

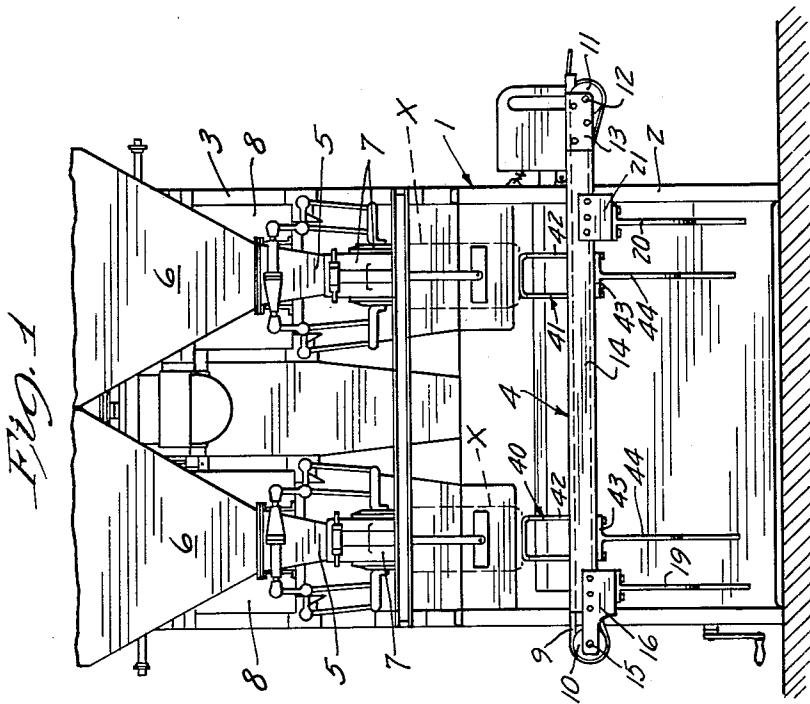
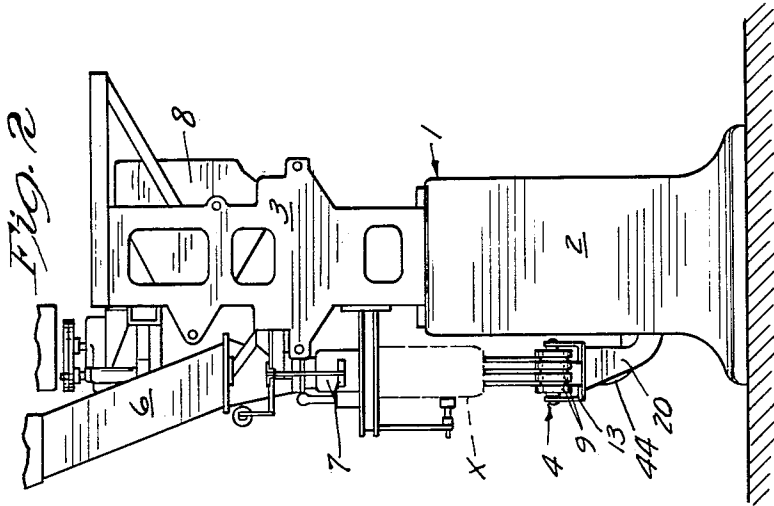
July 5, 1955

