(No Model.) 3 Sheets—Sheet 1.

G. V. CLINK.

FEED MILL OR GRINDING MACHINE.

No. 419,750. Patented Jan. 21, 1890.

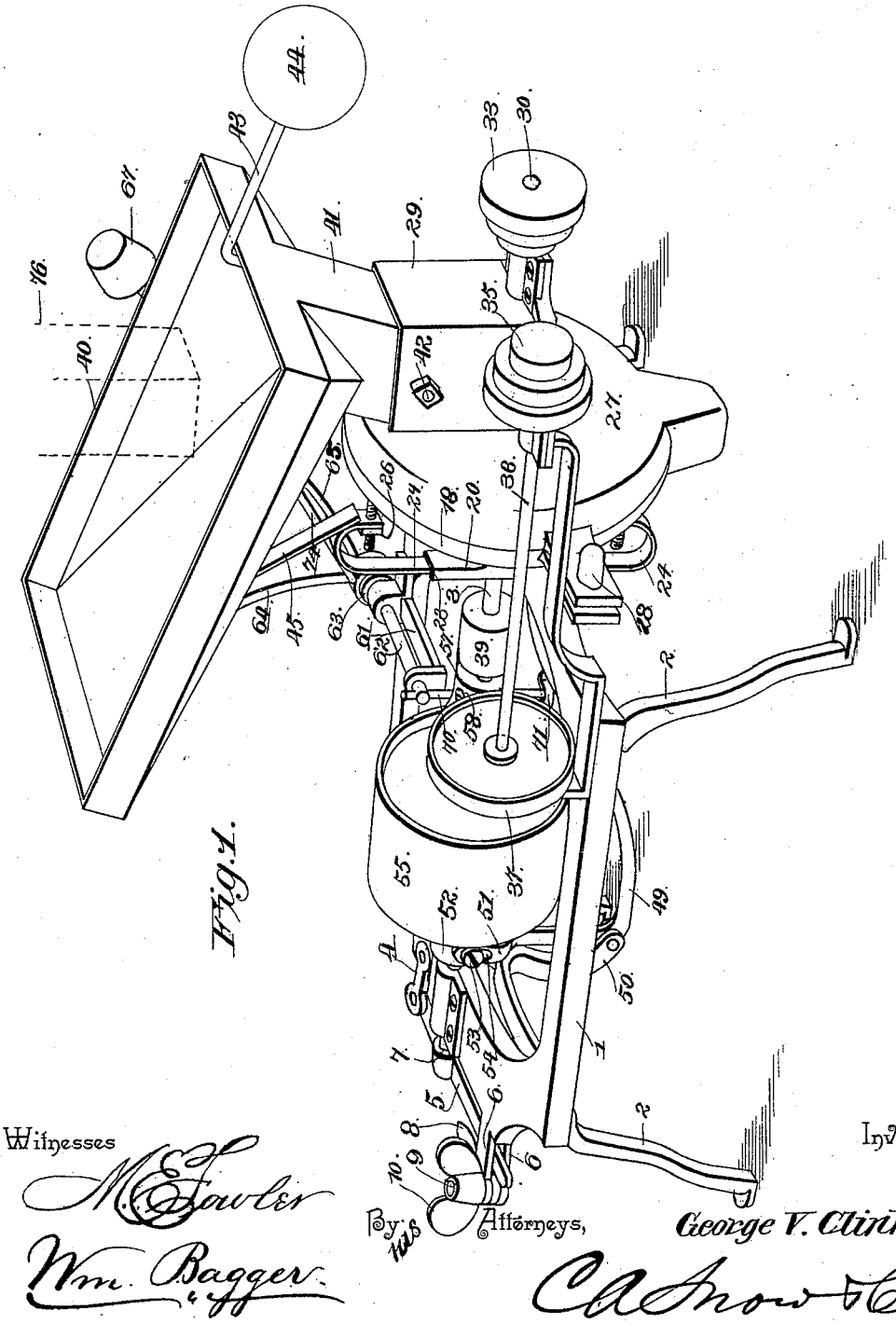

Fig. 1.

Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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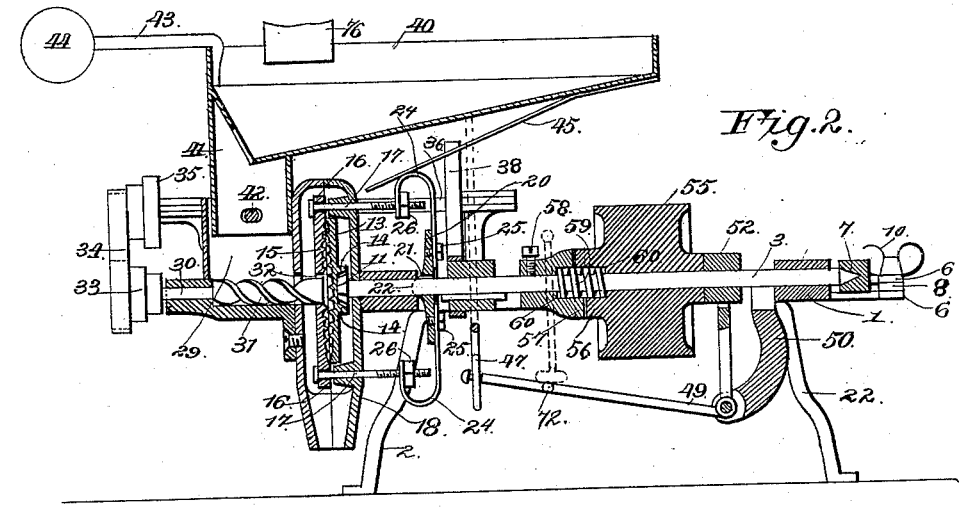

Fig. 2.

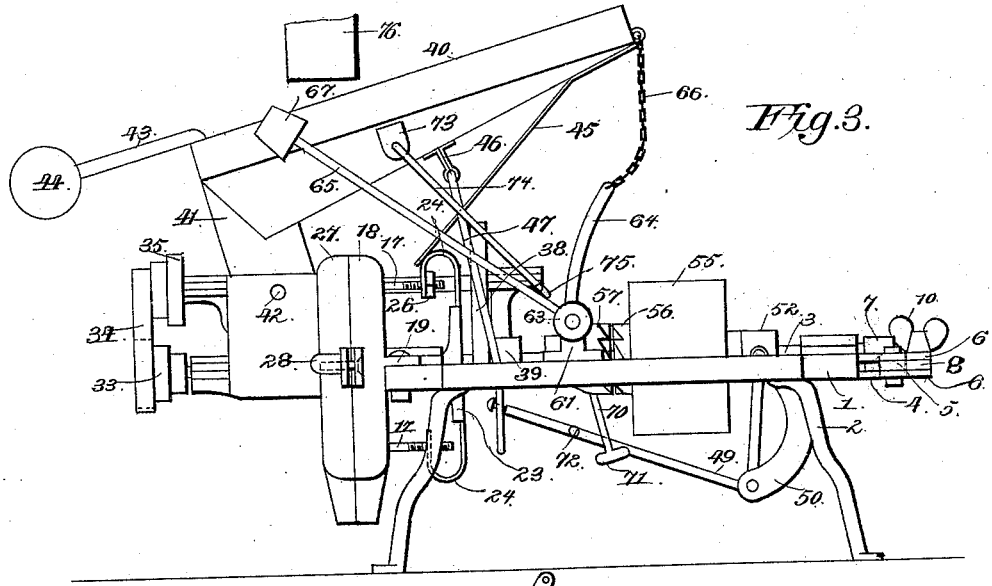

Fig. 3.

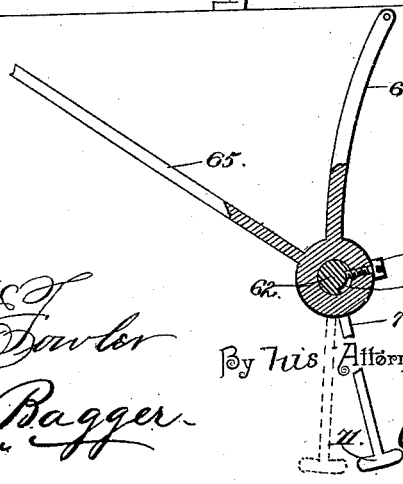

Fig. 6.

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(No Model.) 3 Sheets—Sheet 3.

G. V. CLINK.

FEED MILL OR GRINDING MACHINE.

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Fig. 4.

