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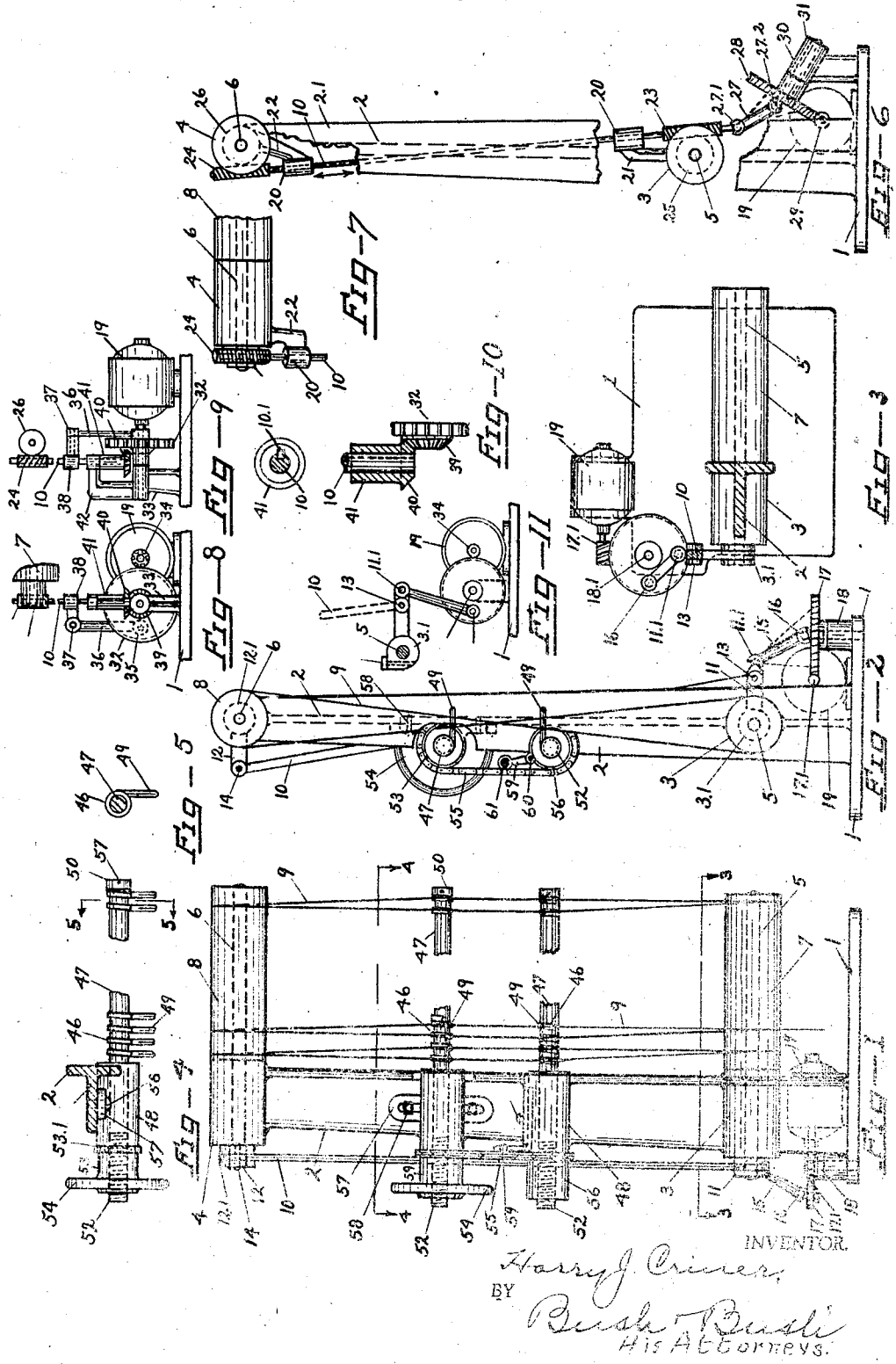
RECIPROCATING ENDLESS BAND KNIFE BREAD-SLICING MACHINE