H. V. KINDSETH
BAG SHAKING MECHANISM FOR BAG FILLING
AND CONVEYING MACHINES

2,712,406

Filed July 12, 1952

5 Sheets-Sheet 1



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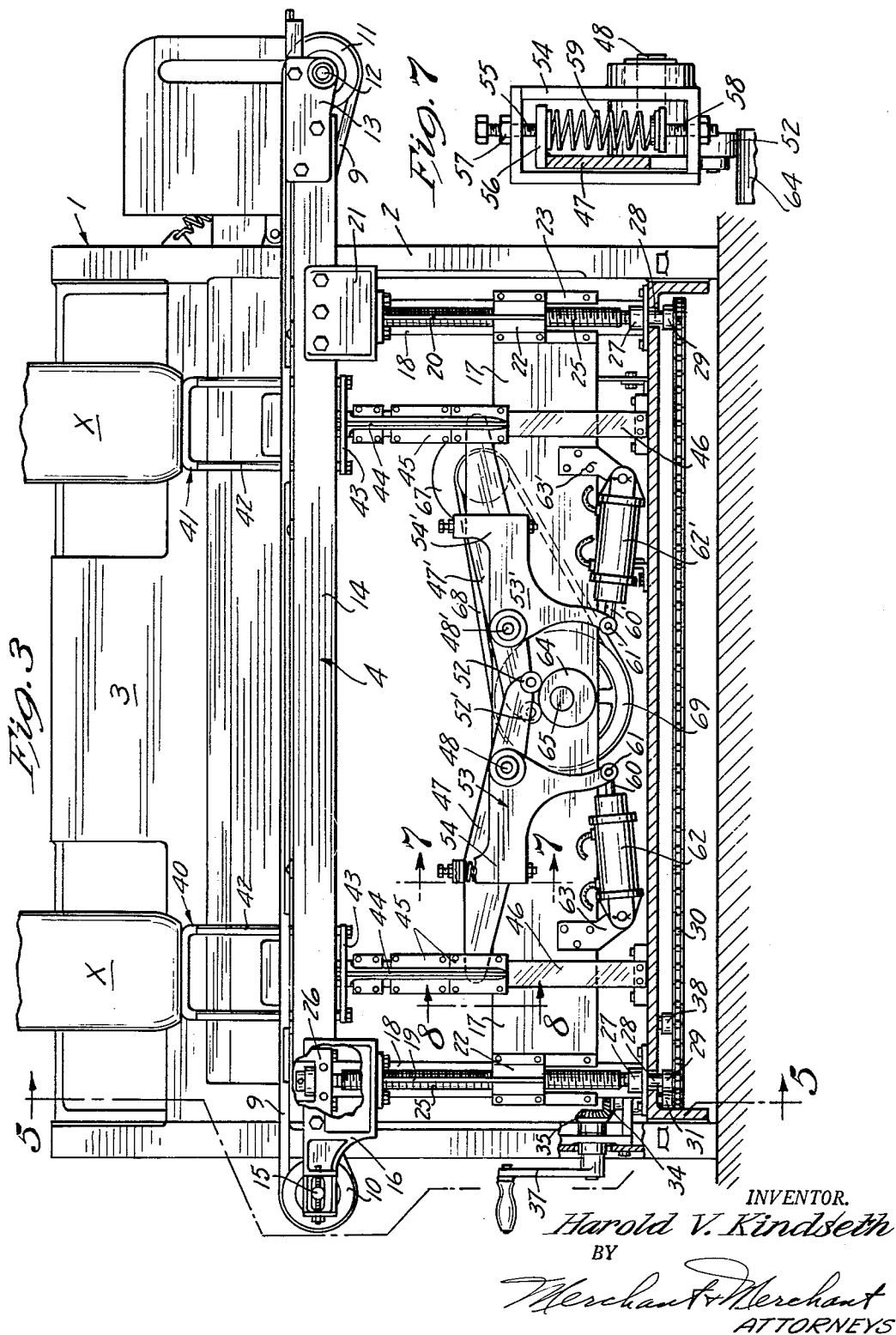
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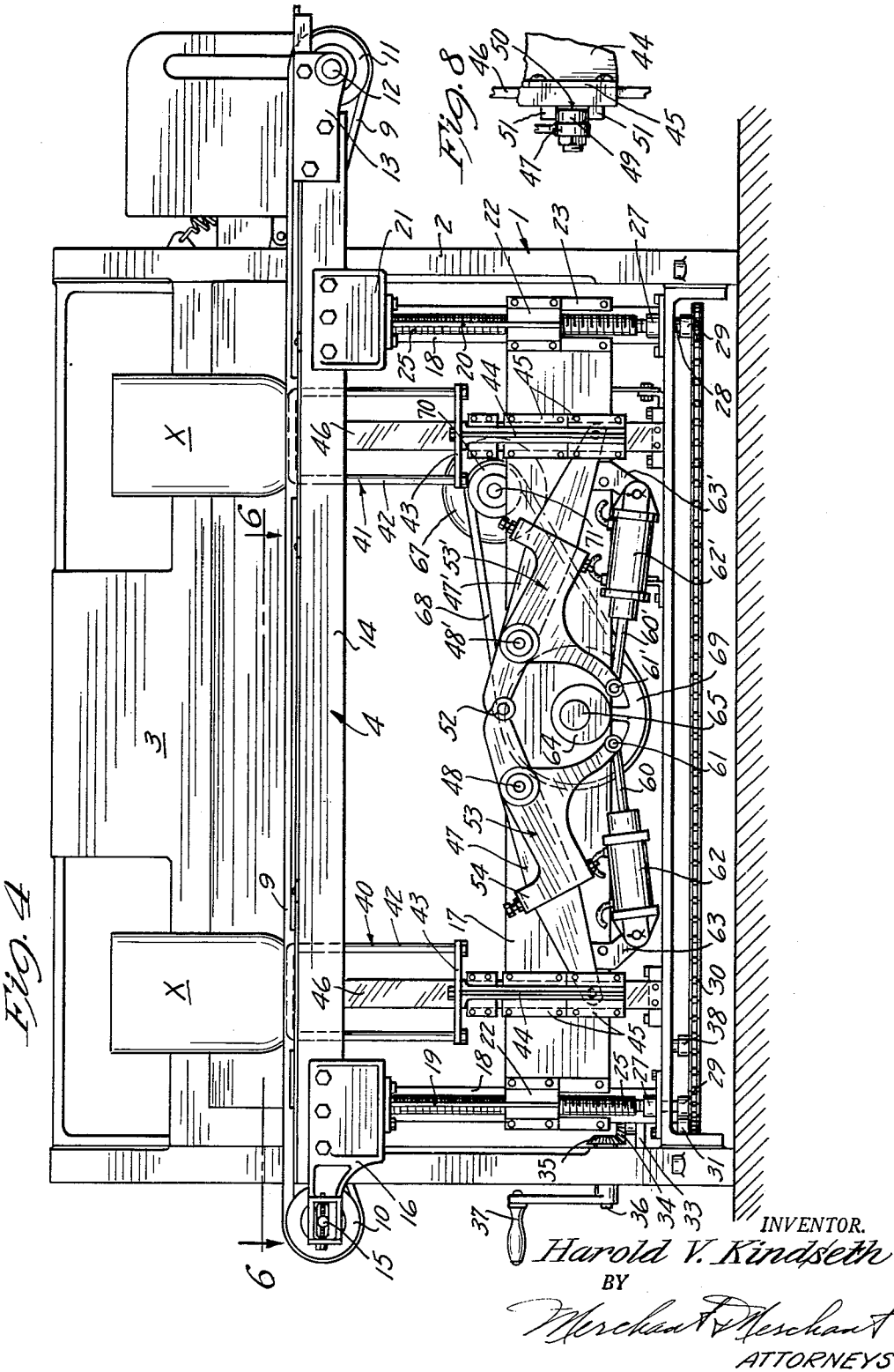
