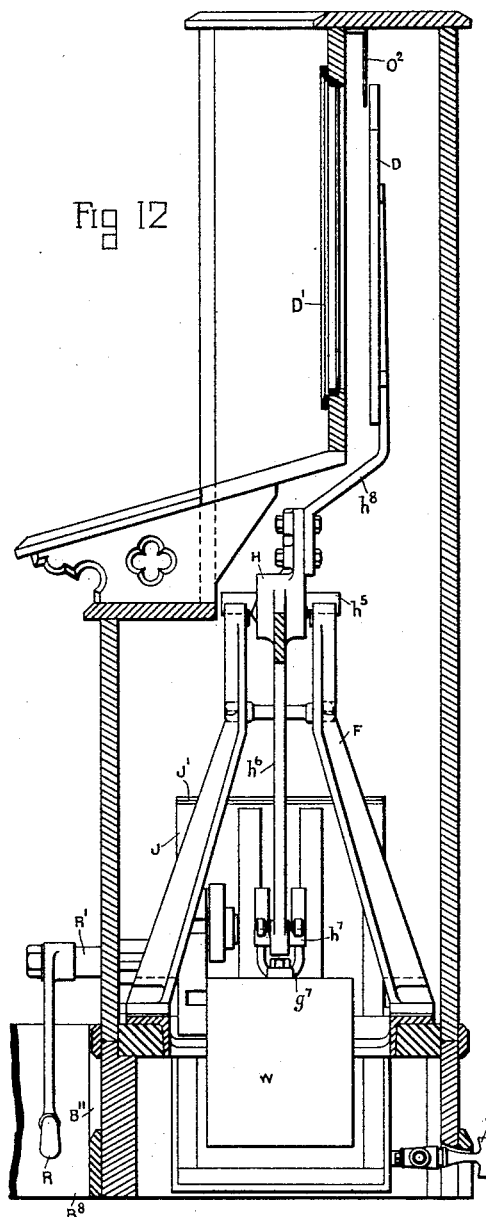
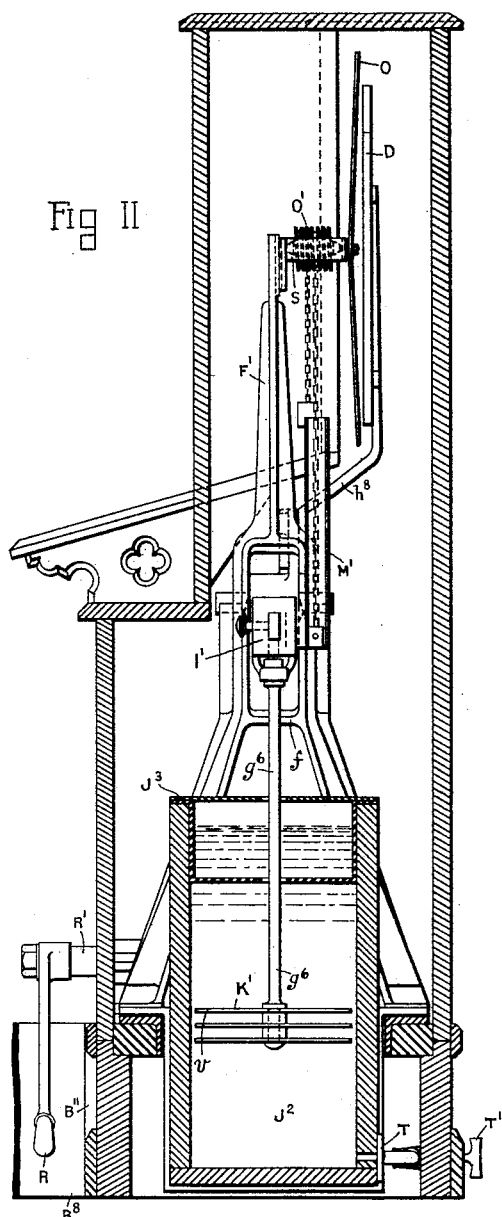
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