

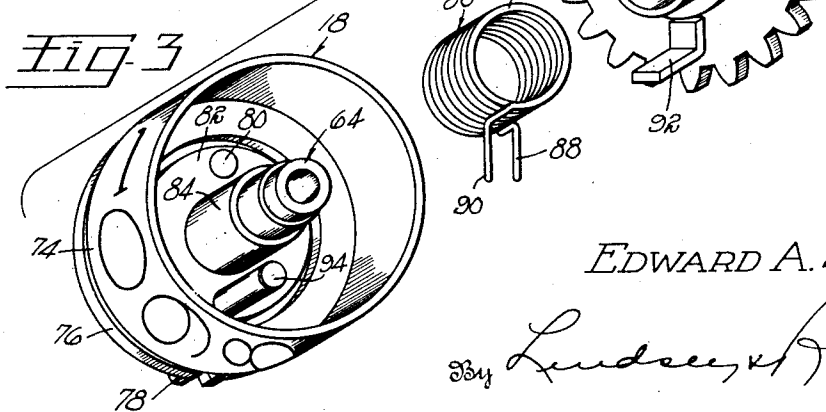
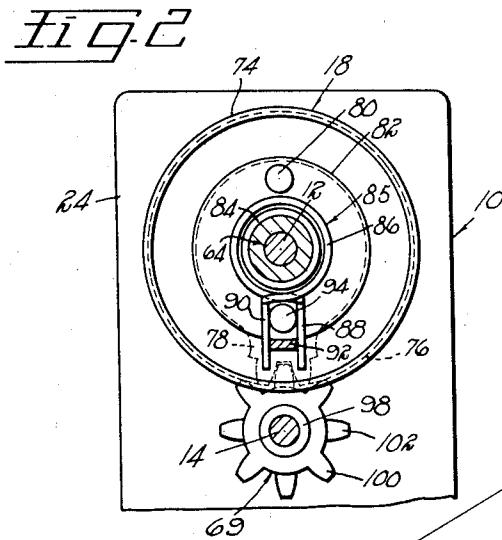
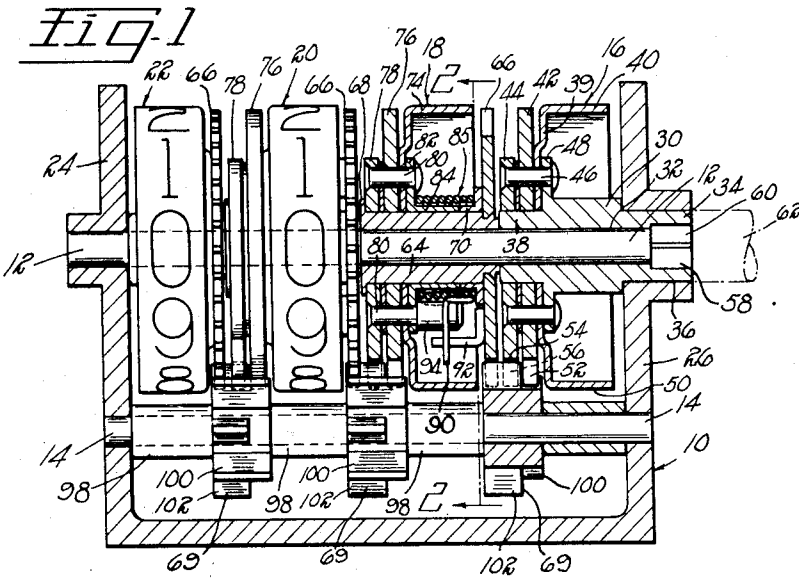
Dec. 7, 1943.

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2,336,307

COUNTER

Filed May 3, 1941



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UNITED STATES PATENT OFFICE

2,336,307

COUNTER

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Application May 3, 1941, Serial No. 391,811

3 Claims. (Cl. 64—27)

The present invention relates to counters and more particularly to counters adapted to be operated at high speed, as, for example, when used in conjunction with a weighing scale or the like.

The object of the present invention is to provide in a counting unit of the above-indicated type means for dampening and absorbing the shock resulting from the impact during a transfer and providing a cushioning effect which is equally effective both at the start and at the finish of the transfer operation. In high speed counters, even when the parts are made as light as possible there is a very considerable inertia effect when the lowest order unit, travelling at high speed and with no load for nine-tenths of a revolution, is suddenly called upon to pick up and transfer one or more stationary higher order units and move them at the same rate of speed through one-tenth of a revolution and then suddenly stop them. The sudden blow or impact in picking up the higher order units will cause undue wear or breakage of the leading tooth of the two-tooth transfer gear, or the first transfer pinion, or both. The stopping of the higher order unit after a fast transfer is effected by the long tooth of the transfer pinion suddenly contacting the locking disk of the lower order unit, and again the pinion tooth or rim of the locking disk is apt to fail.

Another object is to provide a unit wherein the shock absorbing means also constitutes a driving couple between the driving gear and numeral wheel of the order unit and wherein the driving couple also functions to maintain the numeral wheels in proper alignment with one another.

