Jan. 27, 1970 C. B. LEVI 3,491,604

DEVICE FOR MODIFYING ROTARY MOTION

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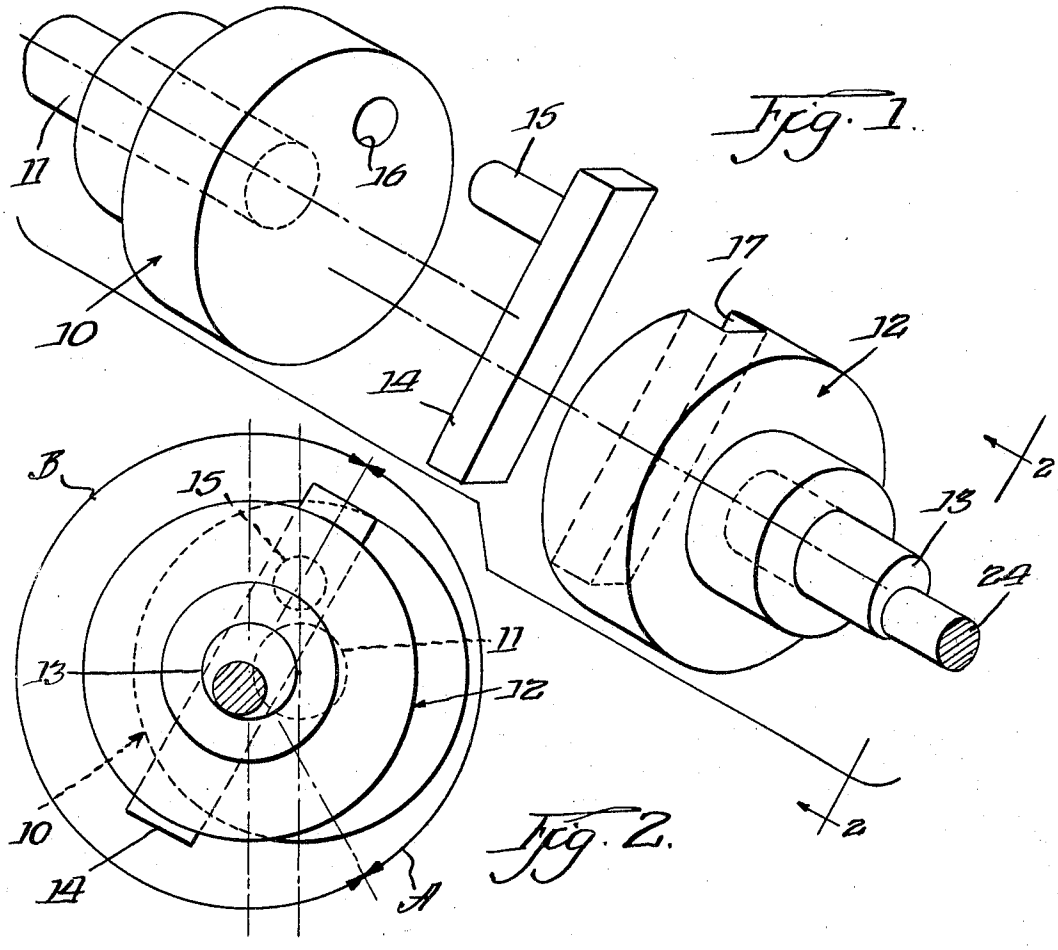


Fig. 1.

Fig. 2.