Filed May 15, 1944 2 Sheets-Sheet 1



Fig—1

Fig—2

Fig—3

Fig—4

Fig—5

Fig—6

Fig—7

Fig—8

Fig—9

Fig—10

Fig—11

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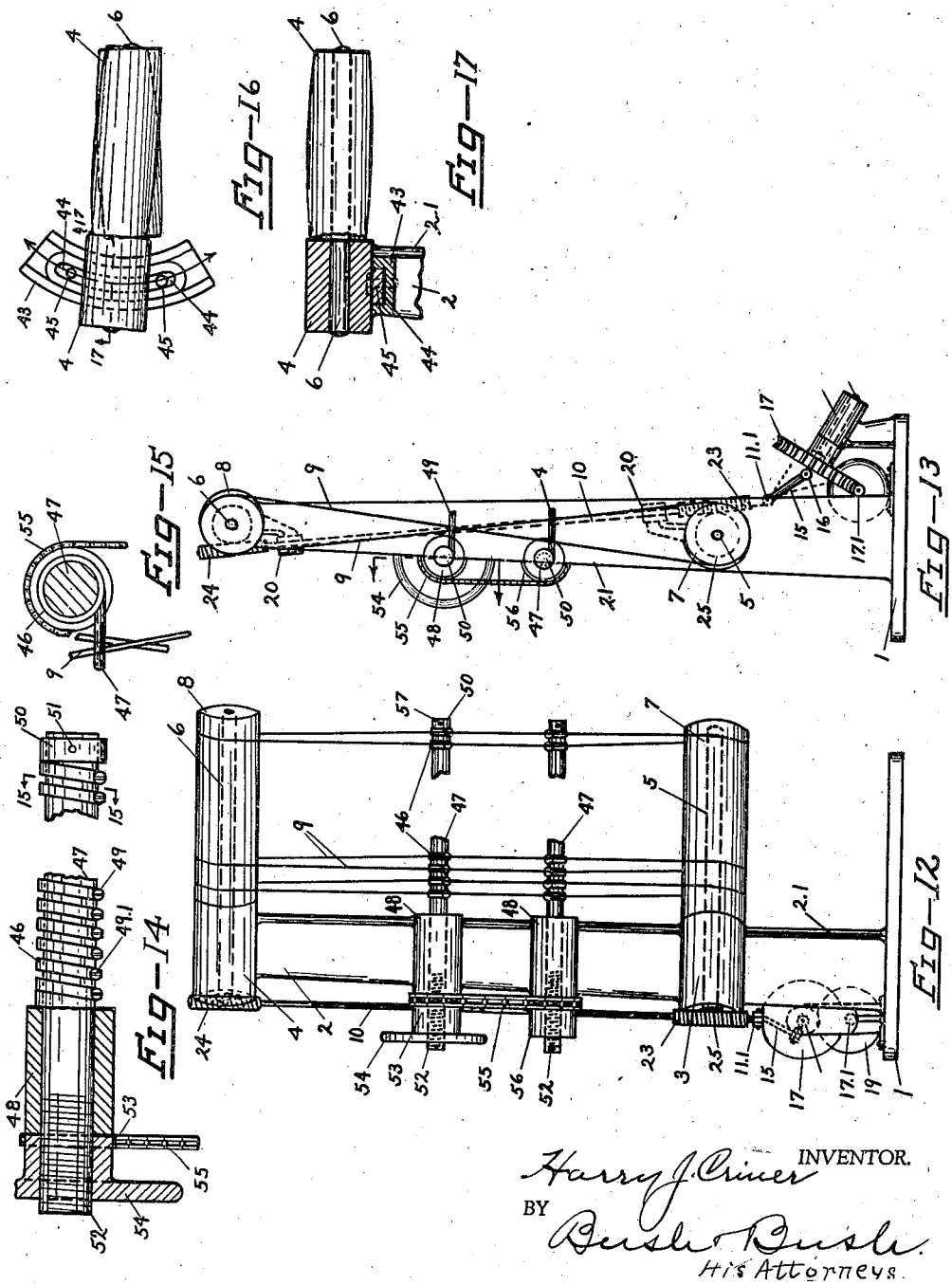

Fig—16

Fig—17

Fig—15

Fig—13

Fig—14

Fig—12

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RECIPROCATING ENDLESS BAND KNIFE BREAD-SLICING MACHINE

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12 Claims. (Cl. 146—88)

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My invention relates to improvements in bread slicing machines.

The objects of my invention are to provide a reciprocating bread slicing machine in which the cutting elements are composed of a plurality of band-blades so arranged that the band-blades will travel longitudinally at the same time that they are reciprocating, whereby the cutting segment of each blade will be continually changing so as to greatly lengthen the life of the blade and the periods which may elapse between successive grinding or sharpenings of the blades as compared with the relatively short blades now in common use in reciprocating machines. Other objects will appear from the description.