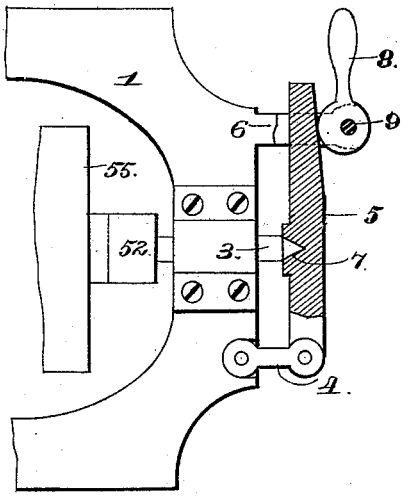


Fig. 5.

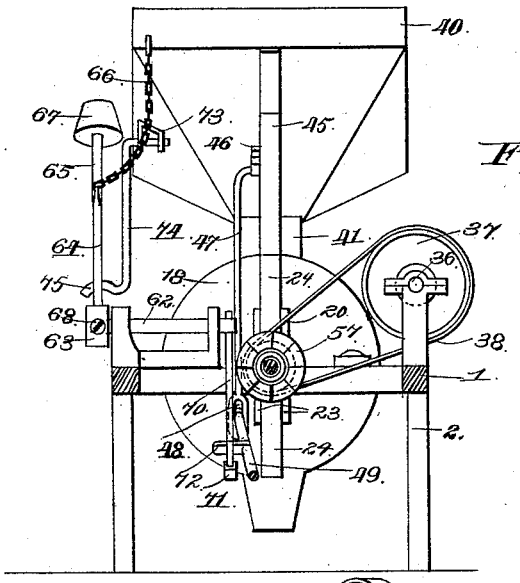
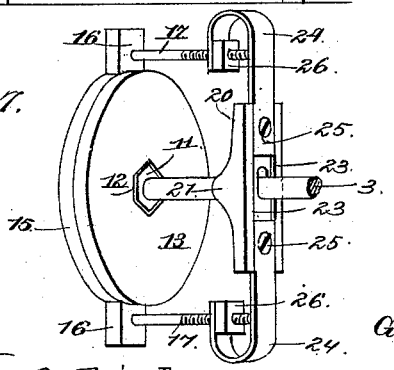


Fig. 7.



Witnesses

M. Fowler

Wm. Bagger.

Inventor

George V. Clink

By his Attorneys,

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UNITED STATES PATENT OFFICE.

GEORGE VINCENT CLINK, OF KEOKUK, IOWA.

FEED-MILL OR GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 419,750, dated January 21, 1890.

Application filed August 1, 1889. Serial No. 319,464. (No model.)

To all whom it may concern:

Be it known that I, GEORGE VINCENT CLINK, a citizen of the United States, residing at Keokuk, in the county of Lee and State of Iowa, have invented a new and useful Feed-Mill or Grinding-Machine, of which the following is a specification.

This invention relates to feed-mills or grinding-machines; and it has for its object to construct a feed-mill which shall be simple, durable, and convenient.

The invention consists in the detailed construction and arrangement of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a perspective view of my improved feed-mill. Fig. 2 is a longitudinal vertical sectional view showing the machine in gear or in position for operation. Fig. 3 is a side view showing the machine out of gear. Fig. 4 is a plan view, partly in section, of the mechanism for adjusting the main shaft and the rear burr. Fig. 5 is a vertical transverse sectional view. Fig. 6 is a longitudinal vertical sectional view of the lever for throwing the mechanism into or out of gear. Fig. 7 is a detail view, on a larger scale, showing the arrangement of the burrs.

Like numerals of reference indicate like parts in all the figures.

1 designates a horizontal frame suitably mounted upon legs 2 2 and having bearings at its front and rear ends for the main shaft 3, which is arranged to have a limited longitudinally-sliding movement in its bearings. To the rear end of the frame is hinged a link 4, at the outer end of which is pivoted a lever 5, the end of which is adjusted bewteen a pair of brackets 6 6, extending from the rear end of the frame. The lever 5 has a conical seat 7, forming a bearing for the rear end of the shaft 3.