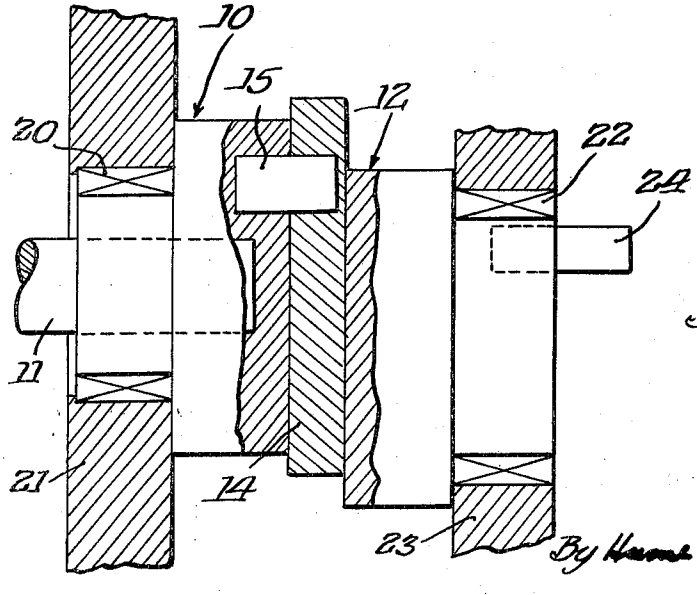


Fig. 3.

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DEVICE FOR MODIFYING ROTARY MOTION

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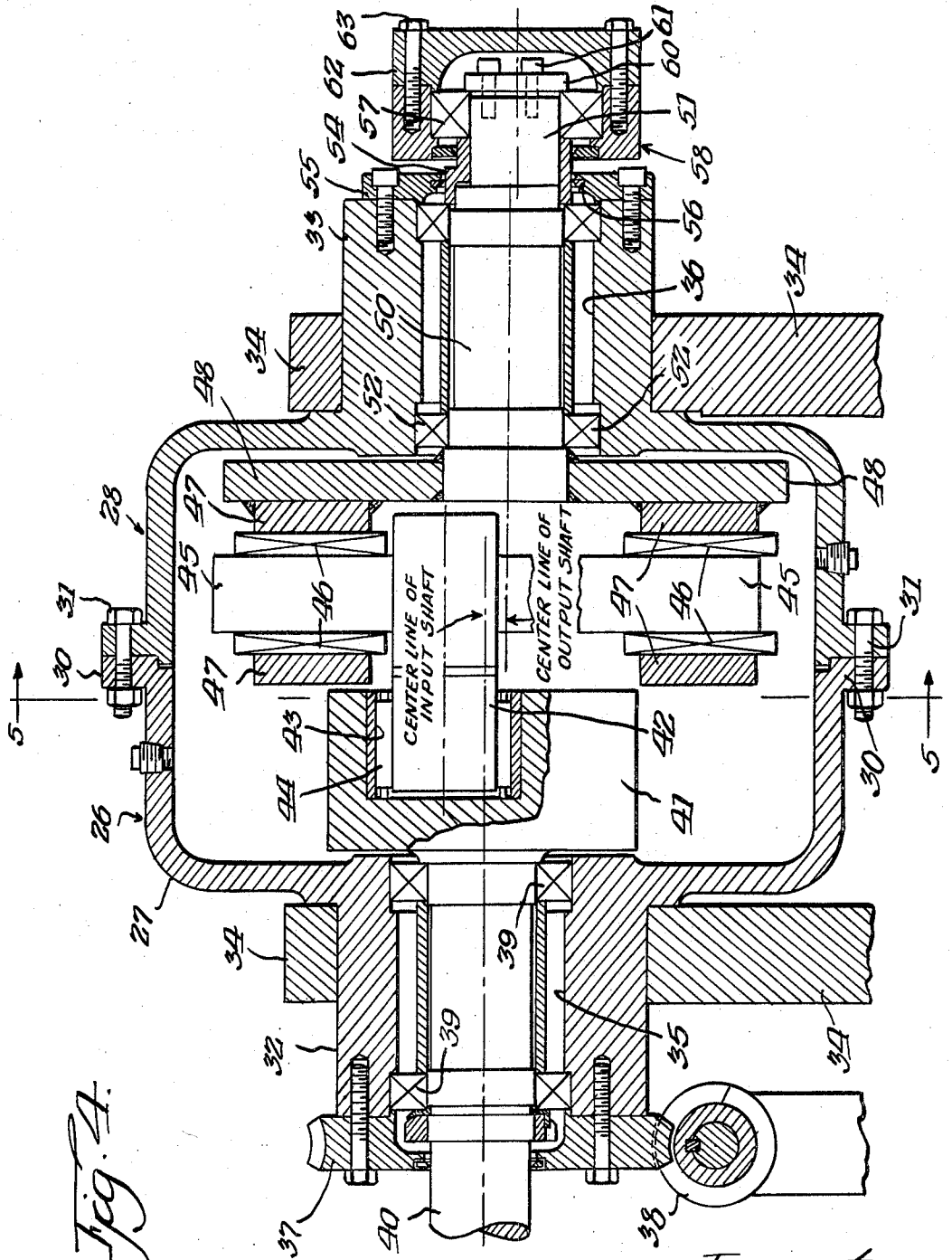