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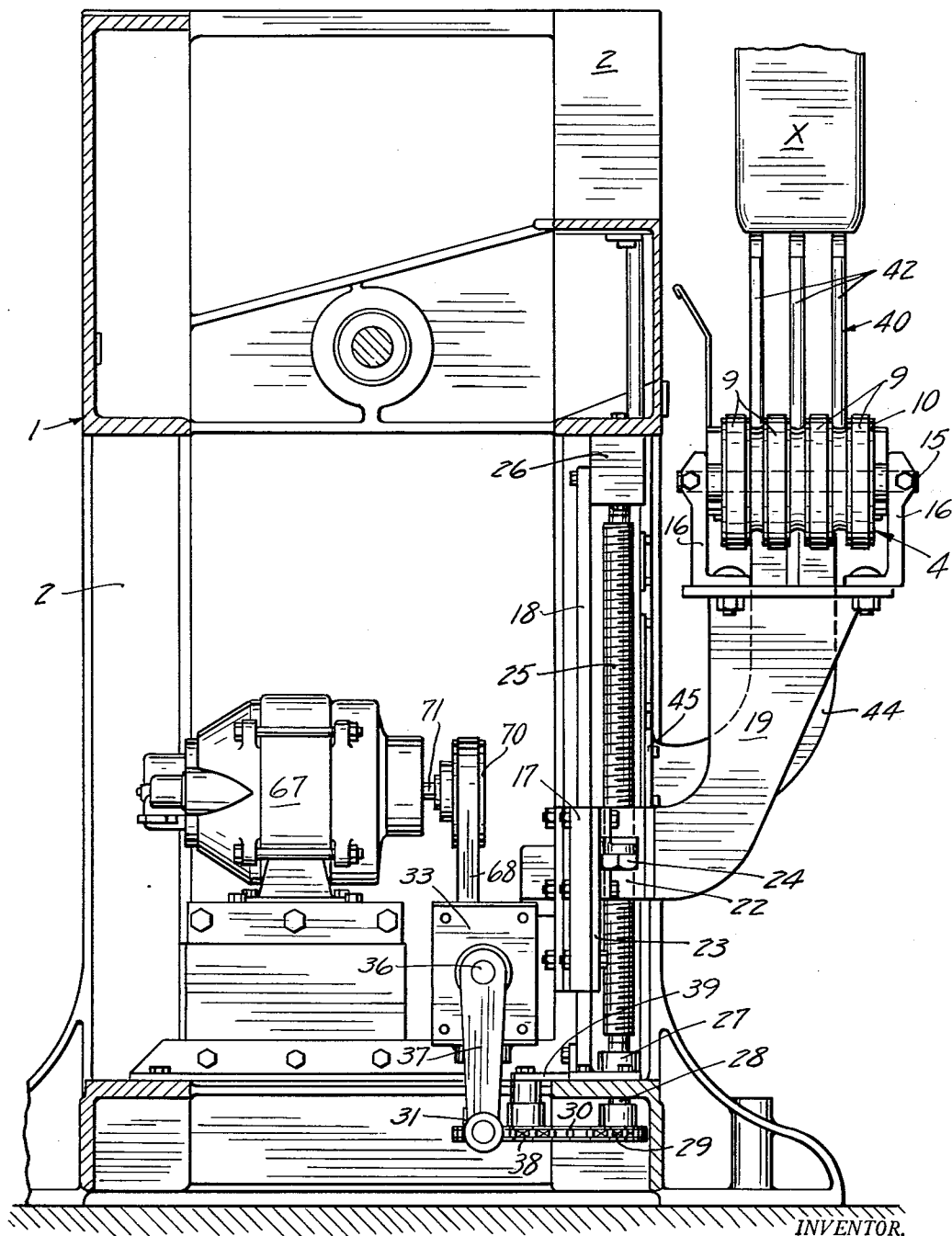
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5 Sheets-Sheet 4