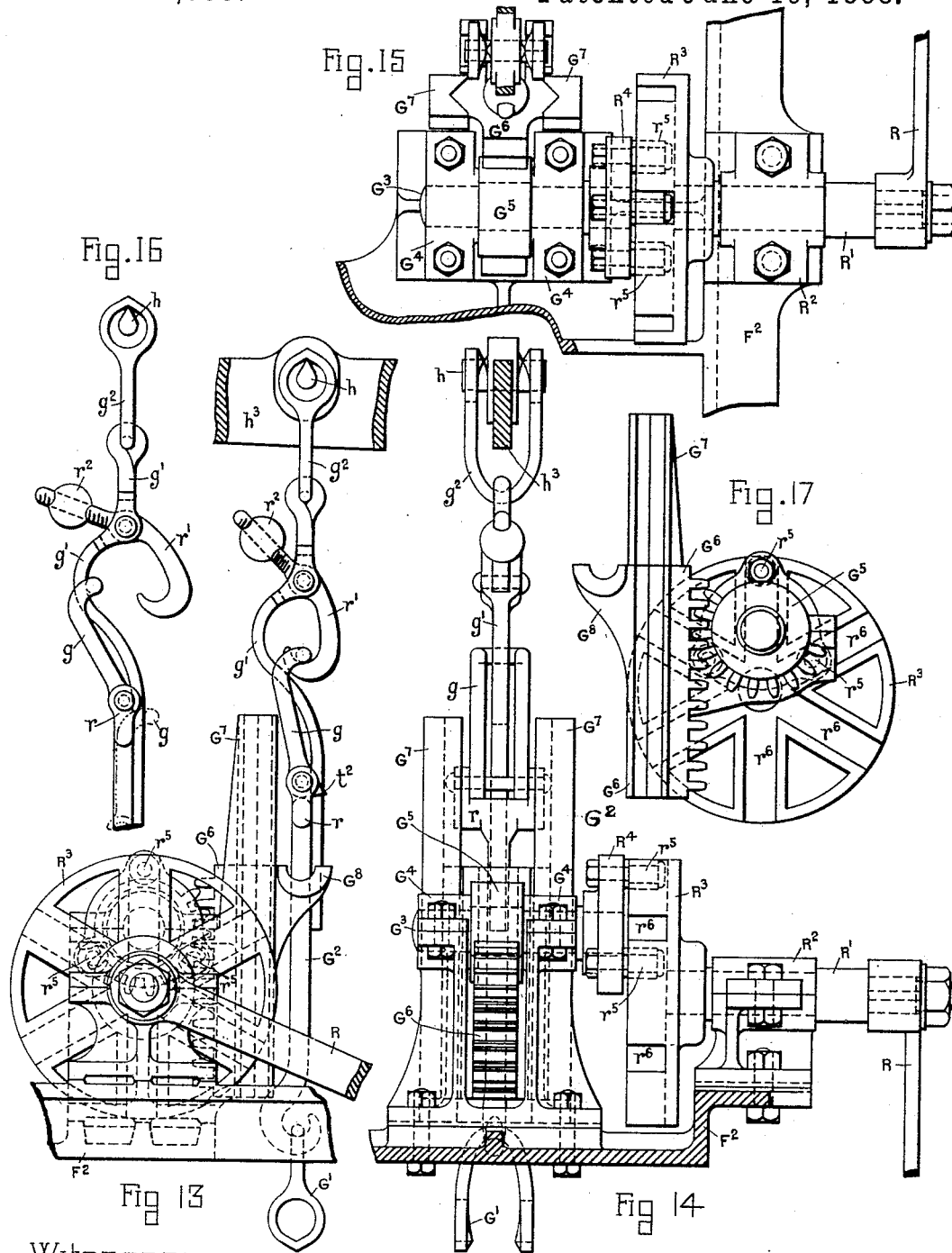
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UNITED STATES PATENT OFFICE.