I accomplish these objects by the means illustrated in the accompanying drawings, in which:

Figure 1 is a front elevation of one form of my machine in which a single vertical column is utilized to carry a pair of spaced parallel drums or pulleys;

Figure 2 is a side elevation of my machine;

Figure 3 is a horizontal cross-section on the line 3—3 of Figure 1;

Figure 4 is a horizontal cross-section on the line 4—4 of Figure 1;

Figure 5 is a sectional detail of the spacing mechanism on the line 5—5 of Figure 4;

Figure 6 is a detail of an alternate form of driving mechanism with portions of the frame broken away; and

Figure 7 is a detail rear view of the upper portion of the driving mechanism shown in Figure 6;

Figures 8 and 9 are details of an alternate form of driving mechanism;

Figure 10 is an enlarged detail showing the lengthened hub of the gear permitting longitudinal travel of the drive-rod therein;

Figure 11 shows an alternate form of driving mechanism;

Figures 12 and 13 show the drums or pulleys standing at an angle to each other instead of having their axes contained within the same plane;

Figure 14 is an enlarged detail showing the arrangement of the spacing fingers and spring to which they are attached;

Figure 15 is an enlarged detail in section on the line 15—15 of Figure 14, but with portions of the blades added;

Figure 16 shows an adjustable mounting for the shaft of the pulleys;

Figure 17 is a detail with the hub in section on the line 17—17 of Figure 16.

My apparatus comprises a base 1 to which is

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secured one or more columns 2 with hubs 3 and 4 in which are mounted shafts 5 and 6 on which are journaled drums or pulleys 7 and 8 on which the blades 9 are mounted, preferably in figure 8 form.

The pulleys 7 and 8 are suitably spaced apart and of such diameter that when the blades 9 are mounted thereon in figure 8 form, the blades will cross midway of the pulleys with all of their cutting edges extending in the same direction.

Rigidly united to the shafts 5 and 6, are rocker arms 11 and 12. The outer ends of the rocker arms 11 and 12 are pivotally united to a drive-rod 10 by pivots 13 and 14.

The lower rocker arm 11 has formed integral therewith a round head which forms the inner member of a ball and socket joint 11.1.

A connecting rod 15 forms a driving connection between the ball and socket joint 11.1 and a ball and socket joint 16 at the lower end of the connecting rod 15. The inner member of the ball and socket joint 16 is rigidly united to a worm gear 17 pivotally mounted upon a suitable support 18 formed integral with the base 1.

The worm gear 17 is driven by a worm 17.1 on the shaft of the motor 19 or other prime mover, and as the motor turns, it rotates the worm 17.1 and the worm gear 17 carrying with it the lower end of the connecting rod 15 and thus producing a reciprocating up and down movement of the rocker arm 11 which carries with it the drive-rod 10 and the upper rocker arm 12. The rocker arms 11 and 12 are rigidly united to the shafts 5 and 6 respectively and as the rocker arms reciprocate, they cause the drums 7 and 8 to rotate reciprocatingly for a short distance. The drums 7 and 8 carry the blades 9 and as the drums rotate reciprocatingly, they transmit a reciprocating longitudinal movement to the blades 9.

If desired, the drive-rod 10 and the upper rocker arm 12 may be omitted and the blades themselves relied on to transmit a reciprocating rotary movement from the lower pulley 7 to the upper pulley 8.

In the forms shown in Figures 1 and 2, the blades merely reciprocate without any progressive movement and when a given cutting segment of a blade becomes dull, the blade may be manually adjusted to bring new cutting segments into action, but this will necessitate stopping the machine and adjusting the blades manually.

In Figure 6 I have shown a form of my machine in which the pulleys not only reciprocate rotatably, but also are advanced a short distance with each reciprocation so that new cutting segments of the blades are continually brought into

action. I accomplish this by slidably mounting the drive-rod 10 in suitable sleeves 20 carried by brackets 21 and 22 rigidly united to the hubs 3 and 4.

Upon the ends of the drive-rod 10 I mount worms 23 and 24 which mesh with corresponding worm gears 25 and 26 rigidly united to the shafts 5 and 6 respectively. A link or connecting rod 27 has one end connected by a ball and socket joint 27.1 with the lower end of the drive-rod 10, and the other end of the link or connecting rod is connected by a ball and socket joint 27.2 to a pivot pin mounted in the face of the worm gear 28 which in turn is driven by a worm 29 on one end of the shaft of the motor 19.

