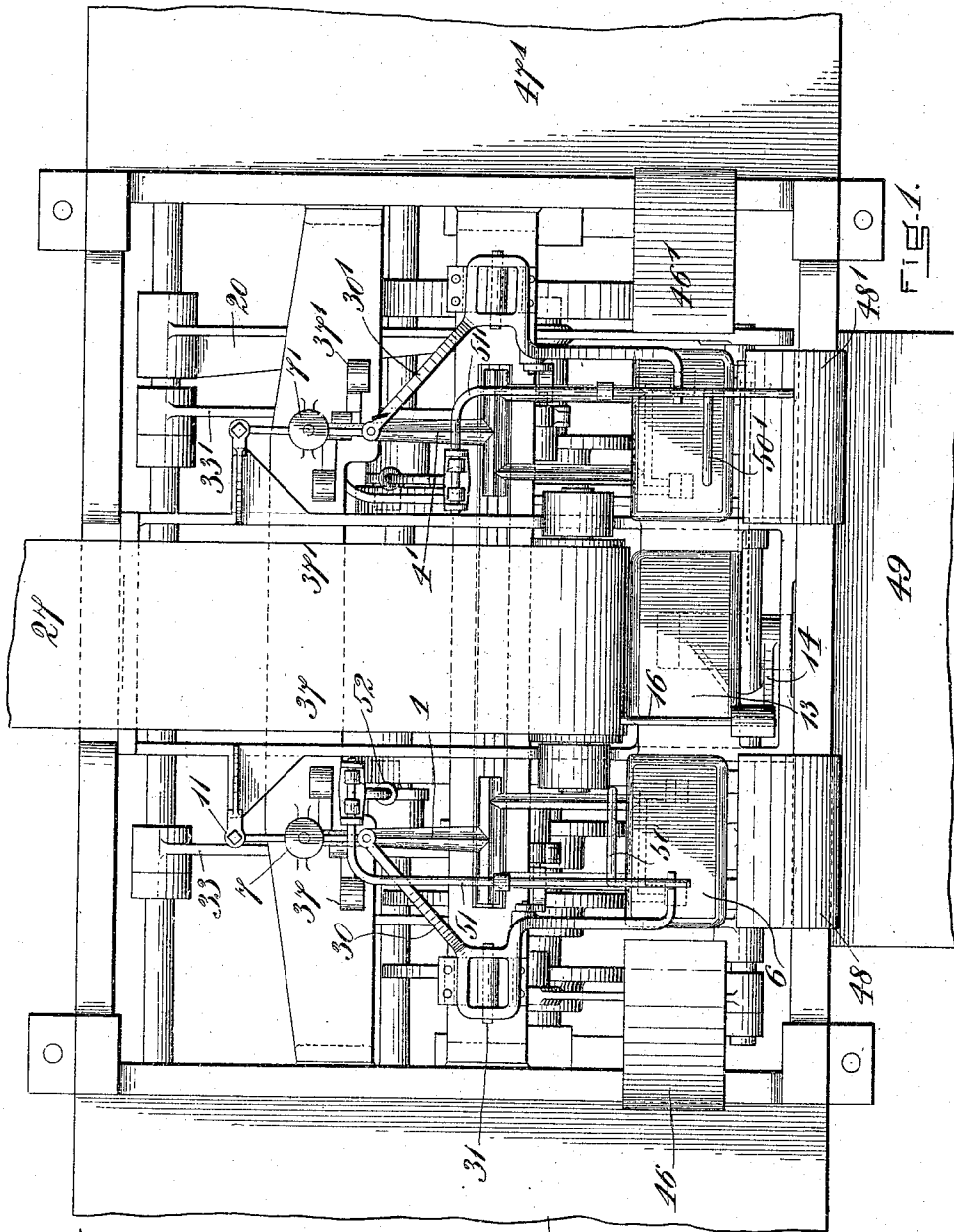


E. G. TREMAINE.
 AUTOMATIC WEIGHING APPARATUS.
 APPLICATION FILED NOV. 27, 1908.

1,200,151.

Patented Oct. 3, 1916.