EUGEN WÖLNER, OF LIVERPOOL, COUNTY OF LANCASTER, ENGLAND.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 384,659, dated June 19, 1888.

Application filed November 6, 1886. Serial No. 218,179. (No model.)

To all whom it may concern:

Be it known that I, EUGEN WÖLNER, a subject of the King of Sweden and Norway, residing at Liverpool, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Weighing-Machines, of which the following is a specification.

This invention relates to that class of machines for which I have already obtained Letters Patent of the United States No. 294,713, and is best described by aid of the accompanying drawings, which is made in two scales.

Figure 1 is a front elevation of my apparatus. Fig. 2 is a general plan on the same scale, with half of the platform and the cover over the lever-coupling removed, showing the machine box and lever. Figs. 3 and 4 are respectively a plan and elevation of machine-levers. Fig. 5 is an enlarged cross-section of lever on the line 5 5, Fig. 3. Figs. 6 and 7 are sectional views, on an enlarged scale, on the lines 6 6 and 7 7, respectively, of Fig. 3; Fig. 8 an enlarged plan view, and Fig. 9 a sectional view, of the weighing-machine itself on the line 9 9 of Fig. 8. Fig. 10 is partly a transverse section and partly an elevation on the line 10 10 of Fig. 2, showing indicating apparatus and relieving apparatus. Fig. 11 is a sectional end elevation of indicating apparatus on the line 11 11 of Fig. 2. Fig. 12 is a sectional end elevation of indicating apparatus on the line 12 12 of Fig. 2. Figs. 13, 14, 15, 16, and 17 are respectively elevations and plan of the relieving apparatus on an enlarged scale.

In the drawings, A is the weighing table or platform, with beams B and B', the former of which are secured at each end to two cross-beams, B², Fig. 8, one at each side of platform A, having small shoes *e* at each end, and the whole resting on the knife-edges *e'* of the levers C and C', Figs. 2, 4, and 9. The limbs of the levers C C' have the cross-section of the letter L, this form being the best to resist the strains they are required to withstand, and easy to mold, the major lever C, consisting of the main limb L, being in a diagonal direction, with strengthening-webs L', and the minor limbs L², with the stay-limbs L³ L⁴ L⁵ and the hanger-shaped ends G, which are provided with knife-

edges *e''*, forming fulcrums. In the pattern for casting the limb L² is placed centrally between the knife-edges *e'* *e''*, and rests on the bottom flange of limb L and joins limb L' on the other side. Limb L' rests also on bottom flange of limb L. L' and L² are joined by the diagonal stay-limbs L³ and L⁴, and also by the central stay-limb, L⁵. The limb L' is at an angle to the limb L², and held together by the said stay-limbs L³, L⁴, and L⁵, and forms a strong beam, both to resist torsional as well as bending strains. The reason why one flange rests on the other, instead of running into the other, is that the pattern by this means is stronger and easier to make; otherwise all the flanges could be in the same plane, running into each other. The minor lever C' is built up exactly in similar manner, and consists of the main limb L⁶ and the minor limbs L' L⁷, with the stay-limbs L⁸ L⁹ L¹⁰, and the hanger-shaped ends G, provided with knife-edges *e''*, forming fulcrums. On limb L of major lever C is a short arm, C⁶, that is cored out to make room for the coupling-link C', Fig. 6, and on C⁶ is fitted a muff, C', provided within, on the bottom side, with a knife-edge, *e''*, and this muff C' is just set in the desired position and secured by the set-screw C', Figs. 3 and 7. In casting, the short arm C⁶ can be fixed on the pattern at any desired point on the limb L. If C⁶ is brought low down on the pattern nearer the hanger G, this will suit a shorter machine, and if C⁶ is fixed on the pattern higher up on the limb L, nearer the center of suspension C¹, it will adapt itself to a longer machine. Again, if hanger G on limb L' of major lever C and hanger G on limb L' of minor lever C' are brought farther out to the side by an extension-piece or brought farther in toward the center by a stopping-off piece on the pattern, the levers C and C' will then be adaptable for narrower or wider machines. The limb L⁶ of minor lever C' can in the same manner be made shorter or longer by a stopping-off or an extension piece for the pattern to meet the position of C⁶ on limb L of major lever C. The limb L⁶ of minor lever C' is also made hollow or channeled at C⁶ to make room for the coupling-link C', Fig. 6, and a muff, C', is fitted on and provided within on the top side with a knife-edge, *e''*, and set in the desired position and secured by the set-