Mounted pivotally between the outer ends of the bracket 6 is a cam-lever 8, adapted to bear against the lever 7, which will thus be caused to force the shaft 3, with its attachments, in a forward direction. The pressure of the lever 5 against the rear end of the shaft 3 will always be evenly centered, owing to the attachment of the said lever to the link 4. The fulcrum of the cam-lever 8 is formed by a screw-threaded pin 9, having a thumb-nut 10, which may be tightened against the upper bracket 6, causing the said brackets to clamp the cam-lever and hold it securely in any position to which it may be adjusted. The front end of the shaft 3 has a polygonal head 11, which is seated in a socket 12, formed in the rear side of the rear burr 13. The walls of the socket 12 are made tapering, as shown at 14, in order that the burr may have a slight rocking or oscillating motion upon the end of the shaft on which it is mounted. The front burr 15 is provided with upwardly and downwardly extending lugs 16, having perforations to receive the bolts 17, which extend in a rearward direction through the rear side of the casing 18, which latter is provided with lugs or brackets 19, by means of which it is bolted upon the front end of the frame.

20 designates a link or stirrup adjusted over the main shaft 3 and having upon its front side a transverse ridge 21, a seat 22 for which is formed in the front part of the frame. The rear side of the stirrup is provided with flanges 23, between which are arranged a pair of springs 24, which are secured to the said stirrup by means of bolts 25. The springs 24 are curved forwardly in a U shape, as shown, and their front ends have perforations for the passage of the bolts 17, which are provided with nuts 26. It will thus be seen that by the action of the springs 24 the front burr 15 is held securely in contact with the face of the rear burr 13. The springs 24 should be sufficiently stiff not to yield under ordinary circumstances, such as when the grain passes between the burrs. It is only when unyielding foreign substances, such as a nail or the like—have become mixed with the grain that the springs 24 will yield sufficiently to enable said foreign substance to pass between the burrs without injury to the latter. It will be seen that the front burr, being secured only by means of the two bolts on its diametrically-opposite sides, is enabled to vibrate or oscillate slightly, the bolt-holes being made sufficiently large to enable such motion to take place. This, in connection with the spring attachment herein described, renders the front burr practically movable or

yielding in all directions. It will furthermore be observed that the springs 24 are connected by the rocking stirrup 20. The pressure of the said springs is thus perfectly equalized, and it will be seen that by tightening the nut upon either of the bolts 17 the strain will be equalized between the two springs, and the upper and lower ends of the burr will be drawn with equal force against the face of the rear burr 13. The latter, as has already been described, has a rocking motion upon the end of the shaft, with which it is loosely connected by the socket 12 and head 11. It will thus be seen that when the machine is in operation each of the burrs is flexible in its relation to the other, thus permitting unyielding foreign substances to pass through the mill without injury to the latter. It will also be seen that the distance between the burrs may be readily adjusted for the purpose of grinding the feed as fine or as coarse as may be desired by means of the lever 5, which serves to force the shaft carrying the rear burr up toward the front burr with any desired degree of pressure.

27 designates the front part of the casing, which is secured detachably to the rear part 18 by means of stud-bolts or turn-buttons 28. The front casing 27 is constructed with a forwardly-projecting hopper 29, the lower part of which has bearings for a longitudinal shaft 30, carrying a spiral flange or feed-screw 31, which serves to convey the material to be ground in between the burrs. The front burr is provided with a central opening 32, through which the material to be ground may pass in between the burrs. The front end of the shaft 30 has a cone-pulley 33, which is connected by a belt or band 34 with a cone-pulley 35 upon the front end of the shaft 36, which is journaled in suitable bearings parallel to the main shaft 3. The rear end of the shaft 36 has a drum 37, which is connected by a belt or band 38 with a drum or pulley 39 upon the main shaft, from which motion is thus conveyed to the spiral feed-shaft.

40 designates a feed-trough having a downwardly-extending spout 41, which is mounted pivotally in the hopper 29 upon a transverse bolt 42. The front end of the trough 40 has a forwardly-extending arm 43, the end of which carries a weight 44, by means of which the hopper or trough, when empty, is tilted in a forward position. To the under side of the trough 40 is attached a flat spring 45, which normally rests upon the upper spring 24 and which assists to tilt the said trough in an upward and forward direction. To a bracket 46 upon the under side of the trough 40 is hinged a downwardly-extending arm 47, the lower end of which has a vertical slot 48, into which extends the front end of the horizontal arm of a bell-crank lever 49, which is pivoted to a bracket 50, extending downwardly from the rear end of the frame. The upper end of the vertical arm of the bell-crank lever 49 terminates in a fork 51, the arms of which are fitted against the opposite sides of a collar 52, which is mounted to slide longitudinally upon the main shaft 3, near the rear end of the latter. The collar 52 is provided with laterally-extending studs 53, extending through slots 54 in the arms of the fork 51. It will thus be seen that by operating the bell-crank lever 49 the collar 52 may be moved in a forward or rearward direction upon the main shaft.

