April 14, 1942. E. M. KEEN 2,279,947

GRADING MACHINE

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Fig. 3.

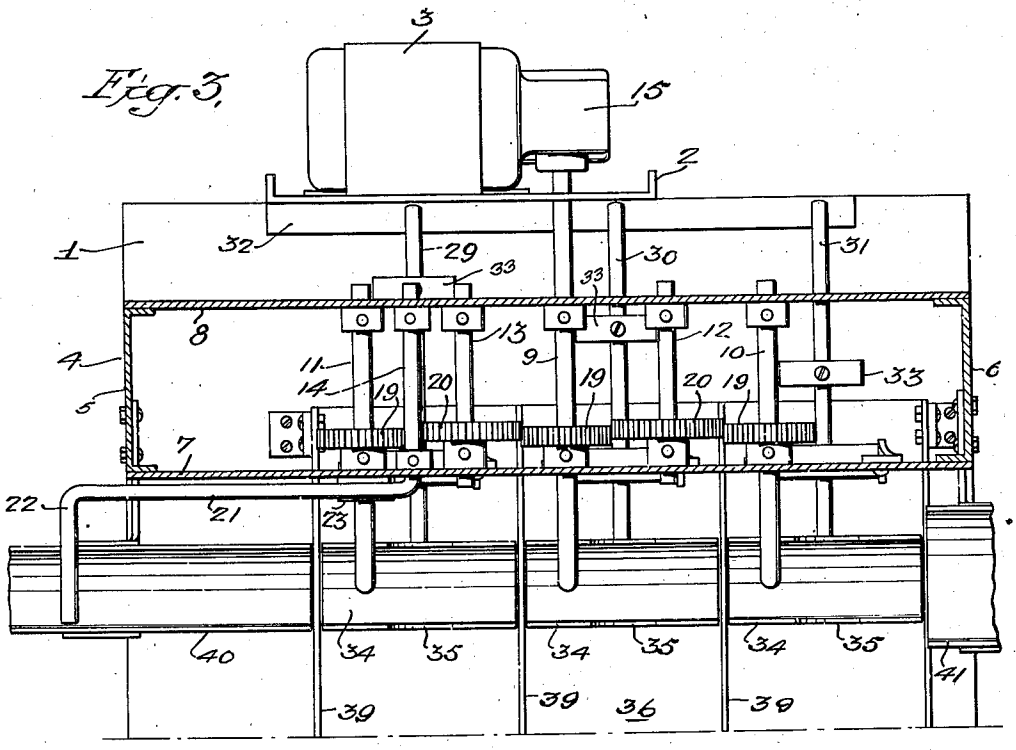
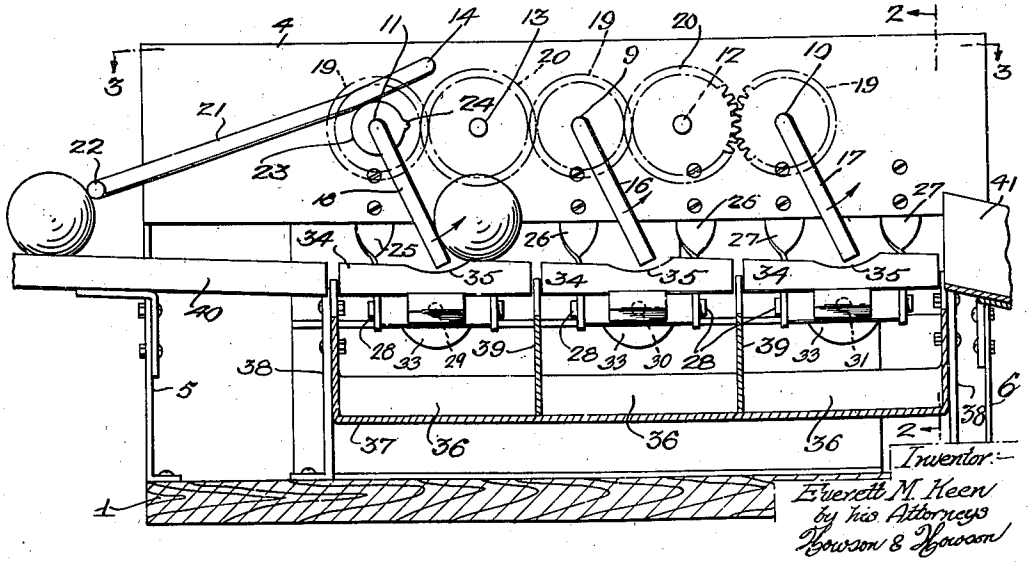


Fig. 1.