Fig. 5



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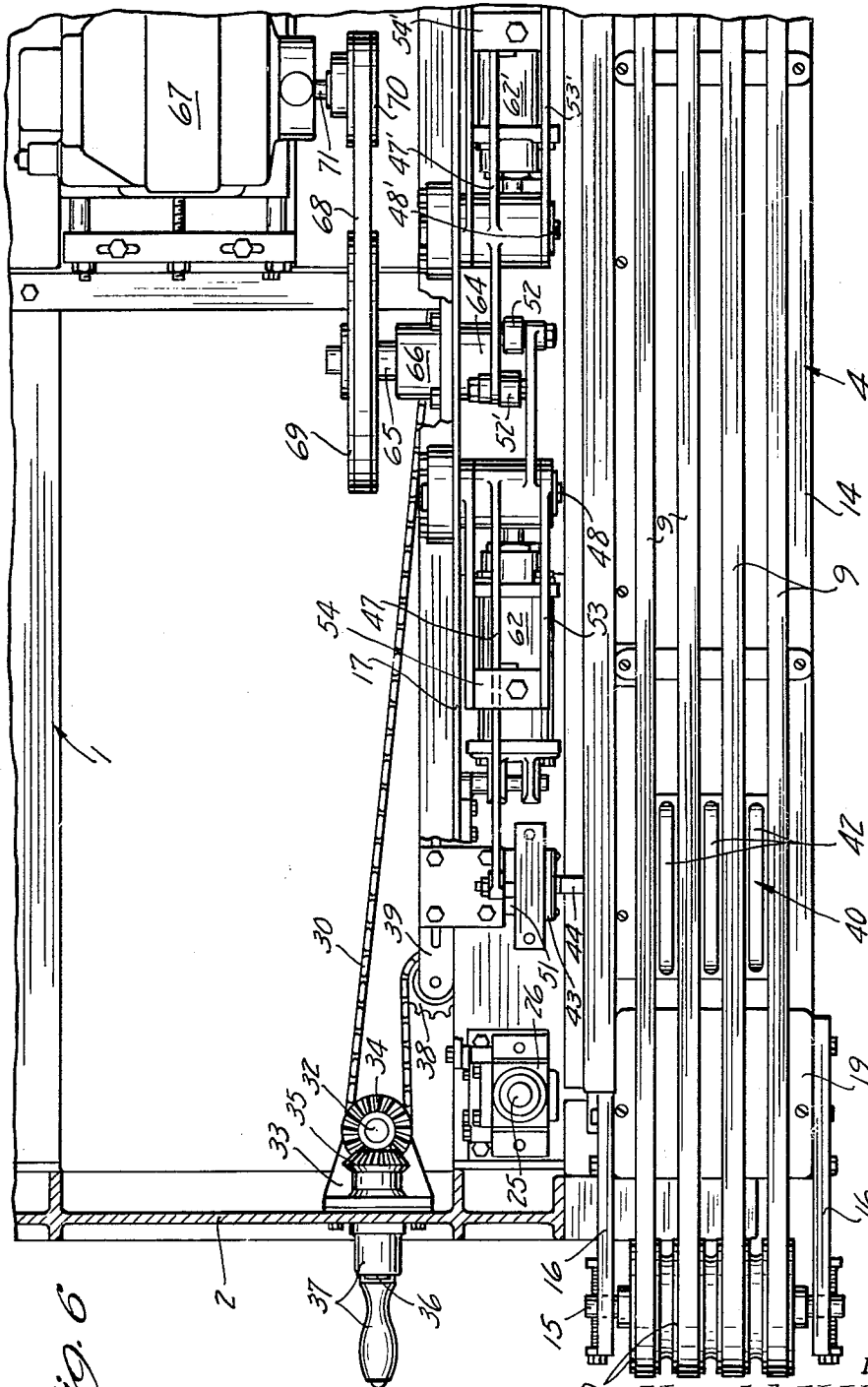
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5 Sheets-Sheet 5



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2,712,406

BAG SHAKING MECHANISM FOR BAG FILLING AND CONVEYING MACHINES

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Application July 12, 1952, Serial No. 298,561

11 Claims. (Cl. 226—55)

My invention relates generally to machinery for the handling of bags when the bags are being filled with bulk material.

More particularly, this invention is in the nature of a machine for shaking or otherwise agitating bags made from paper, cloth, or the like when said bags are filled with granular or powdered material, whereby to cause the fill to settle properly in the bag before closing and sealing the same.

My present invention is primarily intended for use in connection with well-known equipment utilized in the filling of bags with a predetermined quantity of granular or powdered bulk material such as flour, corn meal and the like. Bulk materials of this type being relatively light in weight and of rather fluffy character, do not automatically settle or pack down to occupy a minimum space at the moment of being poured into a bag or the like as do other materials such as, for example, sugar or rice. An important object of my invention is, therefore, the provision of means for engaging the bottoms of filled bags and for shaking or agitating the bags to settle the material thereon, and thereafter depositing the filled bags upon a conveyor.

Another object of my invention is the provision of a bag-engaging and shaking device which will engage the bottoms of the bags without touching the side walls thereof and, when in an inoperative position, avoiding contact with bags being carried on said conveyor. To this end, I provide a conveyor comprising a plurality of laterally spaced parallel conveyor belts and a bag-engaging platform comprising a plurality of platform sections vertically movable between the conveyor belts from an inoperative position below the level of the bag-engaging portions of the conveyor belts to an operative bag-supporting position above said level.

Another object of my invention is the provision of novel means for raising and lowering said bag-engaging and supporting platform.