6 SHEETS—SHEET 1.



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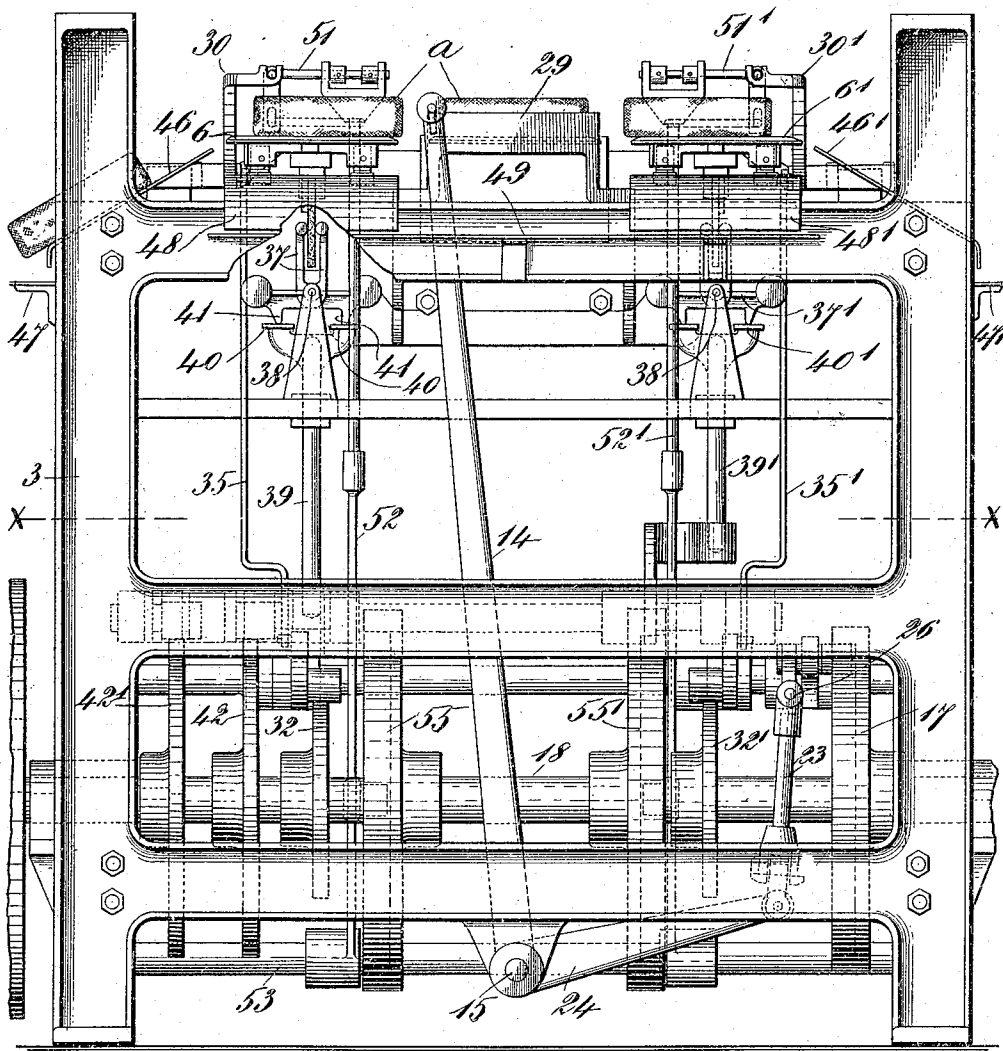


FIG. 2.

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1,200,151.

The drawing is a technical illustration of a mechanical assembly, possibly a pump or engine, shown in a vertical cross-section. The main body is a large, rounded rectangular frame (3) containing internal components. At the top, there is a horizontal shaft (30) with a pulley (50) and a lever (4). A vertical shaft (39) runs through the center, connected to a large circular element (18) at the bottom. The device is mounted on a base (2) and has a side panel (15) on the right. Various other parts are labeled with numbers and letters, including 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 7

Fig. 3.