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Fig. 2.

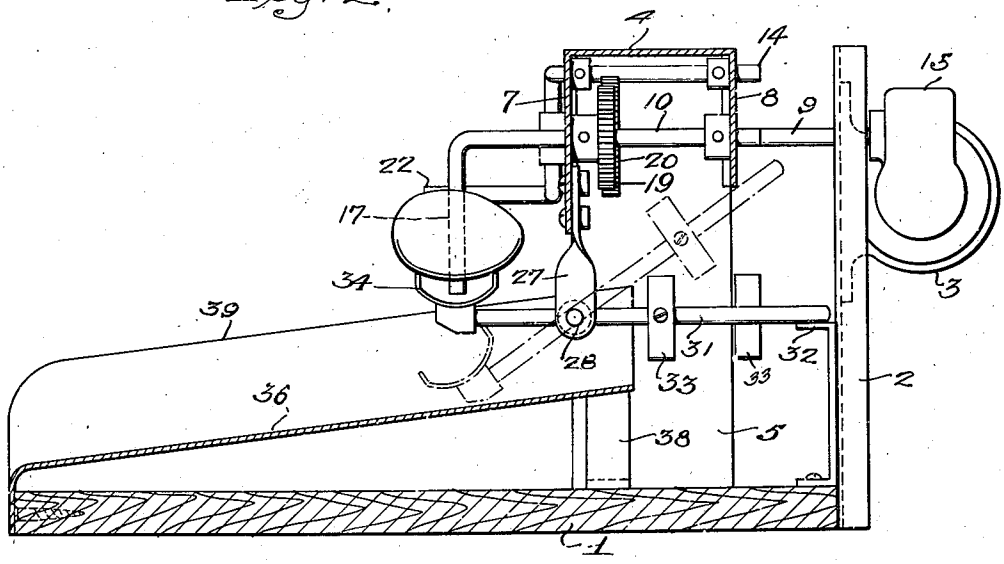
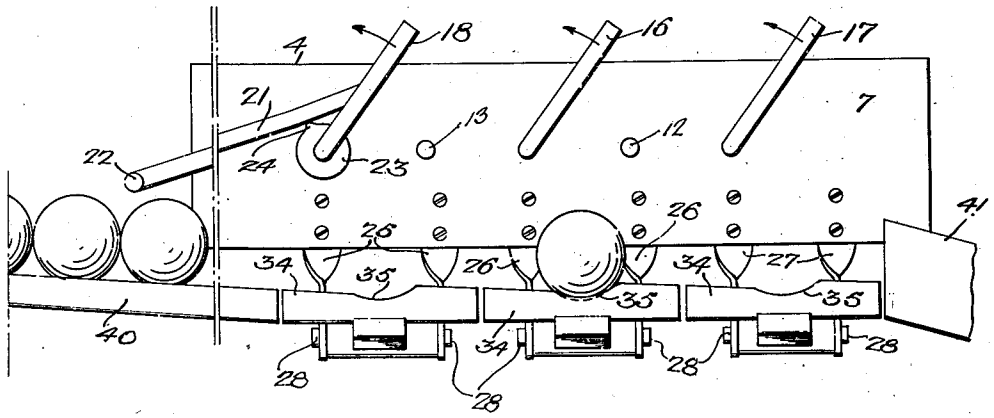


Fig. 4.



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UNITED STATES PATENT OFFICE

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GRADING MACHINE

Everett M. Keen, Vineland, N. J.