The worm gear 28 is mounted upon a shaft 30 revolvably mounted in a suitable support 31 united to the base 1.

Various forms of drive may be utilized for reciprocating and rotating the drive-rod 10 and I do not limit by claims to the specific forms of drive shown.

In Figures 8 and 9 I have shown an alternate form of drive in which a drive wheel 32 is pivotally mounted upon a support 33 united to the base 1. It is driven by a spur gear wheel 34 mounted upon the shaft of the motor 19 and carries a crank pin 35 on which is pivotally mounted one end of the connecting rod 36, the upper end of which is provided with a pivotal mounting 37 uniting it to an arm 38 rigidly mounted upon the drive-rod 10 so that as the drive wheel 32 revolves, it will communicate a reciprocating vertical motion to the drive-rod 10.

A bevel gear wheel 39 may be formed integral with the drive wheel 32 or otherwise operatively connected therewith and a complementary bevel gear wheel 40 is mounted upon an elongated hub 41 which is rotatably carried in a bracket 42 united to the support 33. The drive-rod 10 is splined in the hub 41 so as to rotate therewith but to be free for vertical movement relative to the hub 41.

The upper end of the drive-rod 10 is fitted with a worm 24 which meshes with the worm gear 26, the latter being rigidly united to the shaft 6. The upper end of the drive-rod 10 is slidingly mounted in the sleeve 20 united to the bracket 22.

My improved arrangement is also applicable to machines embracing a pair of pulleys 7 and 8 mounted upon shafts 5 and 6 set at an angle to each other as shown in Figures 12 and 13 whereby the cutting segments of each blade at the crossing point will be spaced apart by reason of the angle of the pulleys as described in my Patent No. 2,236,245. In such cases the hubs 3 and 4 may be rigidly united to the frame 2 as shown in Figure 12 and if desired, the hub 4 may be formed integral with a bar 44 slidingly mounted in a groove formed in the frame 2 which may be locked in place by stud-bolts 45.

Any type of spacers may be used with my machine.

In Figure 14 I have shown a spacing device comprising a flat coiled spring 46 coiled around a suitable shaft 47 mounted in a hub 48 rigidly secured to the frame 2 or formed integral therewith. Slotted spacing fingers 49 have one end rigidly united to the spring 46 by spot-welding or otherwise, and the other end provided with slots 49.1 in which the blades may travel.

A stop ring 50 is rigidly united to one end of the shaft 47 by a pin 51 or other suitable means. The opposite end of the shaft 47 is threaded at

52 to receive the elongated hub 53 of the handwheel 54 and when the handwheel 54 is turned in one direction, it will draw the shaft 47 inwardly so as to contract the spring 46 and narrow the spacing of the fingers 49 and when turned in the opposite direction, will permit the spring 46 to force the fingers 49 apart by its resilient action.

The shafts 47 may be provided with sprocket wheels 53.1 carrying a sprocket chain 55 and a hub 56 may be united to the lower sprocket wheel and threaded to correspond with the upper hub 53 and the shafts 47.

One or both of the hubs 48 may be united to a bar 57 adjustably united to the frame 2 by bolts or set screws 58 so that either one or both of the spacing assemblies may be adjustable vertically of the frame.

In the drawings I have shown the pulleys supported by a single column, but it is obvious that an additional column may be added by lengthening the shafts 5 and 6 or the apparatus may be mounted in a suitable housing to take the place of the columns in any of the forms in common use.

It is likewise obvious that equivalent driving means other than shown in the drawings may be adopted and that the size, proportions and arrangement of the various parts may be varied to a large extent without departing from the spirit of my invention, and I do not limit my claims to the precise forms shown in the drawings, which are to be regarded as illustrative rather than as working drawings. Likewise various forms of chutes and conveyors are well known and in common use for carrying the bread to the cutting segments of the blades and any desired form of conveyor may be utilized with my machine.

In the operation of my machine there will be very little vibration as compared with ordinary reciprocating machines because of the light weight of the vertically reciprocating parts and because the reciprocating rotary movement will not produce anywhere near the vibratory effect produced by the ordinary machines which have vertically reciprocating frames.

Likewise, the breakage of band-blades due to crystallization from continually traveling around the pulleys, will be greatly reduced so that the blades will last much longer.