screw C'. The adjustment of the levers C and C' at the couplings C² and C³, Fig. 4, becomes very easy, as their position is on the outside of the platform A, and they can be got at through the hand hole B¹⁰, Fig. 2, of the box-neck B⁹ without disturbing any parts of the weighing-machine. The position of these coupling-centers e⁵ and e⁶, Figs. 4 and 6, are of course equally distant from the fulcrum-centers e² of the levers C and C'. The distance between the two coupling-centers e⁵ e⁶, as shown in Figs. 6 and 7, is by this arrangement brought down to a minimum, which is very important in the coupling of a pair of levers to insure sensitive weighing. The form of these levers is of advantage on account of leaving the center space of the machine unoccupied and allowing the beams which carry the platform with the load to come down in between them, and also in larger machines they allow a free access down into the pit of the machine-foundations and the whole can be got into a shallow box.

The lever C is carried by its fulcrum knife-edges e² in the links e³, Figs. 2, 8, and 9, hanging in the corner-box brackets B³ of the machine-box, and suspended in the shackle G', Figs. 10 and 16, by the knife-edge in muff C¹, Figs. 10, 2, and 3, which is adjustable and secured by set-screws C¹⁰, Fig. 4, and hooked onto the suspension-rod G², Figs. 10 and 16, in the relieving apparatus. The minor lever C', Fig. 3, is suspended by the knife-edge e², Fig. 6, in muff C² from the coupling-link C⁴, that is again carried by the knife-edge e⁶ in muff C³ on the short arm C⁶ on the diagonal arm L, Fig. 3, of major lever C. The link e³, Figs. 8 and 9, in one corner-bracket is connected by a rod, e⁴, to the link e³ in the opposite corner-bracket of the machine-box. The connection of the links e³ by the rod e⁴ prevents the levers C and C' from moving in a direction opposite to each other, but still allows a simultaneous parallel action to take place by any side motion of the platform A.

The platform A, Figs. 8 and 9, with beams B and B' and cross-beams B² at each end of machine, will rest at the points B⁹ of the four corner-brackets B³ when the machine is thrown out of gear, as shown in Fig. 8. The platform A is made of wood, and the central planks, P', Figs. 8 and 9, are secured to the wooden beams B' and placed on the main wooden beams B. The two outside planks, P, are secured to the cross-beams B² at the overhanging parts B⁸, Fig. 8. The three sides B⁸, Figs. 1 and 9, of the machine-box can also be made of wood and dovetailed into the corner-brackets B³, and plates B' are let in on the outside and secured with bolts through the brackets B³. The neck B⁸ of machine-box is of metal and bolted to the corner-brackets B³, Figs. 11 and 12, and to the casing of the relieving apparatus at B¹¹. By this mode of making the box a great deal of metal is saved. The suspension-rod G², Figs. 10 and 13, in the indicating apparatus is hooked into the shackle G', the latter carrying the sus-

pension-knife edge C¹¹, Figs. 3 and 4, in the muff on the major lever's limb L. The suspension-rod G² has at its upper end two lateral projecting shoulders, r, and the shackle g. This latter is hooked up by the hook r', hanging by the bolt in the eye of shackle-guard g', which in turn hangs on the shackle g², suspended from the knife-edge h on the arm h² of the compound lever H of the indicating apparatus, Fig. 10, where all the transferred power from the levers C and C' is taken up by these means.