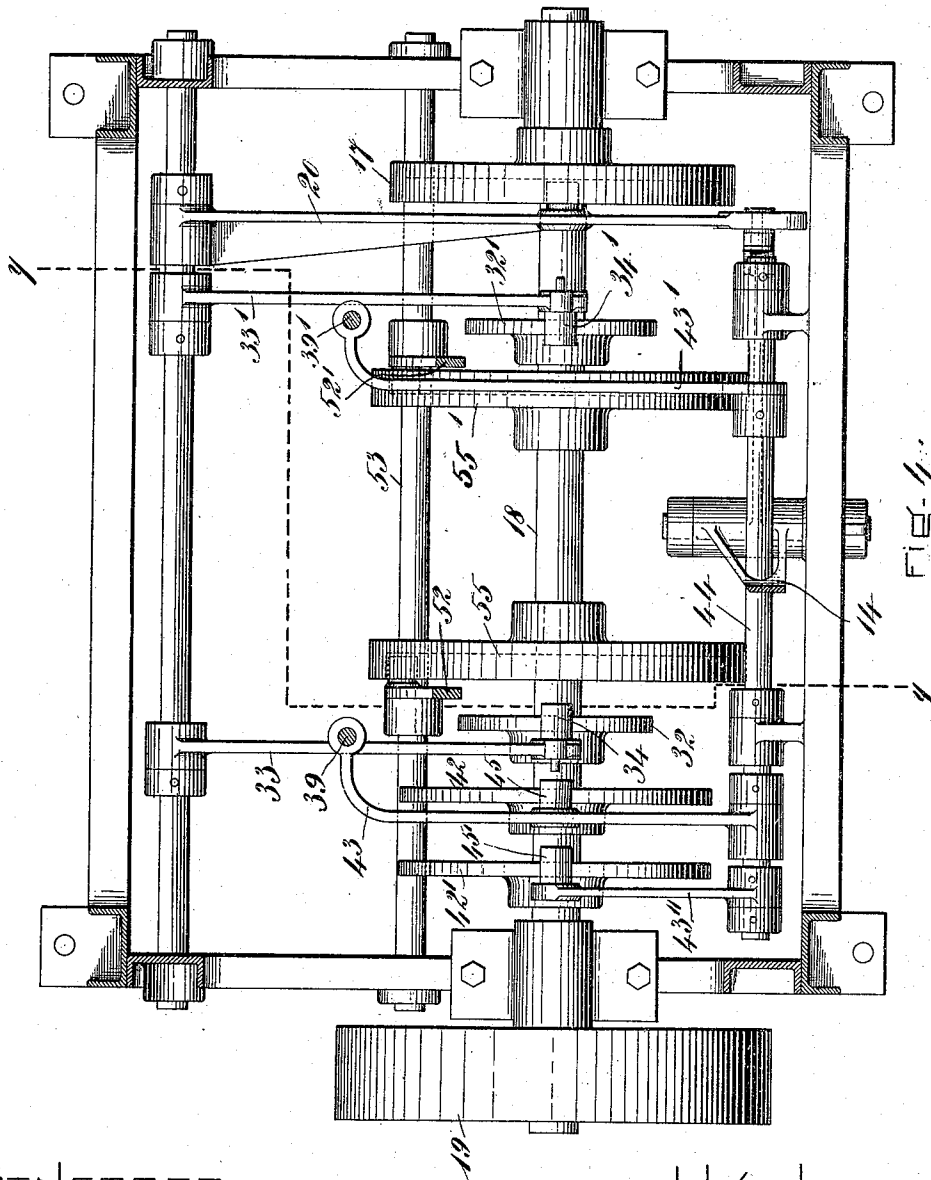
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6 SHEETS—SHEET 5.