A still further object is a unit of the above-indicated type which is of simple construction and wherein the parts are so manufactured that they may be readily assembled into a complete unit of rugged construction.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing:

Figure 1 is a side view of a counter embodying the invention herein with portions thereof in section to show the details of construction;

Fig. 2 is a view taken on the line 2—2 of Fig. 1; and

Fig. 3 is a perspective exploded view of one of the order units of higher order.

Referring to the drawing, the counter comprises generally a U frame 10, a supporting shaft 12 upon which the order units are rotatably mounted, and a second supporting shaft 14 upon which are mounted the transfer pinions for transferring the operation from a unit of lower order to a unit of higher order. In the embodiment illustrated, the counter includes a unit 16 of lowest order and three units 18, 20, and 22 of successively higher order; each of the units of higher order being advanced one step upon a complete revolution of the preceding unit of lower order.

Referring now to the counting unit 16 of lowest order, it includes a hub 30 provided with a longitudinally extending bore 32 for supporting one end of the drive shaft 12; the other end of the shaft being supported in an aperture in the left vertical leg 24 of the base 10. The hub in turn is provided with a right reduced end 34 for rotatably mounting the hub in an aperture 36 provided in the right vertical leg 26 of the frame 10. The other or left end of the hub 30 is also provided with a reduced portion 38 upon which there is mounted the discoidal web 39 of a numeral wheel 40, a locking disk 42, and a two-tooth transfer gear 44; these members all being secured to the hub by rivets 46 extending through aligned apertures provided in said members and in a radial flange 48 integral with the hub. The numeral wheel 40 also includes a rim portion 50 extending laterally from the web 39 and is provided on its periphery with suitable indicia comprising numerals from zero to nine, inclusive. The locking disk 42 and the two-tooth gear 44 are of usual construction; the former having a single notch 52 in alignment with the recess 54 between the two teeth 56 of the two-tooth gear 44; these members cooperating with the transfer pinion as presently described.

In order to drive the lowest order unit 16, the reduced hub portion 34 is provided with a square recess 58 for receiving the square end 60 of a driving shaft 62 whereby upon rotation of the shaft the lowest order unit will be rotated in a counterclockwise direction.

Referring now to the order unit 18, it includes a hub 64 rotatably mounted on shaft 12 and having staked to the end adjacent the order unit 16 a twenty-tooth transfer gear 66 and provided at its other end with a radial flange 68. There is also integral with the twenty-tooth gear 66 a sleeve 70 which may be secured to the inner face

of the gear as by a radial flange 72 welded thereon; the inner face of the sleeve bearing on the hub 64. Positioned intermediate of the gear 66 and the flange 68 and rotatably mounted on the hub 64 are a numeral wheel 74, locking disk 76, and two-tooth gear 78, all of like construction to the corresponding parts of the lowest order unit 16. The numeral wheel, locking disk, and two-tooth gear of the order unit 18 are, however, secured by rivets 80 to the radial flange 82 of a sleeve 84; the sleeve also being rotatably mounted on hub 64 and of such length that when the two-tooth gear abuts against the hub flange 68 the end of the sleeve is positioned adjacent the end of the sleeve 70 of the pinion 66.

With this construction, in order to drive the numeral wheel 74 and its associated parts upon operation of the twenty-tooth gear 66, there is mounted on the sleeves 70 and 84 a coupling member 85 comprising a spiral spring 86 wound into a sleeve and having its opposite ends offset toward one another and then bent outwardly to provide depending driving fingers 88 and 90, arranged in parallel relationship to one another. To cooperate with the fingers 88 and 90, the twenty-tooth gear 66 is provided with a driving member or projection 92 extending from its inner face and located between the fingers 88 and 90, whereby upon rotation of the gear 66 it will engage one of the fingers and simultaneously rotate the coupling member. In order to rotate the numeral wheels 74 and associated parts, one of the securing rivets 80 is further provided with a driven stud or projection 94 which likewise extends inwardly and is located between the fingers 88 and 90 of the spring 86, whereby upon rotation of the coupling one of the fingers will engage the stud and simultaneously rotate same. The projections 92 and 94 are disposed at different distances from the center of the shaft 12 so as not to interfere with one another during the operation of the counter.

As best seen in Fig. 2, the width of driving projection 92 corresponds to the diameter of driven stud 94, and the fingers of the spring straddle these projections and engage the opposite side edges thereof. Therefore, projections will be maintained in accurate alignment, and thus when the counter comes to rest, the numerals of the higher order wheels will always be in proper alignment with those of the lower order wheels.

Inasmuch as the order units 20 and 22 are not transferred at high speed, they may be of any usual construction; it being apparent that the locking disk and two-tooth gear may be omitted from the unit of highest order.