Fig. 4.

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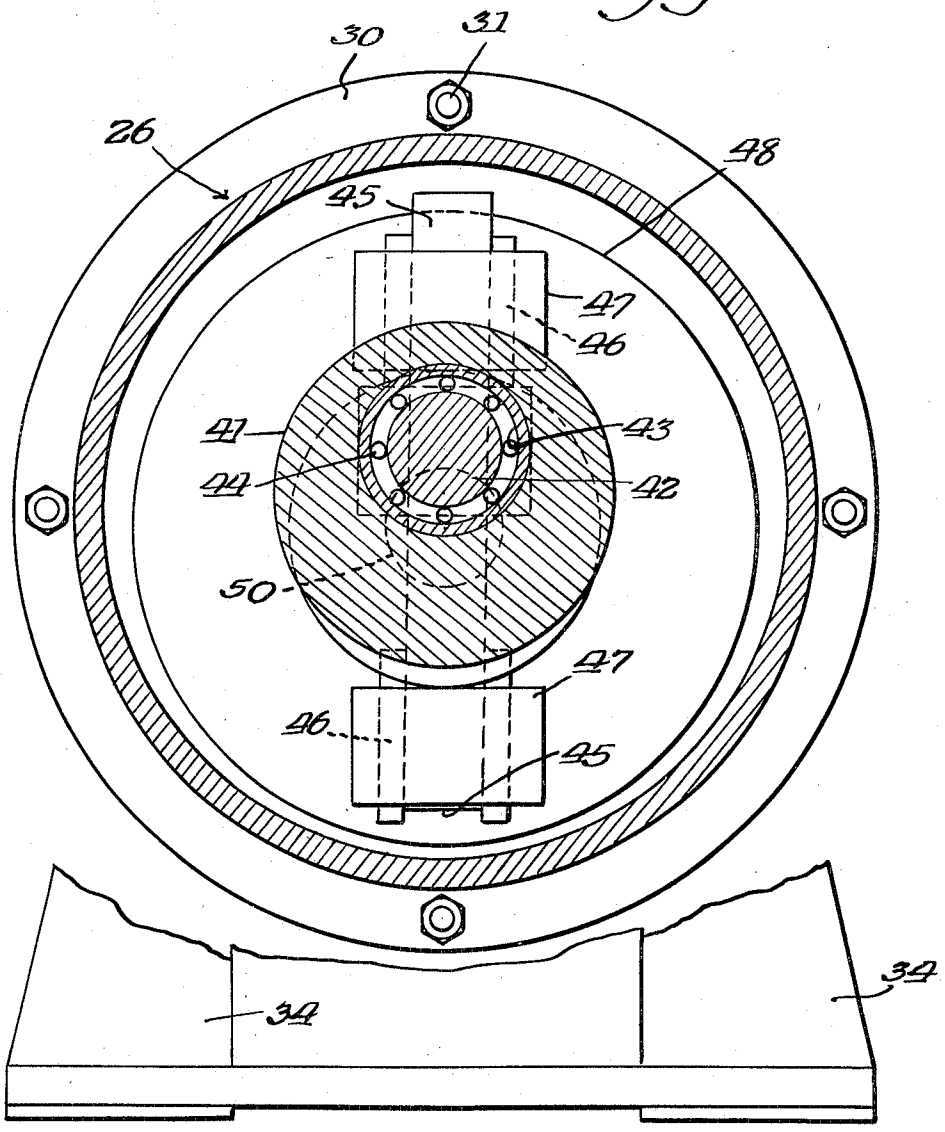
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DEVICE FOR MODIFYING ROTARY MOTION