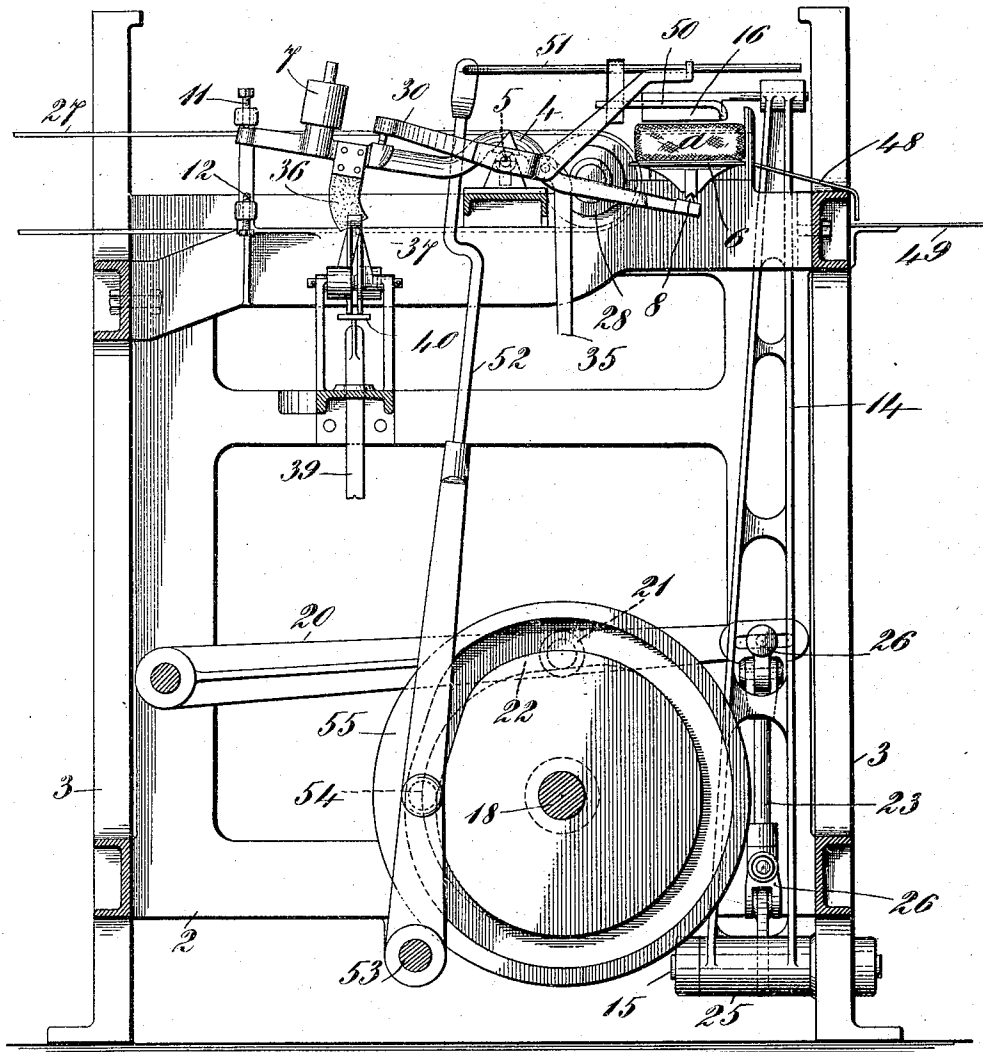


FIG. 5.

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1,200,151.

Patented Oct. 3, 1916.

6 SHEETS—SHEET 6.

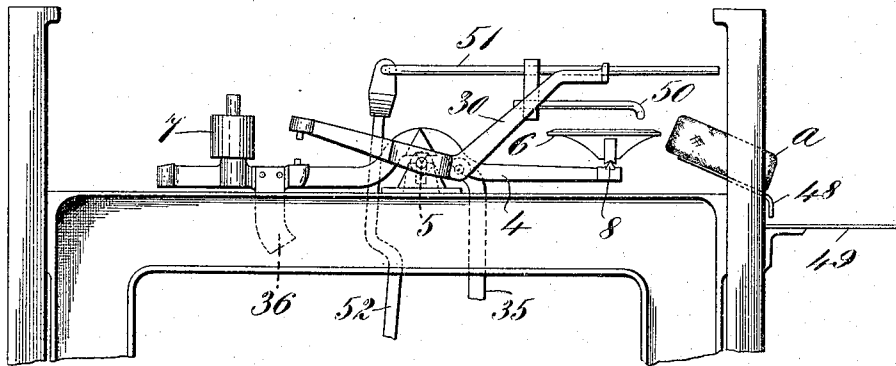


FIG. 6.

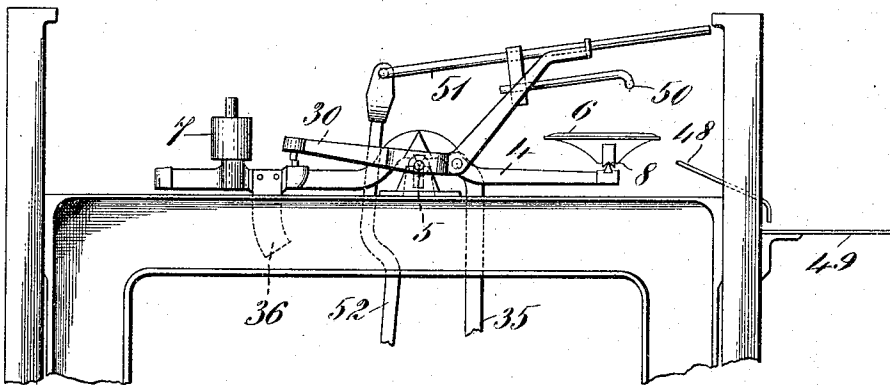


FIG. 7.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC WEIGHING APPARATUS.

1,200,151.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed November 27, 1908. Serial No. 464,716.

