

April 25, 1950

H. LIST

2,505,125

CONTINUOUSLY OPERATING KNEADER AND MIXER

Filed Aug. 19, 1946

2 Sheets-Sheet 1

FIG. 1

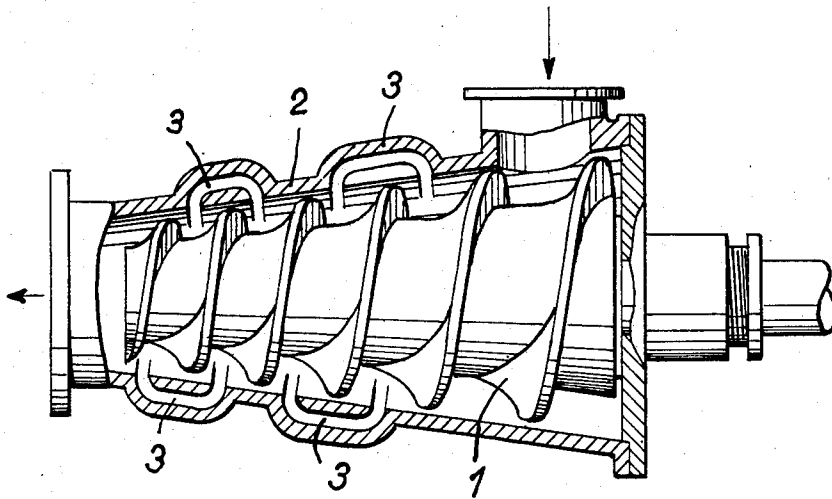
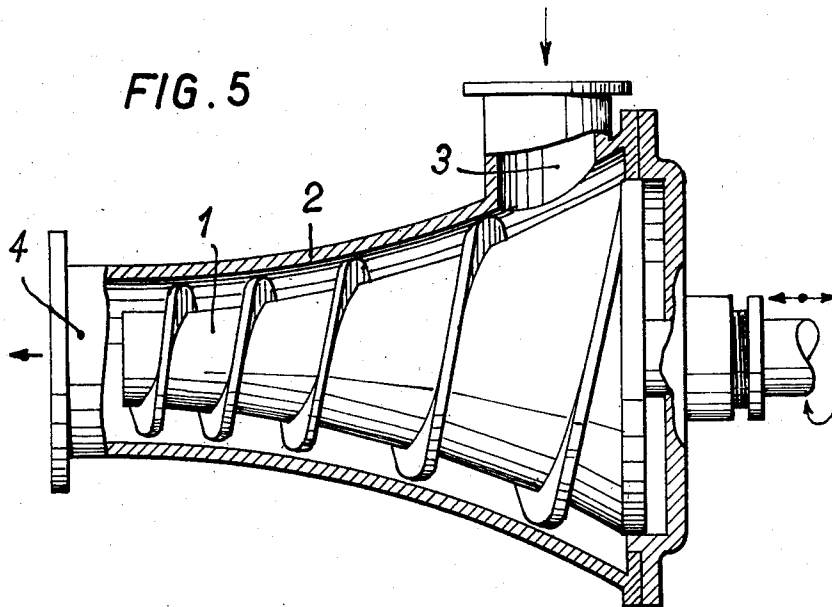


FIG. 5



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FIG. 2

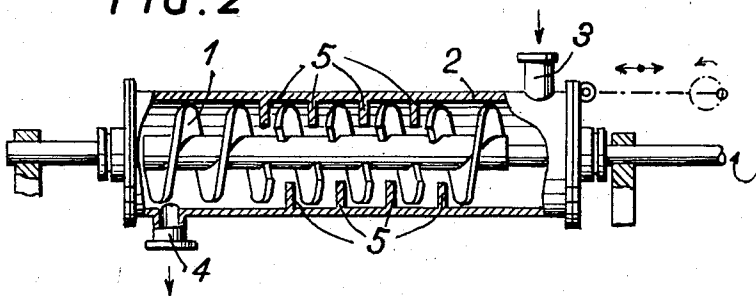


FIG. 3

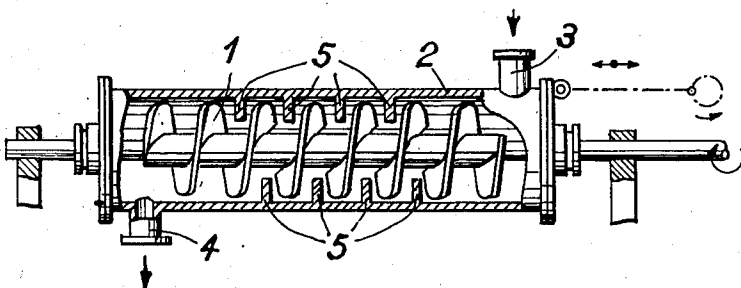
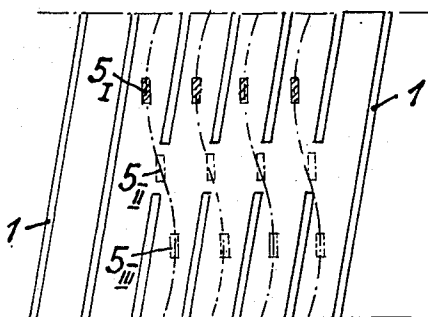


FIG. 4



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UNITED STATES PATENT OFFICE

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CONTINUOUSLY OPERATING KNEADER AND MIXER

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Application August 19, 1946, Serial No. 691,574
In Switzerland August 20, 1945

4 Claims. (Cl. 259—99)

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According to the present state of art, a continuously operating machine for kneading and mixing is available which works by means of two worms according to the principle of gear pumps. For many products, in particular rubber mixtures and plastic mixtures, such prior machine, however, does not afford a sufficient kneading action.