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Fig. 5.



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DEVICE FOR MODIFYING ROTARY MOTION

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Fig. 6.

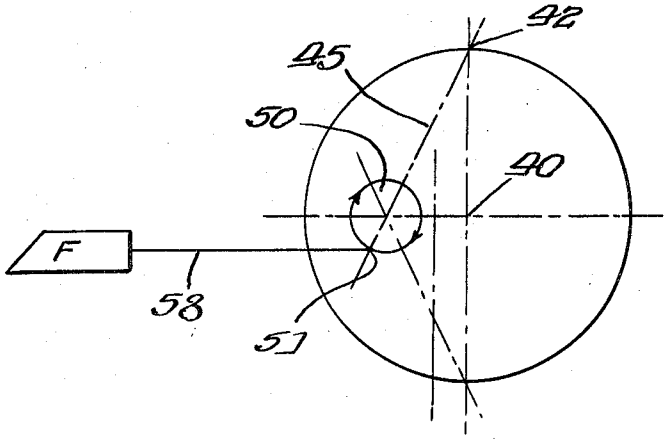
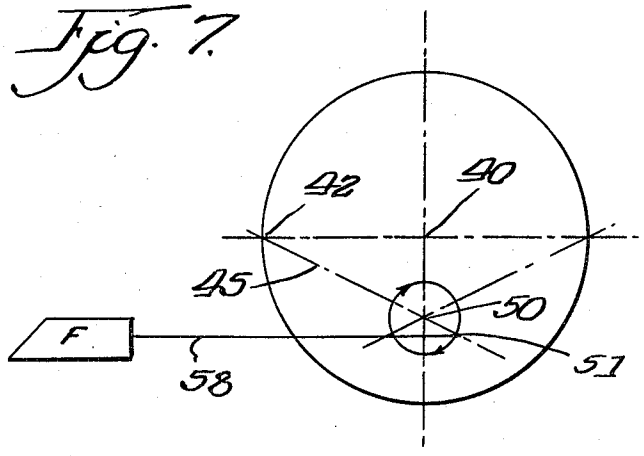


Fig. 7.