The use of band-blades will do away with the frequent sharpening required for the straight blades of the ordinary reciprocating machines and in the form shown in Figure 6, the periods required for sharpening will be extended somewhat proportionately to the greater length of the blades as compared to the short blades commonly in use on reciprocating machines.

I claim:

1. In a bread slicing machine, a support, a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, means for simultaneously imparting a reciprocating rotary motion to the shafts and pulleys through a limited arc and means for continuously advancing the blades uniformly when the machine is in operation.

2. In a bread slicing machine, a support, a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, a rocker arm united to one of the shafts, a drive wheel revolvably mounted on the support with a

prime mover to drive it, a connecting rod to connect the rocker arm to the drive wheel and arranged to reciprocate the rocker arm through a limited arc and simultaneously impart a reciprocating limited rotary motion to the shaft and pulley thereon and means for continuously advancing the blades in a given direction around the pulleys at a uniform rate when the machine is in operation.

3. In a bread slicing machine, a support, a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, rocker arms united to the shafts respectively, a drive rod pivotally united to the rocker arms, a prime mover, means actuated by the prime mover to reciprocate the drive rod longitudinally whereby a reciprocating rotary movement will be produced in the shafts and pulleys through a limited arc and means for continuously advancing the blades in a given direction around the pulleys at a uniform rate when the machine is in operation.

4. A bread slicing machine as described in claim 3, a drive wheel revolvably mounted below the lower rocker arm, a connecting rod having its lower end connected by a ball and socket joint to the drive wheel and its upper end connected by a ball and socket joint to said rocker arm whereby the revolution of said drive wheel will cause the rocker arm to travel reciprocatingly through a limited arc, and a prime mover to revolve the drive wheel.

5. In a bread slicing machine, the combination with a support, of a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, means for simultaneously imparting a reciprocating rotary motion to the shafts through a limited arc, comprising worm-gear wheels united to the pulley shafts, a drive rod carrying worms arranged in mesh with said wheels, a driving shaft with a suitable prime mover to drive it, a drive wheel driven by said shaft, a crank pin mounted in the drive wheel, and a connecting rod connected to the crank pin and to the drive rod whereby the drive rod will be reciprocated longitudinally with each revolution of the drive wheel.

6. A slicing machine as described in claim 5, and means to cause the drive rod to revolve progressively simultaneously with its reciprocation.

7. A combination as described in claim 5, the drive rod being slidably splined in the hub of a bevel gear revolvably mounted in the support, in mesh with a corresponding bevel gear mounted on the driving shaft whereby a progressive rotary movement will be imparted to the drive rod and the pulleys simultaneously with their reciprocating movement.

8. A combined reciprocating rotary and progressive rotary drive for shafts comprising a support, a shaft revolvably mounted thereon, a worm gear mounted on the shaft, a driving-rod having a worm secured upon one end thereof in mesh with the worm gear and its opposite end being slidably mounted and splined in an elongated hub carrying a driven bevel gear wheel in mesh with a drive bevel gear wheel mounted upon a drive shaft, a crank united to the drive shaft and a connecting rod connecting the drive

rod to the crank so arranged that as the drive shaft revolves it will cause the drive-rod to reciprocate longitudinally and simultaneously revolve.

9. In a bread slicing machine, the combination with a support, of a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, means for simultaneously imparting a reciprocating rotary motion to the shafts and pulleys through a limited arc, and means for advancing the blades a fixed distance at each reciprocation of the pulleys.

10. In a bread slicing machine, the combination with a support, of a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, means for simultaneously imparting a reciprocating rotary motion to the shafts and pulleys through a limited arc, and means for continuously advancing the blades at a very slow rate when the machine is in operation.

11. In a bread slicing machine, a support, a pair of spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of endless band-blades mounted upon the pulleys in spaced relation, and means for simultaneously imparting a reciprocating rotary motion to the shafts and pulleys through a limited arc, together with means for continuously and uniformly advancing all of the blades in a given direction around the pulleys at a very slow rate when the machine is in operation.

12. In a bread slicing machine, the combination with a support, of a pair of parallel spaced shafts revolvably mounted in the support, pulleys united to the shafts carrying a plurality of endless band-blades mounted upon the pulleys in spaced relation and arranged in figure 8 form, and means for simultaneously imparting a reciprocating rotary motion to the shafts and pulleys through a limited arc, together with means for continuously and uniformly advancing all of the blades in a given direction around the pulleys at a very slow rate when the machine is in operation.

HARRY J. CRINER.

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