To all whom it may concern:

Be it known that I, EDWARD G. TREMAINE, a citizen of the United States, and a resident of Hackensack, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Automatic Weighing Apparatus, of which the following is a specification.

This invention is particularly intended to provide a simple and efficient apparatus by means of which a series of similar packages or other articles may be successively weighed and separated into two groups, one containing all the packages which equal or exceed in weight a certain predetermined standard, and the other containing all the packages which are of less weight. The packages constituting these groups are hereinafter referred to as the heavy packages and the light packages respectively.

My invention comprises various features which contribute to the successful accomplishment of the object above mentioned, which features, together with others relating more particularly to details of construction and arrangement, are hereinafter set forth.

An apparatus embodying my improvements as preferably constructed and arranged for the purpose above referred to is illustrated in the accompanying drawings, in which—

Figure 1 is a top plan view of the complete apparatus; Fig. 2 is a front elevation thereof; Fig. 3 is a side elevation thereof, as viewed from the left hand side of Fig. 2; Fig. 4 is a sectional plan view of the lower portion of the machine, the plane of section being indicated by the line $x-x$ in Fig. 2; Fig. 5 is a sectional side elevation, the plane of section of the lower portion of the apparatus being indicated by the line $y-y$ in Fig. 4; and Figs. 6 and 7 are side elevations illustrating a weighing mechanism and certain adjacent parts, with the latter in different positions which are assumed thereby during the operation of the apparatus.

The supporting framework of the apparatus may be of any suitable construction, being principally composed, in the particular machine illustrated, of side uprights 2—2 and front and rear uprights 3—3 bolted together as shown, and for reasons

which will hereinafter appear, the complete apparatus preferably includes two similar weighing mechanisms, which are carried by the top portion of the framework, one at each side of the apparatus. Referring first to the left-hand weighing mechanism, as seen from the front of the apparatus, it comprises a scale beam 4 centrally supported on suitable knife edge bearings 5 and provided at its front end with a platform 6 to receive the packages to be weighed. 7 represents a counterweight carried by the rear arm of the scale beam, which counterweight is so adjusted that a heavy package will depress the platform 6 when it rests thereon. Said platform 6 is supported on knife edge bearings 8 and is maintained in a horizontal position during its vertical movements by any suitable means, such as a link 9 pivoted at one end to a fixed part of the machine and at its other end to a rod 10 depending from said platform, as shown in Fig. 3, and 11 and 12 represent adjustable stops which serve to engage the rear end of the scale beam at the ends of its upward and downward movements respectively and thereby limit the oscillations thereof.

The packages to be weighed are delivered to the scale platform 6 one at a time, and preferably by automatically-operating means, to which end I provide a fixed shelf 13 which is located at the front of the machine, adjacent to and at one side of the scale platform and on a level with the same when the latter is in its elevated position, so that a package may be pushed directly off the shelf and on to the platform. In front of this shelf 13 is located an arm 14 mounted at its lower end to oscillate on a fixed stud 15 and provided at its upper end with a rearwardly-extending finger 16 adapted to sweep across the shelf 13 from one side to the other, at such a height above the shelf that said finger will engage a package located in front of it and push it off the shelf when the arm 14 is oscillated.

The oscillation of said arm 14 is effected by means of a cam 17 secured to a transversely-extending shaft 18 journaled in the lower portion of the framework and serving as the driving shaft of the machine, being provided with a belt pulley 19 by means

of which it is continuously rotated. The connections between the cam 17 and the arm 14 are represented as consisting of an arm 20 pivoted at its rear end to the framework and provided with a roller 21 which travels in a cam groove 22 formed in the cam 17, and a link 23 connecting the free end of said arm 20 with the free end of another arm 24 which is rigidly secured at its opposite end to the sleeve 25 which turns on the stud 15 and constitutes the lower end of said arm 14. Universal joint connections 26 are provided at the ends of the link 23, as best shown in Figs. 2 and 5, in order to provide for the relative movements of the parts which they connect, the arms 20 and 24 being mounted to turn on axes extending at right angles to each other, and one end of said link is preferably made adjustable lengthwise of the arm 20, as by means of the pin and slot connection shown in Fig. 5, so as to provide for the adjustment of the travel of the finger 16 over the shelf 13.