The present invention, now, serves for the purpose of eliminating such deficiency, and relates to a machine for carrying out continuous kneading and mixing operations, comprising (in contra-distinction to prior machines) only a single worm, special measures being taken, in view of the purpose aimed at, which shall be further described hereinafter.

Three forms of invention are illustrated in the accompanying drawing, in which:

Fig. 1 is a longitudinal section through a conical press-worm, constituting the first form of invention,

Figs. 2 and 3 are longitudinal sections through a second form, showing two different operating positions,

Fig. 4 shows, in a greater scale, a development of the worm according to Figs. 1 and 2, and

Fig. 5 is a longitudinal section through a third form of press-worm.

The worm of Fig. 1 is a conical press-worm of customary design, the case 2 of which, however, is provided with by-passes 3. In operation, the worm 1, due to the pressure difference between the worm threads, presses the mass to be kneaded through the by-passes 3, and the mass thus is repeatedly turned back into the working cycle so as to ensure an intimate intermixing of all particles.

The form of invention according to Figs. 2 and 3 is a cylindrical worm, the body of which is provided with interrupted or non-continuous threads for the purpose of forming individual worm wings. The worm case 2 comprises an inlet port 3, and outlet port 4, and a plurality of tooth-like projections 5 integral with its inner wall. The case 2 is so mounted as to permit of being axially reciprocated. Such latter movement may be brought about by means of a crank mechanism, as indicated in Figs. 2 and 3. The disposition of the snugs or nibs 5 on the inner wall of case 2, and that of the passages or gaps in the worm threads is such that the reciprocating snugs 5 during the rotation of the worm 1 and the reciprocating movement of case 2 at corresponding speed repeatedly pass through the gaps in the worm threads. In Fig. 4 such process is illustrated by means of a development of the

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worm wings or flanks; I designates the lefthand terminal position of the snugs 5, II the latter's position at the moment of passage through the gaps in the worm body 1, and III the righthand terminal position of the snugs 5. If desired, the case 2 also could be given a slight rocking or oscillating movement, aside of its longitudinal movement.

Figs. 3 and 4 show the machine in its two terminal positions. In Fig. 3, the case 2 has been displaced to the right. The mass to be kneaded is fed or pressed into the machine through the inlet port 3 by means of a device known per se. During the movement of case 2 to the right, a pressure is being exerted onto the mass situated at the exit port of the case, thus ejecting the mass through the outlet port 4. Such ejection or delivery suitably is assisted in that in the last couple of worm threads no gaps are provided so that these threads act as pistons in the case 2. When the case 2 is displaced to the left, the mass at the inlet port 3 is moved or delivered into the working cycle, while the completely kneaded mass is ejected through the outlet port of case 2.

Fig. 5 shows a conical press worm, in which the case 2 also may be reciprocated. When displacing the case toward the side of the outlet 4, a space is produced between the worm body 1 and the case 2, through which a portion of the mass is being pushed back due to the difference of pressure between the individual worm threads, improving the kneading action thereby.

In order to increase the pressure difference between the worm threads, the worm suitably is adapted in concave form, as shown. In such a design, the space referred to above is not being uniformly enlarged when displacing the case, as in the rectilinear design, but is enlarged toward the inlet port 3. The pressure different between the worm threads thus is increased and the pushing back of the mass to be kneaded improved, as is the aim of the present invention.

What I claim and desire to secure by Letters Patent is:

1. A continuously operated kneader and mixer comprising a casing, a cylindrical worm member rotatable in said casing having interrupted worm threads, projections on the inside surface of said casing for coacting with said interrupted worm threads, said casing being axially reciprocable with respect to said worm whereby a portion of a mass already mixed is returned into a less mixed mass for more complete mixing and kneading.

2. In a continuously operated kneader and mixer as claimed in claim 1, said worm member

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having a small area of uninterrupted threads adjacent the discharge end of said casing for expelling the mass of mixed and kneaded material therefrom.

3. A continuously operated kneader and mixer comprising a casing, a cylindrical worm member rotatable in said casing having interrupted worm threads, projections on the inside surface of said casing for coating with said interrupted worm threads, said casing and said worm member being relatively reciprocable with respect to one another whereby a portion of a mass already mixed is returned into a less mixed mass for more complete mixing and kneading.

4. A continuously operated kneader and mixer comprising a casing, a single worm member rotatable in said casing and means coating with said single worm member to repeatedly return a portion of a mass to be kneaded on its way through said casing back into the working cycle,

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said worm member being cylindrical and having interrupted worm threads, said means comprising tooth-like projections integral with the inner wall of the worm casing, and the latter being axially reciprocable whereby the kneading action is improved by subjecting a portion of said mass to repeated kneading.

HEINZ LIST.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
949,618	Bugg, Jr.	Feb. 15, 1910
1,750,645	Offenhauser	Mar. 18, 1930
1,941,808	McConnaughay	Jan. 2, 1934
2,020,878	Doering	Nov. 12, 1935
2,159,670	Neitzke	May 23, 1939