The indicating apparatus in Figs. 10, 11, and 12 is drawn in its half-way position. The indicating apparatus consists of the compound lever H, supported on the knife-edges h⁵, working on frame F, carrying a sliding weight, I, on the arm h³, having a scale for adjusting said weight and a clamping-screw, i. This weight I is used for weighing off the tare. On the said arm h³, at the extreme end, is suspended from the knife-edge h² the shackle g³ and suspension-rod g⁴, with piston K in plunger J, filled with any suitable liquid and covered with the box-cover J'.

The piston K is made up of a number of plates, v, a little apart from each other to allow the liquid to form a hydraulic packing. The cover J' has a hole in its top and bottom large enough for the suspension-rod g⁴ to pass through, plus clearance, and is made in the form of a box, that the fluid in the cover may act like a cushion for the fluid that tries to rush up through the bottom hole, and also for the purpose of hindering motion of the liquid in the plunger-box J by the working of the piston K. The other arm, h⁴, on the opposite side of the knife-edges h⁵, has a counter-balance-weight, I', by which the indicating apparatus is brought to zero, and is also provided with a knife-edge, h', fixed at the same distance from h⁵ that h² is. From knife-edge h' is suspended the shackle g⁵ and suspension-rod g⁶, with piston K' in plunger-box J². This latter is filled with fluid (petroleum or other oil preferred) and covered with the box-cover J², and is in every respect like its fellow plunger box, J. Piston K' in plunger-box J² checks undue oscillation of the compound lever H in its upward movement, and the piston K in plunger-box J acts in a similar manner for the downward movement.

The arms h³ and h⁴ constitute the equal beam of the compound lever H.

To insure the same level of the fluid in the two plunger-boxes J and J², they are provided with a tube, T, which is provided with a cock, T', fixed on the side near to the bottom of the two plungers. Thus, when the fluid is poured into one plunger the cock T' is opened, and the liquid will find its own level through the tube T. The communication is then closed, if desired, by turning the cock T'.

When the plunger-boxes J and J² are to be emptied, the cocks T² and T', Figs. 10, 11, and 12, are opened and the fluid runs out. The liquid in the plunger-boxes may be at a

high or low level without having any interfering effect upon the counterpoise-weight W. The arm h^6 , going in a downward direction, is at the extreme end provided with a knife-edge, h^7 , from which is suspended in the shackle g^1 the counterpoise-weight W. This arm h^6 constitutes the pendulous lever or pendulum. The arm h^3 , going in an upward direction and bolted to and forming a part of the compound lever H, carries the dial D, on which are a series of scales, d , for the minor weights, and a scale, d' , on the edge of the dial for the major weights. The indication on the dial takes place in the following manner: On the arm h^4 is bolted a segment-quadrant, M' , on which is fastened by its one end a chain, M, that passes round a helical grooved pulley, O', working in a bracket, S, fixed on the carrier-frame F', bolted on the base-frame F². The chain M is fastened on the middle of the pulley O' to prevent its slipping, and a weight, Q, at the other end keeps the chain tight. On the inner pivot of the pulley O' is fixed a pointer-wheel, O, that points to the scales d for the minor weights on dial D, and a pointer, O², that is fixed on the casing points to the scale d' for the major weights on the edge of dial D.