In order that the packages may be automatically deposited on the shelf 13 one at a time, as fast as they are removed therefrom by the finger 16, I provide an endless conveyer belt 27 which passes around a drum 28 journaled on a horizontal axis in such position that the upper portion of the belt 27, where it passes downward over the drum, is located close to and about on a level with the rear edge of said shelf 13, as shown in Figs. 1 and 3. Said belt 27 extends horizontally rearward from the drum 28 and passes around another drum (not shown), being continuously driven by suitable means and in such direction that its upper portion moves forward toward the shelf 13. The packages (indicated at *a*) are placed in series upon this belt by an attendant at any convenient point, and as soon as a package reaches the rear edge of the shelf 13 it is forced forward on to said shelf, if the latter is empty, where it is arrested by a vertical ledge 29 extending upward from the front edge of the shelf. Each package, while resting upon the shelf, serves as a stop to hold back the succeeding packages, under which said belt slips continuously until the package on the shelf is removed therefrom, whereupon another package immediately takes its place.

Inasmuch as the pushing of a package from the shelf 13 onto the scale platform 6 might depress said platform, regardless of the weight of the package, if the scale beam 4 were free to move at that time, I provide a beam lock which operates to hold said platform in its uppermost position while each package is being pushed upon it. In the construction illustrated, this beam lock consists of a rock arm 30 (shown in plan view in Fig. 1 and in side elevation in Figs. 6 and 7) which is pivotally mounted on the

framework of the machine, as at 31, and is adapted to bear at its rear end on the rear portion of the scale beam 4 and thereby hold the same down upon its stop 12. Said rock arm 30 is operated by means of a cam 32 secured to the driving shaft 18 and an arm 33 provided at its front end with a roller 34 which travels on the periphery of the cam 32, said arm 33 being pivoted at its rear end to the framework of the apparatus and connected by a link 35 with the rock arm 30, as shown in Fig. 3.

The arrangement just described suffices to hold the platform 6 in its uppermost position while a package is being pushed onto it, but it is also desirable to hold said platform against downward movement while a light package is being removed from it, as hereafter explained, and to this end I provide a beam clamp, preferably consisting of a tongue 36 secured to and extending downward from the rear portion of the scale beam 4, and means for engaging and releasing said tongue at the proper times. Said tongue 36 is preferably made of leather or other tough and flexible material, and the tongue-engaging means may conveniently consist of two L-shaped grippers 37 pivotally mounted at their angles on a pivot 38 (Fig. 2) and so arranged that their upper ends are located on opposite sides of and adjacent to the tongue 36, while their lower portions extend horizontally in opposite directions beneath said tongue, being weighted at their outer ends to cause the upper ends of the grippers to close upon the tongue when permitted to do so. Said upper ends of the grippers 37 are roughened or provided with points on their opposed inner surfaces to engage and hold the tongue 36, and for opening the grippers I provide a rod 39 mounted to slide vertically on the framework of the machine and carrying at its upper end a pair of supporting plates 40 which are located respectively beneath downwardly-extending projections 41 formed on the corresponding grippers, so that when said rod 39 is raised sufficiently the supporting plates 40 will lift the weighted ends of the grippers 37 and thereby separate their upper portions and release the tongue 36. Said tongue is long enough to be engaged by the grippers in any position of the scale beam. The rod 39 is raised and lowered by means of a cam 42 secured to the driving shaft 18 and an arm 43 pivotally supported at its front end on a rod 44 carried by the framework of the machine and arranged to support the lower end of the rod 39 upon its rear end, said arm 43 being provided with a roller 45 which travels on the periphery of the cam 42.

After a package has been placed upon the scale platform 6 and its weight has been tested, it is discharged from said platform

along one or the other of two paths, according to whether the package is a heavy package or a light package. The removal of the heavy packages may conveniently be effected by means of the arm 14 and its finger 16, since whenever said finger pushes a package upon the platform 6 this package will push the next preceding package off from said platform, provided the latter package has not previously been removed therefrom. The heavy packages will therefore be pushed off that edge of the platform 6 which is adjacent to the corresponding side of the machine, and an inclined chute 46 is located at this point in position to receive these packages, which slide down the chute by gravity and onto a horizontal shelf 47 or other suitable receptacle placed in position to receive them. For removing the light packages, an arrangement is provided whereby these packages are pushed off the platform 6 in a different direction, and preferably toward the front of the machine, where they are received on an inclined chute 48 and slide down the same onto a horizontal shelf 49. The removal of these light packages from said platform 6 is accomplished by means of a push rod 50 carried by a slide rod 51 which is reciprocated horizontally, or substantially so, toward and from the front of the machine, by means of a rock arm 52 pivotally connected at its upper end to said slide rod 51 and mounted at its lower end to oscillate on a rod 53 carried by the framework of the machine, said rock arm 52 being provided with a roller 54 arranged to travel in a cam groove cut in a cam 55 secured to the driving shaft 18. The front portion of the slide rod 51 is preferably supported in a notch formed in the front end of the rock arm 30 and guided thereby during its sliding movements, so that said rod 51 and the push rod 50 are raised and lowered by means of said rock arm 30, as illustrated in Figs. 6 and 7, and the push rod 50 should be adjustably connected to the slide rod 51 in order that its position may be varied in accordance with the sizes and shapes of the packages to be tested. The front end of said push rod is preferably arranged at right angles to the direction of its movement so that it will extend along the rear edges of the packages placed upon the scale platform 6, as shown in Fig. 1.