Application January 26, 1940, Serial No. 315,794

1 Claim. (Cl. 209—121)

This invention relates primarily to improvements in egg-grading machines, although the invention is applicable also to machines for grading other products, such, for example, as fruits and vegetables.

A principal object of the invention is to provide a grading machine of simple mechanical and structural form that may be manufactured and sold at relatively low cost as compared with the more complicated conventional grading machines.

More particularly, the invention contemplates a relatively simple and novel device for advancing the eggs or other articles to be graded over a series of graduated scales, as more specifically described hereinafter and as illustrated in the attached drawings, in which:

Figure 1 is a front elevational and partial sectional view of a machine made in accordance with my invention;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a section on the line 3—3, Fig. 1, and

Fig. 4 is a fragmentary front elevational view illustrating a detail of operation.

With reference to the drawings, the machine comprises a base 1, to the rear of which is secured an upright 2 which constitutes a support for an electric motor 3. The machine further comprises an elevated transverse housing 4 which is supported on the base 1 by means of uprights 5 and 6 at opposite sides respectively of said base. The housing 4 comprises front and rear vertical plates, 7 and 8 respectively, in which are journaled a series of shafts designated respectively by the reference numerals 9, 10, 11, 12, 13 and 14. The shaft 9 is operatively connected through a suitable reduction gear 15 with the motor 3, and this shaft together with the shafts 10 and 11 are provided at their forward ends with transverse arms, 16, 17 and 18 respectively. Each of the shafts 9, 10 and 11 has attached thereto, intermediate the plates 7 and 8 of the housing 4, a toothed gear 19, and these gears are operatively connected with each other through the medium of gears 20, 20 which are carried respectively by the shafts 12 and 13. The shaft 14 has at its forward end an elongated arm the terminal end 22 of which is offset so as to extend in parallel relation to the said shaft. The arm 21 bears upon a cam 23 which is secured to the shaft 11 immediately in advance of the front plate 7 of the housing 4, and this cam, as shown in Figs. 1 and 4, has an elevation 24 which functions to intermittently oscillate the arm 21 with its shaft 14 in the manner and for the purpose hereinafter described. The aforedescribed arrangement provides for rotation of the shafts 9, 10 and 11 by the motor 3 in the same direction and at the same rate of speed, and synchronized with this rotation of the shafts 9, 10 and 11, the shaft 14 with its arm 21 is oscillated by action of the cam 23.

Depending from the front plate 7 of the housing 4 are three sets of straps 25, 26 and 27, the straps of each set being spaced apart and being apertured for reception of trunnions 28 of a scale arm, 29, 30 and 31 respectively. The rear end of each of these scale arms rests normally upon a relatively fixed support 32, and each arm intermediate this support and the point of pivotal connection of the arm with the depending supports 25, 26 and 27 carries a weight 33 which is adjustable longitudinally of the rod. Each rod carries at its forward end a transversely extending channel element 34, and these elements are arranged in vertical alignment, see Figs. 2 and 3, with the arms 16, 17 and 18 of the shafts 9, 10 and 11. Each of the elements 34 has the upper edges of the sides of the channel recessed, as indicated at 35, the function of these recesses being hereinafter described.

Immediately below the forward end of each of the scale arms 31 and the associated channel element 34 is a relatively fixed trough 36, these troughs 36 being aligned with the respective scale arms and extending away from the machine at a slight downward inclination. In the present instance, the troughs are formed of a primary trough element 37, the inner or upper end of which is supported on suitable brackets 38 secured to the base member 1, the lower end of this primary member being secured to the forward edge of the base member as illustrated in Fig. 2. The adjoining sides of the individual troughs 36 are defined by upright partition elements 39, 39 suitably secured in the primary trough member 37.