Loosely mounted upon the main shaft 3 is the band-wheel 55, to which motion is transmitted from suitable operating mechanism. The front end of the band-wheel 55 has a clutch 56, adapted to engage a clutch-collar 57, which is mounted rigidly upon the shaft 3 by means of a key or set-screw 58. A spring 59 is coiled upon the shaft 3, between the clutch 56 and collar 57, the adjacent faces of which are provided with recesses 60 of sufficient depth to seat the said spring when the latter is compressed. Normally the function of the spring 59 is to force the band-wheel 55 in a rearward direction, so as to keep the clutch 56 out of contact with the clutch-collar 57. By operating the bell-crank lever 49 it will be seen that the drum 55 may be forced in a forward direction against the tension of the spring 59, so as to throw the clutch 56 into engagement with the collar 57, thereby throwing the feed-grinding mechanism into gear.

One side of the frame 1 is provided with a laterally-extending bracket 61, having bearings for a rock-shaft 62, upon the outer end of which is mounted a hub 63, having arms 64 and 65, that extend, respectively, in an upward and a forward direction. The upper end of the arm 64 is connected by a chain 66 with the rear end of the trough 40, and the arm 65 carries at its outer end a weight 67. The hub 63 has a radial stud or set-screw 68, the inner end of which works in a notch 69, extending partly around the periphery of the rock-shaft 61. It will thus be seen that the hub carrying the arms 64 and 65 may be partially rotated upon the rock-shaft 61 before the latter is actuated by the stud or set-screw 68 coming in contact with either end of the notch 69. The inner end of the rock-shaft 61 has a downwardly-extending arm 70, the lower end of which is provided with a shoe 71, adapted to engage an arm 72, which extends laterally from the horizontal arm of the bell-crank lever 49. One side of the feed-trough 40 is provided with a downwardly-extending bracket 73, to which is hinged an arm 74, the lower end of which is provided with a laterally-extending bracket 75, which normally rests between the arms 64 and 65 of the hub 63.

In practice it is the intention to supply the material which is to be ground to the hopper or trough 40 through a spout 76, which conducts the material to the said

trough from a suitably-located bin. The spout 76 should be so arranged as to keep the trough 40 normally level full, but not to overflowing. This may be easily accomplished by causing the spout 76 to extend slightly below the upper edge of the trough 40 when the latter is in a horizontal position.

My improved feed-mill may be operated by steam or other suitable force; but it is especially intended and adapted to be operated by a windmill of any suitable construction, inasmuch as the automatic mechanism for throwing it into and out of gear renders constant attention unnecessary.

The operation and advantages of my improved feed-mill will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed. The material which is to be ground enters the trough or hopper 40 through the spout 76. When the trough 40 is nearly full, the weight of the material therein will overbalance the weight 44 and overcome the tension of the spring 45, and the trough will thus be tilted to a horizontal position. When this takes place, the lower end of the arm 47, engaging the horizontal arm of the bell-crank lever 49, operates the latter, thus moving the collar 52 in a forward direction upon the main shaft 3, and thereby forcing the drum or band-wheel 55 in a forward direction upon the said shaft until the clutch 56 engages the clutch-collar 57. By the same movement of the trough 40 the arm 74, hinged to the latter, or the bracket 75 at the lower end of said arm, is caused to bear against the arm 64 of the hub 63, mounted upon the rock-shaft 61. This movement continues without affecting the position of the rock-shaft until the weighted arm 65 assumes an approximately-vertical position, when the stud or set-screw 68 of the hub 63 comes in contact with one end of the notch 69. The weighted arm 65 now drops over to the other side, thus causing a partial rotation of the rock-shaft, the arm 70 at the inner end of which is thus thrown in a forward direction until the shoe 71 at the lower end of said arm engages the arm 72, extending laterally from the horizontal arm of the bell-crank lever 49, which latter is thereby locked securely in position. The grinding mechanism being now in gear will grind the material fed from the hopper to any requisite degree of fineness, which is regulated by the lever mechanism herein described. When the supply of the material to be ground runs out and the weight of said material in the trough 40 decreases, it is overbalanced by the weight 44 and by the tension of the spring 45, and the hopper is now tilted in a forward direction. Owing to the slot 48 at the lower end of the arm 47 the bell-crank lever 49 will not be immediately actuated. The said bell-crank lever, besides, is kept in a locked position by the shoe 71 of the arm 70 engaging the laterally-extending bracket 72 of the horizontal arm of said bell-crank lever. When the trough 40 is nearly empty, the chain 66, drawing upon the arm 64 of the hub 63, rotates the latter upon the rock-shaft 62 until the weighted arm 65 assumes a vertical position. When the said weighted arm 65 swings back to its original position, the set-screw 68 in the hub 63 engages the notch 69 in the rock-shaft, thus turning the latter in its bearings until the shoe 71 of arm 70 is disengaged from the bracket 72 of bell-crank lever 49. The latter is now operated by the link-rod 47, and the collar 52 is moved in a rearward direction upon the main shaft, thus causing the clutch mechanism to be thrown out of gear by the tension of the spring 59 and instantly stopping the machine.