The operation of the parts above described is as follows: Starting with the several parts in the position which they occupy when the finger 16 is at the right hand end of the shelf 13, as viewed from the front of the machine, and with a package resting on said shelf, said finger 16 is moved to the left by the operation of the arm 14 and the package is thereby pushed onto the scale platform 6, whereupon the finger 16 is im-

mediately moved a short distance to the right, so that it will not interfere with the weighing of the package by remaining in contact therewith. While this transfer of the package is taking place the rock arm 30 occupies the position shown in Fig. 7, and the platform 6 is thereby firmly held in its uppermost position, the push rod 50 being held at the same time in an elevated position, so that it cannot touch the package. Before the rock arm 30 leaves the position shown in Fig. 7 the push rod 50 is moved backward, upon completion of which movement said rock arm is moved into the position shown in Fig. 3, thereby lowering the push rod behind the package and simultaneously releasing the scale beam 4. At this time the rod 39 is in its elevated position, so that the grippers 37 are open and the tongue 36 is also released. The scale beam 4 is now free to poise, and in case the package resting on the platform 6 is a light package the scale beam will not move, so that said platform 6 will remain in its uppermost position. The rod 39 is then lowered, whereupon the grippers 37 engage and hold the tongue 36, thereby preventing downward movement of the platform 6 while the package is being removed, and the push rod 50 is then moved forward, with the result that said push rod engages the rear edge of the package and pushes said package over the front edge of the scale platform 6 and onto the inclined chute 48, whence it slides onto the shelf 49 as illustrated in Fig. 6. The rod 39 is then raised to open the grippers 37 and release the tongue 36, and the rock arm 30 is then returned to the position shown in Fig. 7, in which it holds down the rear end of the scale beam and locks the platform 6 in its elevated position. Meanwhile the finger 16 has been moved back to the right hand end of the shelf 13 and another package has been placed upon the shelf in front of said finger, and the cycle of operations above described is thereupon repeated. In case the package being tested is a heavy package, however, it depresses the platform 6 when the scale beam is released and left free to poise, and the push rod 50 is so located that in this case it does not engage the package when it is moved forward but passes over the top of the same, as illustrated in Fig. 5, so that the package remains on the platform 6 and is elevated therewith when the rock arm 30 is returned to the position shown in Fig. 7. In such case, when the finger 16 is next moved to the left, the package transferred thereby from the shelf 13 to the platform 6 engages the heavy package which has immediately preceded it and pushes the same off said platform and onto the chute 46, down which it slides onto the shelf 47. The light and heavy packages are thus automatically separated and

delivered at different points, according to their weights, and may be removed from the shelves 47 and 49 by an attendant.

For the purpose of securing a desirable degree of accuracy in the weight-testing operation a certain interval of time should be allowed for the poising of the scale beam, and in order to increase the capacity of the apparatus without unduly shortening this interval I prefer, as already stated, to provide my apparatus with two weighing mechanisms. These mechanisms operate alternately and their actuating cams are preferably secured to the same driving shaft 18, being so arranged thereon that like phases of corresponding cams are 180° apart. In the apparatus illustrated, a weighing mechanism similar in all respects to that above described is located at the right of the central shelf 13 and is so arranged that the arm 14 and its finger 16 serve as a package-feeding device for both weighing mechanisms, the finger 16 operating to push a package onto one or the other of the two scale platforms each time it moves across the shelf 13 in either direction. The parts of the second weighing mechanism above referred to are constructed and arranged to operate in all respects like the corresponding parts of the weighing mechanism already specifically described, and are indicated in the drawings by like numerals with a "prime" affixed. Further description of the details thereof will therefore be unnecessary, except that, for convenience, the cams 42 and 42' which operate the rods 39 and 39' are located near one end of the machine, side by side, and the arm 43' is fixed to the rod 44 instead of turning thereon, which rod is mounted in suitable bearings and serves as a rock shaft, being actuated by an arm 43'' carrying the roller 45' which bears on the cam 42'.