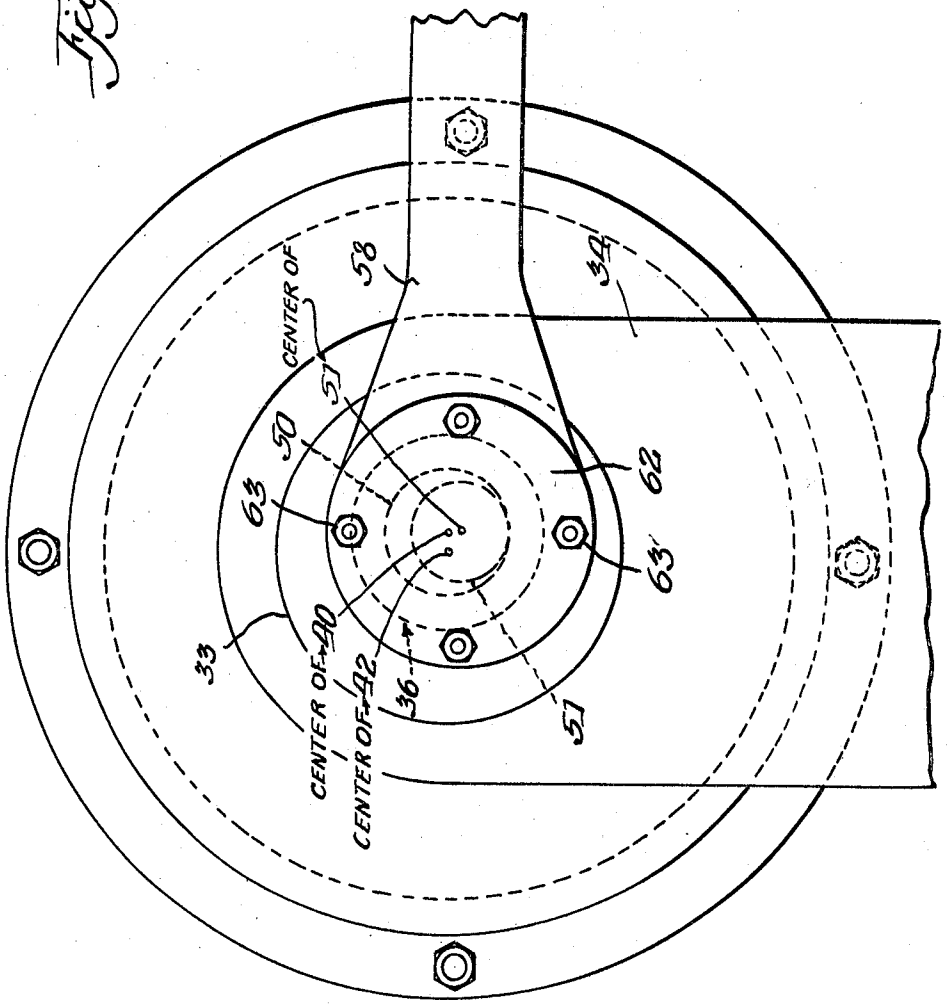
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DEVICE FOR MODIFYING ROTARY MOTION

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Fig. 8.



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3,491,604

DEVICE FOR MODIFYING ROTARY MOTION

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Int. Cl. F16h 21/12, 21/48, 25/08
U.S. Cl. 74—63 2 Claims

ABSTRACT OF THE DISCLOSURE

In the present device for modifying rotary motion, the input which consists of rotary motion at a constant speed is converted into rotary motion having different angular speeds for each revolution. A single connecting part is employed between the driving and driven members and since the members are offset with respect to each other, the connecting part is caused to reciprocate.

The invention relates to an improved device for modifying rotary motion and has reference more particularly to improved drive means for a feeder or similar apparatus and which can be adjusted to change the feeding action of the apparatus to and from maximum and zero feed.

An object of the invention resides in the provision of a device capable of converting rotary motion at a constant speed into rotary motion having different angular speeds during each revolution.

Another object of the invention is to provide a device of the character described which will employ a single connecting part between the driving member and the driven member. The driving member drives the driven member by means of the connecting part and since the members are offset with respect to each other the connecting part is caused to reciprocate in relation to the driving member. This mode of operation causes the driven member to move through fast and slow angular speeds for each revolution.

A further object is to provide a device for modifying rotary motion as described and which can be adjusted to vary the reciprocating action of the device with respect to a horizontal plane by adjusting the rotated position of the housing of the device.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like refernce characters are used to designate like parts:

FIGURE 1 is an exploded view in perspective showing the invention in simplified form;

FIGURE 2 is a transverse sectional view taken substantially along line 2—2 of FIGURE 1;

FIGURE 3 is a longitudinal sectional view showing a modified form of rotary motion device coming within the invention;

FIGURE 4 is a longitudinal sectional view showing another modification of the invention wherein the housing is rotatably adjustable;

FIGURE 5 is a sectional view taken substantially along line 5—5 of FIGURE 4;

FIGURE 6 is a sectional view taken substantially along line 5—5 of FIGURE 4, but showing in diagrammatic form the location of the centers of the principal elements for a maximum feeding operation;

FIGURE 7 is a sectional view taken substantially along line 5—5 of FIGURE 4 but showing the centers of the principal elements when the housing is rotated ninty degres for a minimum feeding operation; and

FIGURE 8 is a rear elevational view of the apparatus of FIGURE 4, the same illustrating the eccentric and associated feeder arm for protruding the desired reciprocating motion.