It will be seen from the foregoing that the operation of throwing the feed-grinding mechanism into or out of gear is performed not only instantaneously and automatically, but that it is completely performed by a single quick stroke or movement of the operating-lever. It is therefore impossible for the ends or faces of the clutches to grind or wear against each other to the detriment of the operating mechanism.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with the rear burr mounted loosely upon the end of the main shaft, of the front burr, the springs mounted in rear of the rear burr and having curved or U-shaped ends, and the bolts connecting the said front burr with the said springs, substantially as set forth.

2. The combination of the rear burr mounted loosely upon the end of the main shaft, the front burr having outwardly-extending lugs on diametrically-opposite sides, a stirrup mounted upon the main shaft, springs extending from the said stirrup, and bolts connecting the lugs of the front burr with the said springs, substantially as set forth.

3. The combination of the rear burr having a polygonal socket by means of which it is mounted loosely upon a polygonal head at the end of the main shaft, a rocking stirrup mounted upon the main shaft and having a transverse ridge seated in a recess or bearing in the main frame, springs attached to and extending from the said stirrup, the front burr, and bolts connecting the latter with the said springs, substantially as set forth.

4. The combination of the frame, the main shaft, the burr mounted loosely upon the front end of the latter, a rocking stirrup, the springs attached to and extending from the latter, the front burr, the bolts connecting the latter with the said springs, the rear casing secured to the frame, the front casing secured detachably to the rear casing and having a suitably-constructed hopper, a shaft journaled in the bottom of the latter and having a spiral feed-flange, and mechanism for conveying

motion to the said feed-shaft from the main shaft of the machine, substantially as set forth.

5. The combination of the rear burr mounted loosely upon the front end of the main shaft, the front burr having bolts connecting it with suitable supporting-springs and provided with a central opening, the casing having a hopper, a shaft journaled in the bottom of the said hopper and having a spiral feed-flange connecting with the central opening of the front burr, and mechanism for conveying motion to the feed-shaft from the main shaft, substantially as set forth.

6. In a feed-mill, the combination of the main shaft arranged to slide longitudinally in its bearings, the rear burr mounted loosely at the front end of said shaft, the rocking stirrup mounted in the rear of said burr, the front burr, bolts connecting the latter with springs extending from the rocking stirrup, and mechanism for forcing the longitudinally-sliding main shaft in a forward direction, substantially as set forth.

7. The combination of the frame, the main shaft, the rear burr mounted loosely upon the latter, the rocking stirrup having outwardly-extending springs, the front burr, bolts connecting the latter with said springs, links extending rearwardly from the main frame, a lever pivoted to the said links and having a conical seat for the rear end of the main shaft, brackets extending from the rear end of the frame to receive the end of the said lever, a cam-lever mounted pivotally between the said brackets and adapted to bear against the end of the said lever, and a thumb-nut mounted upon the screw-threaded pivot of the said hand-lever, substantially as and for the purpose set forth.

8. In a feed-mill, the combination, with the main shaft carrying the rear burr, of a clutch-collar mounted rigidly upon said main shaft, a drum or band-wheel mounted loosely upon the main shaft and having a clutch adapted to engage the said clutch-collar, a spring coiled upon the said shaft between the clutch and the collar and adapted to be seated in recesses in the faces of the latter when compressed, and mechanism for throwing the said clutch and collar automatically into and out of engagement, substantially as set forth.