In the operation of the described apparatus as a whole, the finger 16 pushes the successive packages upon the scale platforms 6 and 6' alternately, the two weighing mechanisms and the parts which cooperate therewith being also timed to operate alternately at the proper instants, so that the packages brought up by the conveyer belt are tested first by one mechanism and then by the other, in alternation, and the heavy packages are delivered at the sides of the machine and the light packages at its front.

It is to be understood that my broad invention is not limited to an apparatus having two weighing mechanisms, nor to the particular details of construction and arrangement herein described. Certain of the features herein described may also be employed in other kinds and types of weighing apparatus, if desired, particularly those features which relate to the transferring of packages to and from a scale

platform, and to the holding of the scale platform in fixed position during the transference of the packages, as will be evident.

I claim as my invention:—

1. In an apparatus of the character described, the combination of a scale beam carrying a package support, means for transferring a package thereto, a beam lock and means for operating the same to hold said support in fixed position while receiving a package and then release the same, and a package-removing device supported by said beam lock and arranged to move into operative position when the beam lock releases the package support.

2. In a weight-testing apparatus, the combination with a scale beam provided with a package support, of a beam lock comprising a pivoted rock arm adapted to bear upon one end of said beam and hold the package support in position to receive a load, means for operating said rock arm to release the beam after it has received a load, means for feeding a package on to and off said support in one direction, and a push rod and means for reciprocating the same over said support in another direction.

3. A weight-testing apparatus comprising a scale provided with a package support, a pivotally mounted rock arm arranged to engage the scale beam and lock the same with its package support in an elevated position, a push rod supported by said rock arm, means for reciprocating said push rod over the package support in one direction, and means for transferring packages one at a time to and from said package support in a direction transverse to that in which said push rod reciprocates.

4. A weight-testing apparatus comprising a scale provided with a package support, a pivotally mounted rock arm arranged to engage the beam and lock the same with its package support in an elevated position, a beam clamp and means for operating the same, a push rod supported by said rock arm, means for reciprocating said push rod over the package support in one direction, and means for transferring packages one at a time to and from said package support in a direction transverse to that in which said push rod reciprocates.

5. A weight-testing apparatus comprising a shelf and means for delivering packages thereto, two scales each provided with a package support, said package supports being located on opposite sides of and adjacent to said shelf, means for transferring successive packages from said shelf to said package supports in alternation, means for holding each package support in elevated position while a package is being transferred thereto, a push rod cooperating with each package support, means for reciprocating each push rod over the corresponding

package support in a direction transverse to the path of movement of the packages from said shelf to the package supports, beam clamps coöperating with the respective scales, and means for operating each clamp after the corresponding scale beam has poised.

6. A weight-testing apparatus comprising two scales each provided with a package support, means common to the two scales for transferring packages to the corresponding package supports in alternation, one package at a time, a beam lock and a beam clamp coöperating with each scale to hold the same in fixed position before and after it is left free to poise, a push rod for each scale, and means for reciprocating said push rods over the corresponding package supports, the beam lock, beam clamp and push rod for each scale being timed to operate in alternation with the corresponding parts of the other scale.

7. A weight-testing apparatus comprising a shelf provided at its front edge with a stop, a conveyer belt and means for driving the same to deliver packages upon said shelf, one at a time, a package-feeding finger and means for reciprocating the same across the

shelf to remove successive packages therefrom in opposite directions in alternation, a pair of scales located on opposite sides of said conveyer belt and each provided with a package support located adjacent to said shelf, a beam lock for each scale and means for operating the same to hold the corresponding package support in fixed position while a package is being transferred thereto, and to release said package support after it has received a package, a beam clamp for each scale and means for operating the same to clamp the corresponding scale beam after it has poised, a push rod for each scale, and means for reciprocating each push rod across the corresponding package support in a direction at right angles to the movement of said package-feeding finger, the parts associated with each scale being timed to operate in alternation with those associated with the other scale.

In testimony whereof, I have hereunto subscribed my name this twentieth day of November, 1908.

EDWARD G. TREMAINE.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."