In FIGURE 1 the driving member is indicated by the numeral **10** and the driven member by the numeral **12**. The shaft **11** is suitably fixed to the member **10**, whereas the shaft **13** is fixed to the driven member **12**. The connecting part **14** consists of a rectangular block having at one end a pin or projection **15**. The face of the driving member **10** is provided with an opening **16** offset from the center of rotation and which receives the pin **15**. The face of the driven member **12** is provided with a diametrical groove **17** and which receives the connecting part **14**.

The operation of the device shown in FIGURE 1 can best be understood by reference to FIGURE 2 wherein A represents the arc of travel of the driven member for the first one hundred and eighty degrees of rotation of the driver and B represents the arc of travel of the driven member for the second one hundred and eighty degrees of rotation of the said driver. The driver **10** drives the driven member **12** by means of the connecting part **14**, and since the members are offset with respect to each other, the connecting part reciprocates in the groove **17**. This mode of operation causes the driven member to move through fast and slow angular speeds for each revolution.

The above described motion can be utilized by means of an eccentric on the driven member and structure of this nature is shown in FIGURE 3. The eccentric can be employed to drive a feeder in a reciprocating manner or a screen or other apparatus of similar nature can also be driven.

The device of FIGURE 3 is substantially the same as that of FIGURE 1 except for the journalling means for the driver and for the driven member. The roller bearing assembly **20** journals the driver **10** and the assembly is supported by the frame **21**. In a similar manner the driven member **12** is journalled by the roller bearing assembly **22** supported by the frame **23**. The eccentric on the driven member is indicated by the numeral **24**.

A commercial embodiment of the invention is shown in FIGURES 4, 5 and 7 wherein a housing journals the drive shaft and also the driven shaft and wherein the housing is rotatably adjustable for obtaining a variation in the reciprocating action produced by the device. The housing **26** is fabricated in two parts **27** and **28** substantially similar in size and shape and the parts are joined at the flanges **30** by the securing bolts **31**. The trunnions **32** and **33** are formed integral with the sectional parts and the trunnions are mounted for rotary adjustment in the frame supports **34**. The bore **35** in the trunnion **32** is eccentric as regards the housing being displaced a fractional distance in an upward direction on the vertical center line. The bore **36** in the trunnion **33** is one hundred and eighty degrees opposite being displaced the same fractional amount on the center line in a down direction. For effecting the rotative adjustments of the housing, a worm gear wheel **37** is fixed to the left end of the trunnion **32** and the gear wheel has meshing relation with the worm drive **38**.

The input shaft or driving shaft is indicated by numeral **40** and said shaft extends through the trunnion **32** for integral connection with the disc or driving member **41**. The ball bearing assemblies **39** suitably journal the shaft **40** within the bore **35** of the trunnion **32**. The projection or pin which forms part of the connecting member is indicated by numeral **42** and said pin is received in the opening **43** in the bearing **44** provided in the face of the driving member **41**. The roller bearing **44**, having location in the opening, is interposed between the pin and said member. The remaining element **45** of the connecting member is in the form of a rod which is slidable in carry-

ing plates forming part of the driven structure which will now be described.

In the form of the invention shown in FIGURE 1 the block **14** was slidable in a groove **17**. However, in this commercial apparatus the rod **45** is slidable in special bearings **46** which are retained by the carrying plates **47** fixed to the driven disc or member **48**. The said driven member is suitably fixed to the driven shaft **50** and the said shaft has the eccentric driving member **51** formed integral therewith. The ball bearing assemblies **52** journal the shaft **50** within the bore **36** of the trunnion **33**. Also in this commercial form of the invention the eccentric **51** is integral with the driven shaft **50** and as shown in FIGURE 4 the eccentric is displaced downwardly on the vertical center line with respect to the center of rotation of driven shaft **50**.