To bring the machine out and into gear, I make use of the relieving apparatus, as shown to a larger scale in Figs. 13, 14, 15, 16, and 17. A hand-lever, R, Figs. 1, 2, 10, 11, 12, 13, 14, and 15, is fixed on the one end of spindle R', working in the bearing R², bolted on the frame F, and on the other end is fixed a radial grooved disk, R³. The disk R³ works the disk R⁴, provided with three pins with friction-rollers r^5 , equally distant from each other, working in the grooves r^6 of disk R³. The disk R⁴ is fixed on the end of spindle G³, working in the bearings G⁴, bolted down on the frame F², and has also fixed on the same spindle, in between the bearings G⁴, a pinion, G⁵, working into rack G⁶, guided in the guides G⁷, which are in one with the bearings G⁴. In one with the rack G⁶ is a bracket, G⁸, for the purpose of taking the suspension rod G² at the forked part r of the same. If the hand-lever R be lifted up—say as much as an angle of forty degrees—the grooved disk R³, turning disk R⁴ by the pins with friction-rollers r^5 to double the amount—that is, to eighty degrees—and having the pinion G⁵ on the same spindle, G³, it lifts the rack G⁶, with bracket G⁸, till it lifts out the shackle g at the fork part r of the suspension-rod G² (that carries the levers, &c., in the weighing-machine) from the hook r' , and, as the shackle g is made with a curvature to the one side at the upper part, it is heavier on that side, and will therefore fall back onto the guard-shackle g' . The hook r' , that is balanced by the ball r^2 , will fall a little to the side, as shown in Fig. 16. As the shackle g is unhooked from r' , the compound lever H, Fig. 10, will then be resting by its arm h^4 in the carrier-frame F' at f . By reversing the action of the hand-lever R, Figs. 13 to 17, the rack G⁶, with the suspension-rod G², resting in the

bracket G⁸, will then be brought down, and the shackle g will be guided forward and down on guard g' , as shown dotted in Fig. 16, but cannot fall forward more than the projecting parts t^2 on the shackle g will allow, as these will rest on the fork part r of the rod G². The rod G² with the levers will be brought down till the beams B² in the weighing-machine come down upon the parts B³ of the bracket B³.

To put the apparatus into gear, I repeat the operation and lift the hand-lever R on spindle R', carrying the grooved disk R³, that rotates the disk R⁴ on the spindle G³, and with it the pinion G⁵. This latter works the rack G⁶, thus raising or lifting the same with the suspension rod G² in the bracket G⁸ till the shackle g comes up against the hook r' . This being nicely balanced by the ball r^2 , will be easily pushed upward and aside till the shackle g has passed the hook r' . Then the hook r' will fall back again, and thus cause the shackle g to catch the hook r' . The hand-lever R, that works the rack G⁶, is now again brought down to its original position, as represented in Figs. 13 and 10.

The machine is now connected with the indicating apparatus, the cart is brought onto the platform A, and its weight found by moving the tare-weight I, Fig. 10, on the arm h^3 . When the tare is ascertained, the weight I is fixed in its position by the set-screw i . The cart now returns loaded onto the platform A, and causes the compound lever H to move slowly. The dial D on arm h^3 consequently passes from right to left, and at the same time the pointer-wheel O turns round, being worked by the chain M round the helical grooved pulley O'. The major weight is now read off on the scale d' at the pointer O², and the minor weight on the scales d by means of the pointers of the pointer-wheel O.

I claim as my invention—

1. In a weighing-machine, the combination, substantially such as described, of metal corner-box brackets B³, with the wooden dove-tailed sides B⁶, and plates B⁷, let into the said brackets and secured with bolts to the same, substantially as shown, whereby a considerable amount of metal is saved.

2. In a weighing-machine substantially such as shown, the combination, with the levers C C', of the platform resting thereon, the links e^2 , in which said levers rest, and a rod, e^4 , connecting said links.

3. In a weighing machine, the combination of a diagonal lever, C, having its respective arm L, provided with a hollow arm, C⁶, capable on the pattern of being placed at any point on the said arm L, and fitted with a muff, C³, a knife-edge, E³, fitted within on the bottom side of the said muff and fixed to the said arm C⁶ by an adjusting device, O', at any desired position, whereby machines of different lengths can be supplied with levers to suit them, all cast from the same patterns.

4. In a weighing-machine substantially such as shown, the combination, with the arm L, of

the arms L' and L^3 , (the latter being placed centrally on the hanger-shaped ends G .) knife-edges e' and e^2 , located on opposite sides of the arm L^3 , and stays L^2 , L^4 , and L^5 , connecting the arms L' and L^3 , substantially as shown.