9. In a feed-mill, the combination of the main shaft carrying the rear burr, the front burr supported upon springs, as described, the casing constructed with a hopper having a spirally-flanged feed-shaft, a feed-trough connected pivotally with the hopper, a clutch mounted rigidly upon the main shaft, a longitudinally-sliding drum having a clutch to engage the former, a longitudinally-sliding collar adapted to bear against the rear end of the said drum, a bell-crank lever arranged to operate the said longitudinally-sliding drum, and a link-rod connecting the said bell-crank lever with the under side of the pivoted feed-trough, substantially as and for the purpose set forth.

10. In a feed-mill, the combination of the main shaft carrying the rear burr, the front burr, the casing having the hopper, the feed-trough connected pivotally with the latter and having a forwardly-extended weighted arm, a clutch-collar secured rigidly upon the main shaft, a longitudinally-sliding drum having a clutch to engage said collar, a longitudinally-sliding collar adapted to bear against the rear end of the drum, a bell-crank lever arranged to operate the said sliding collar, and a link-rod pivoted or hinged to the under side of the pivoted feed-trough and having a slot at its lower end to receive the front end of the horizontal arm of said bell-crank lever, substantially as set forth.

11. In a feed-mill, the combination of the main shaft carrying the rear burr, the front burr, the casing having the hopper, the feed-trough connected pivotally with the latter and having a forwardly-extending weighted arm, a spring supporting the rear end of the feed-trough, a clutch-collar secured rigidly upon the main shaft, a longitudinally-sliding drum having a clutch to engage said collar, a longitudinally-sliding collar adapted to bear against the rear end of the drum, a bell-crank lever arranged to operate said collar, a link-rod connecting said bell-crank lever with the pivoted feed-trough, and a spring interposed between the clutch-collar and the drum, substantially as set forth.

12. The combination of the main shaft carrying the rear burr, the clutch-collar mounted rigidly upon the main shaft, the longitudinally-sliding drum adapted to engage the said clutch-collar, the longitudinally-sliding collar adapted to bear against the rear end of said drum, the bell-crank lever arranged to operate the said collar, a bracket extending laterally from the horizontal arm of said bell-crank lever, and a rock-shaft having an arm provided at its lower end with a shoe adapted to bear against and to lock the said bell-crank lever, substantially as set forth.

13. The combination of the main shaft carrying the rear burr, the clutch-collar mounted rigidly upon the main shaft, the longitudinally-sliding drum having a clutch adapted to engage the said collar, the longitudinally-sliding collar adapted to bear against the rear end of said drum, the bell-crank lever operating the said collar, a bracket extending laterally from the horizontal arm of said bell-crank lever, a rock-shaft having an arm provided at its lower end with a shoe adapted to bear against said bracket and to lock the said bell-crank lever in position, and a link-rod connecting the bell-crank lever with a pivoted feed trough or hopper having a forwardly-extending weighted arm, substantially as set forth.

14. The combination of the main shaft carrying the rear burr, the front burr, the cas-

ing having the hopper, the feed-trough connected pivotally with the latter and having a forwardly-extended weighted arm, the clutch-collar mounted rigidly upon the main shaft, the longitudinally-sliding drum having a clutch to engage said collar, the interposed spring, a longitudinally-sliding collar adapted to bear against the rear end of the drum, a bell-crank lever operating said collar, a link-rod connecting said bell-crank lever with the pivoted feed-trough, a rock-shaft having an arm adapted to bear against a bracket projecting from the horizontal arm of the bell-crank lever, a hub mounted upon the said rock-shaft and having a stud or set-screw working in the peripheral notch therein, arms extending from said hub, a chain connecting one of said arms with the rear end of the pivoted feed-trough, a weight at the outer end of the other arm, and an arm hinged to the pivoted feed-trough and having a laterally-extending bracket bearing against the rear arm of the hub, substantially as set forth.

15. The combination, with the pivoted feed-trough having a forwardly-extended weighted arm, of the bell-crank lever for throwing the operating mechanism into and out of gear, a link-rod connecting said bell-crank lever with the pivoted feed-trough, a rock-shaft having an arm adapted to bear against a bracket extending from the horizontal arm of the bell-crank lever, and a hub having a weighted arm and a stud or set-screw working in a peripheral groove in the rock-shaft, said hub being actuated by the movement of the pivoted hopper, substantially in the manner and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

GEORGE VINCENT CLINK.

Witnesses:
T. F. E. WIEDERHOLD,
T. H. MCCLEARY.