A collar **54** is located on the eccentric **51** and the closure plate **55** for this end of the trunnion is in contact with the collar by means of the resilient grease and oil seal **56**. The portion of the collar **54** which is in contact with the seal is circular and the same is concentric with the driven shaft **50**. The extreme right hand end of the eccentric **51** is provided with the ball bearing assembly **57** for the purpose of journalling the actuating arm **58**. The ball bearing assembly is retained in place by the plate **60** fixed to the end of the eccentric by the screws **61**. The actuating arm **58** for the feeder or other apparatus to be reciprocated by the device is retained in an axial direction by the ring **62** and by the bolts **63**, all as clearly shown in FIGURES 4 and 7.

The commercial form of the invention as shown in FIGURES 4 to 7, inclusive, will operate on the same basic principles as explained for the device of FIGURE 1. The driving and driven shafts **40** and **50**, respectively, are offset with respect to each other and a single part operatively connects the same. The said part includes the pin **42** which is located in an opening in member **41** and the part also includes the slidable rod **45**. As previously explained with respect to the position of the parts in FIGURES 4 and 5, the center of the shaft **40** is displaced vertically above the center of rotation of the housing whereas the shaft **50** is displaced vertically below the axis of rotation for the housing. In this position of the housing the feeding effect of the action of the actuating arm **58** is a minimum, assuming the arm to be horizontally disposed as shown in FIGURE 7.

In order to obtain a maximum feeding action, the housing is rotated ninety degrees which will locate the parts as shown in FIGURE 6. In this figure the driving shaft **40** is displaced to the right on a horizontal plane as regards the axis of rotation for the housing and the shaft **50** is similarly displaced to the left. With the arm **62** performing in a substantially horizontal plane, the reciprocating action of the same will be a maximum. Accordingly it is possible to obtain a feeding action from maximum as shown in FIGURE 6 to a minimum as shown in FIGURE 7 by rotative adjustment in the angular positions of the housing.

The eccentricity of the bores **35** and **36** in the trunnions **32** and **33**, respectively, are a matter of design as is also the offset of the pin **42** with respect to the axis of rotation of drive shaft **40**. It will also be understood that the offset relation of the eccentric **51** on the driven shaft **50** can be varied for obtaining the desired vibrating action. However, in all devices the input shaft and driving member will have constant rotation but which is modified by the connecting part into fast and slow angular speeds for the driven member as explained in the description of FIGURE 2. The speed of the driven member will be less than the constant speed for the arc A and greater than the constant speed for the arc B.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings, as various other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In a device for modifying rotary motion, the combination with a housing having a forward trunnion and a rear trunnion, an input shaft providing a driving member and being journalled by the forward trunnion, an output shaft providing a driven member and being journalled by the rear trunnion, the axis of rotation of the input shaft and the driving member being offset with respect to the axis of rotation of the output shaft and driven member and also being offset with respect to the axis of rotation of the housing, a connecting part operatively connecting the driving member with the driven member, said connecting part including a pin rotatably received in an opening in the driving member offset from the axis of rotation, said connecting part also including a slidable member having location in a passage extending diametrically of the driven member, whereby for constant rotation of the input shaft the said output shaft is caused to rotate at different angular speeds for each revolution, means mounting the housing for rotation, and additional means operatively connecting with the housing for effecting rotative adjustments of the housing.

2. A device for modifying rotary motion as defined by claim **1**, wherein means are provided for mounting the housing for rotation, additional means operatively connecting with the housing for effecting rotative adjustments of the housing, an eccentric on the output shaft, and an arm in associated relation with the eccentric and adapted to be actuated thereby.

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