5 In a weighing-machine, the combination of a minor lever, C' , having its arm L^4 capable of being made shorter or longer to suit different lengths of machines, and provided with a hollow extension, C^5 , and a muff, C^2 , having a knife-edge, e^3 , fitted within on the top side of the said muff, and an adjusting device, C^7 , whereby the muff C^2 can be fixed in any desired position to adapt itself to the adjustment of the levers.

6. In combination with the major lever C , comprising arms L' and L^3 and braces L^2 L^4 L^5 , the minor lever C' , comprising similar arms, L^7 L^9 , and similar braces, L^8 L^{10} L^{11} , the parts of the minor lever corresponding but opposite in arrangement to the parts of the major lever.

7. The combination, with the platform of a weighing-machine, of an indicator-lever having arms h^3 h^4 , the knife-edges h' and h^2 , and the pistons K and K' , formed of a number of plates a little apart from each other, suspended from the knife-edges and working in the plunger-boxes J and J^2 , filled with liquid, whereby the liquid forms a sort of hydraulic packing and a slow and steady motion is insured, substantially as and for the purposes described.

8. In a weighing-machine, the combination, with the platform and the dash-pots, of the lever H , provided with an indicator-plate and with dash-pot arms h^3 h^4 , a pointer adapted for use in connection with the indicator-plate, an indicator-wheel, and weights I and I' , applied to the arms h^3 h^4 , all substantially as shown, whereby the arms h^3 h^4 may be used to take the tare instead of having an independent arm therefor.

9. The combination, with the lever H , having laterally-extending arms h^3 and h^4 and vertical arm h^5 , of a dial, D , secured to arm h^5 and provided with indicator-scales d' and d , and indicator O , placed to one side of the dial-plate, whereby the main weights can be read off on a scale placed centrally and horizontally, and the smaller weights on another scale placed centrally and vertically.

10. In a weighing-machine, substantially as

described, the combination, with the platform and the lever H and its indicator, of the pistons K K' , carried by the lever H , and the plunger-boxes J and J^2 , having box-formed covers J^7 and J^3 , provided with holes to allow the piston-rods to pass through, whereby the liquid in the plunger-boxes is steadied and cushioned when the movements of the different parts of the indicator take place, thereby avoiding jars and concussions.

11. In a weighing-machine, the combination, with the platform and the lever H , connected therewith and provided with pistons K K' , of the plunger-boxes J J^2 , and a pipe, T , connecting the boxes and provided with a valve.

12. In combination with the suspension-rod G^2 of a weighing-machine, a shaft, R' , provided with a handle, R , and cam-wheel R^3 , a shaft, G^3 , provided with a pinion, G^4 , and with a wheel, R^4 , to be actuated by the wheel R^3 , and a rack, G^6 , adapted to be engaged by wheel G^4 , and provided with a bracket, G^8 , to engage the rod G^2 .

13. In combination with the suspension rod G^2 of a weighing-machine, a projection or shoulder, r , formed thereon, and an adjustable bracket, G^3 , adapted to engage said shoulder and to receive the weight of the platform.

14. In combination with the suspension-rod G^2 of a weighing-machine, a shackle, g , a hook, r' , adapted to engage the hook, a projection, r , upon the rod G^2 , a guard, g' , and a bracket or stop, G^8 , adapted to engage the projection r .

15. In combination with the suspension-rod G^2 of a weighing-machine, a bracket, G^8 , adapted to engage the same, shackle g , provided with foot t^2 , guard-link g' , and a pivoted balance-hook, r' , adapted to engage the shackle g .

16. In combination with the lever-arm h^3 and the rod G^2 , a knife-edge, h , upon the lever-arm, a shackle, g^2 , suspended therefrom, guard-link g' , carried by the shackle g^2 , balanced pivoted hook r' , and a shackle, g , carried by the arm G^2 .

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGEN WÖLNER.

Witnesses:

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H. P. SHOEBRIDGE.