As illustrated in Figs. 1, 3 and 4, the channel elements 34 are arranged in alignment with each other and with their adjoining ends in close proximity, so that the upper edges of these elements form in effect a continuous double rail for supporting the articles to be graded and over which the said articles may pass from one scale to another. At the left side of the machine as viewed in Figs. 1, 3 and 4 is a relatively fixed track member 40 of the same characteristic channel form as the scale elements 34. This element 40 extends in alignment with the elements 34, and one end thereof lies in close proximity to the element

34 of the terminal scale at that end of the machine. As shown in Fig. 1, the member 40 is slightly inclined downwardly towards the proximate scale element 34; and preferably the elements 34 are formed so that the upper edges of side rails of the channels are also slightly inclined in the portions between the respective recesses 35 and at the outer ends of the terminal elements. At the opposite end of the machine is a trough 41 which also lies in alignment with the scale elements 34, and the inner end of this trough 41 lies in close proximity to the element 34 of the terminal scale at that end of the machine. This trough, as shown in Fig. 1, inclines downwardly away from the proximate scale element. It will be apparent that the member 40 and the respective scale elements 34 form in effect a continuous track which terminates in the trough 41.

In the operation of the machine, the eggs to be graded are placed in contacting series upon the upper end of the track member 40, the lowermost of the eggs of the series bearing against the offset end 22 of the arm 21, as shown in Fig. 1. The machine is then set in operation, with the result that the shafts 9, 10 and 11 are rotated in synchronism, the arms 16, 17 and 18 of these shafts moving together in the direction indicated by the arrows. When the arms 16, 17 and 18 approach the position in which they are shown in Fig. 4, the elevation 24 on the cam 23 acts to momentarily elevate the arm 21 so that the lowermost egg of the series is released and is permitted to roll down the track member 40 onto the receiving element 34 of the first scale. The arm 21 is elevated only sufficiently to release one egg, and is permitted to drop immediately into the egg-retaining position, as shown in Fig. 1, so as to retain the remaining eggs of the series in place upon the member 40. The one egg released at this time passes downwardly onto the element 34 of the first scale and comes to rest in the recesses 35 of that element. If the egg is sufficiently heavy to depress the forward end of the scale, the latter will drop downwardly to the position shown in dotted lines in Fig. 2, the egg being discharged from the element 34 into the first of the troughs 36. If the egg is not sufficiently heavy to depress the scale as described, it will be engaged by the arm 18 of the shaft 11, as shown in Fig. 1, and will be propelled out of the recess 35 and onto the element 34 of the second scale to come to rest in the recesses 35 of that element. The arms 16, 17 and 18 now move through another cycle, in the course of which another egg is released by the action of the arm 21 to pass downwardly on the member 40 to the element 34 of the first scale. If the first egg released, as described above, is not sufficiently heavy to depress the second of the scales, it will be advanced by action of the arm 16 of the shaft 9 to the third scale, and the arm 18 of the shaft 11 will act correspondingly to advance the second of the released eggs from the first to the second scale in the event that that egg is not of sufficient weight to depress the first scale of the series. In this manner, the eggs are passed successively from one scale to the other, the scales being differentially weighted so as to afford the desired separation of the eggs according to weight. If any of the eggs is insufficiently heavy to cause a depression of the third scale of the series, it will be passed from this scale by action of the arm 17 of the shaft 10 into the trough 41, in which it passes from the machine. It will be apparent that the machine illustrated is designed to grade the eggs in four lots by weight, and that a closer grading of the eggs may be obtained by the use of additional graduated scale units.

It will be apparent that the machine described above is characterized by relative simplicity of form and mechanism arising largely from the use of the rotary arms 16, 17 and 18 as the means for advancing the eggs successively over the series of grading scales. The device requires no particular precision in manufacture, and the individual elements of the machine are adapted for manufacture from relatively cheap materials and by inexpensive forming operations.

I claim:

In a machine for grading eggs by weight, a plurality of scales each comprising an article-supporting member, each said member having a central article-receiving socket and means at opposite sides respectively of said socket for guiding said articles to and from the latter, said members being arranged contiguously in series and end to end so that the guide means of adjoining members form in effect an uninterrupted way for said articles between the said receiving sockets, and means for dislodging the said articles from the said sockets and onto said guides for transfer to the socket of the next adjoining member, said last-named means comprising a rotary shaft associated with each of said scales, and an arm on said shaft arranged to describe an arc extending over and in proximity to the said supporting member.

EVERETT M. KEEN.