The drive between each unit of lower order and each unit of next higher order is accomplished through transfer pinions 69 rotatably mounted on the supporting shaft 14. The shaft 14 is supported in suitable apertures provided in the vertical legs of the frame 10, and the pinions 69 are spaced in cooperating relationship with the wheels by spacing sleeves 98. The transfer pinions 69 are of usual construction, having alternate long teeth 100 and short teeth 102. As usual with this type of transfer pinion, the locking disk of the lower order unit normally contacts two of the long teeth of the transfer pinion, preventing rotation of the latter until the completion of nine-tenths of a revolution of the unit of lower order. When this occurs, the two-tooth gear is brought into mesh with the short tooth of the

transfer pinion to rotate same and simultaneously advance the next higher order unit one step through the meshing engagement between the twenty-tooth gear 66 and the long tooth of the transfer pinion.

With the counter constructed in the aforesaid manner, it will be seen that upon counterclockwise rotation of the shaft 60, the lowest order unit 16 will be rotated in a counting direction. As this unit approaches a complete revolution, the two-tooth gear 44 will mesh with the transfer pinion 69 to rotate the latter and simultaneously rotate the twenty-tooth gear 66 of the next higher order unit 18. As previously indicated, when the two-tooth gear 44 meshes with the transfer pinion, the lowest order unit will have considerable inertia, resulting in a sudden impact when meshing engagement is made. However, with the arrangement indicated, this sudden impact is absorbed because upon the sudden rotation of the gear 66 the driving projection 92 will initially engage the depending finger 88 of the coupling member 85, tending to rotate the coupling member and, through the coupling member, rotate the numeral wheel 74 and its associated parts. However, as the coupling member is torsionally wound, it will initially tend to wind into a coil of lesser diameter and absorb the impact shock resulting from the sudden starting prior to the finger 90 exerting any appreciable driving effect on the stud 94. After absorbing the shock, the spring will tend to unwind, whereupon the gear 66 will act as a driving member to simultaneously rotate the coupling member and the driven numeral wheel 18.

In like manner, at the completion of a transfer, the transfer pinion will be suddenly stopped due to the engagement between the long teeth and the locking disk 82, again resulting in considerable impact. However, when this occurs, the driving projection 92 of the gear 66 will then engage against the depending finger 90 of the coupling member, thus producing a dampening effect and absorbing the resultant shock. As previously stated, when the drive shaft 60 and the lowest order unit finally come to rest, the spring coupling will also function to positively align the driven stud 94 with the driving projection 92, and thus the successively higher order wheels will be kept in accurate indicating relationship relative to one another.

It will also be noted that after a predetermined rotation in a counting direction the order units will operate in a reverse or clockwise direction in returning to zero. Due to the construction of the coupling member herein shown, the impact shock resulting from the transfer upon the reverse rotation is also absorbed. As is evident, the operation will be identical to the operation when operating in a counting direction, except that the driving projection 92 will initially engage the finger 90 rather than the finger 88 and the coupling member will be operated in a direction reverse to that during driving. From this it will be seen that the counter is capable of being operated in either of two directions and that the coupling member will absorb the impact shock upon the transfer of one order unit to the next, regardless of the direction of operation.

Referring particularly to Fig. 3, it will be seen that an advantage of manufacturing the counter in the manner described is that the higher order units may be readily assembled. As indicated, the numeral wheel, locking disk, and transfer

pinions may initially be manufactured and secured together as a unit. Thereafter they may be slid onto the hub 64 until they abut the hub flange 68. Following this, the coupling spring 86 may be mounted by sliding it over the sleeve 84, and thereafter the twenty-tooth gear 88 may be assembled onto the hub and then secured into position, thereby completing the entire assemblage.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. An order unit for counting mechanisms comprising a driving member mounted for rotation in opposite directions, a driven member mounted for rotation in opposite directions, and an operative connection between said driving member and said driven member and comprising a coiled spring rotatable in opposite directions, said spring having at its opposite ends generally radially extending parallel fingers, a driving projection carried by said driving mem-

ber, and a driven projection carried by said driven member, said projections being positioned between said fingers and with their side edges respectively engaged with said fingers.

2. An order unit for counting mechanisms including a hub, a driving gear secured to the hub and having an inwardly extending projection, a numeral wheel rotatably mounted on the hub and having a projection extending towards said driving gear and located at a different distance from the center of rotation of the hub than said first projection, a torsion spring mounted on said hub between said gear and wheel for rotation in opposite directions, said torsion spring having at its opposite ends parallel fingers extending generally in a radial direction, said fingers being in straddling relation to said projections with the respective fingers engaging the opposite side edges thereof.

3. An order unit for counting mechanisms comprising a supporting shaft, a driving member mounted on said shaft for rotation in opposite directions, a driven member mounted on said shaft for rotation in opposite directions, said driving member and driven member having projections disposed at different distances from, and to the same side of the axis of, said shaft, and a spring coupling between said driving member and driven member comprising a torsion spring mounted on said shaft for rotation in opposite directions, said spring having at its ends spaced parallel radially extending fingers straddling said projections and adapted to engage the opposite edges thereof.

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