Still another object of my invention is the provision of novel mechanism for imparting vibratory movements to said bag-supporting platform when the platform is moved to its operative position above the level of the conveyor belts.

Still another object of my invention is the provision of a common supporting frame for the conveyor, the bag-engaging platform, the platform raising and lowering means, and the means for imparting vibratory movements to the platform, and of novel means for raising and lowering said frame and the parts carried thereby.

Another object of the invention is the provision of a novel arrangement whereby a portion of the mechanism for raising and lowering the platform comprises part of the means for vibrating the platform, and in which the platform vibrating means has no material effect on the platform raising and lowering mechanism.

Another object of the invention is the provision of a machine as set forth which is relatively simple and inexpensive to manufacture, which is efficient in opera-

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tion, and which is rugged in construction and durable in use.

The above and still further highly important objects and advantages of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings, which illustrate the invention, and in which like characters indicate like parts throughout the several views:

Fig. 1 is a fragmentary view in front elevation of a bag-filling machine incorporating my invention;

Fig. 2 is a fragmentary view in end elevation of the machine of Fig. 1;

Fig. 3 is a fragmentary view in front elevation of a portion of the machine of Fig. 1, on an enlarged scale, some parts being broken away and some parts being shown in section;

Fig. 4 is a view corresponding to Fig. 3 but showing a different position of some of the parts;

Fig. 5 is an enlarged detail partly in end elevation and partly in section taken substantially on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged fragmentary view partly in plan and partly in section taken substantially on the line 6—6 of Fig. 4, some parts being removed;

Fig. 7, Sheet 2, is an enlarged fragmentary detail partly in end elevation and partly in section taken substantially on the line 7—7 of Fig. 3; and

Fig. 8, Sheet 3, is an enlarged fragmentary detail partly in end elevation and partly in section taken substantially on the line 8—8 of Fig. 3.

In the filling of bags with bulk material as above indicated, the opened empty bags are applied to the lower discharge end of a weighing and dispensing device which deposits a predetermined quantity of material into the bags while the bags are being supported thereunder by the bag-feeding and holding mechanism. Upon being filled, the bags are deposited upon a conveyor which carries the filled bags to a different station where the bags are closed and sealed. One of several conventional types of bag-filling devices is illustrated fragmentarily in Figs. 1 and 2 and is shown as comprising a supporting structure 1 including a generally rectangular base 2 and superstructure 3. An endless conveyor, indicated in its entirety by the numeral 4 and carried by the base 2 underlies the discharge portions 5 of a pair of hoppers 6 which form part of a conventional material-dispensing and bag-filling device. These devices are well known in the art and, not in themselves comprising the instant invention, it is not deemed necessary to show or describe the same in greater detail. However, it should be noted that the discharge portions 5 of the hoppers 6 are disposed in longitudinally spaced relationship relative to the underlying conveyor 4.

The base 2 and superstructure 3 are adapted to mount a pair of bag-feeding devices, one for each hopper 6 which feed successive bags x and hold said bags in position under the discharge portions 5 while material is deposited therein. One type of such bag-feeding and holding devices is fully disclosed in United States Letters Patent No. 2,343,879 to Daniel Belcher et al. and, for the sake of brevity, is not shown nor described herein except for bag-holding means 7 which are indicated diagrammatically in Figs. 1 and 2. Magazines for holding bags to be filled are indicated more or less diagrammatically at 8.

The conveyor 4 comprises a plurality, as shown, four, of laterally spaced parallel endless conveyor belts 9 which run over pulleys 10 and 11 at opposite ends of a conveyor, the pulleys 11 are mounted on a drive shaft 12 which is journaled in suitable bearing brackets 13 at one end of a conveyor frame 14, the shaft 12 being power-driven by suitable means, not shown. The pulleys

10 are journaled on a shaft 15 mounted in brackets 16 secured to the opposite end of the conveyor frame 14. The shaft 15 is movable longitudinally of the conveyor frame 14 whereby tension of the endless conveyor belts 9 may be adjusted.

The conveyor frame 14 is carried by a supporting frame or plate 17 which is mounted at its opposite ends for vertical sliding movements on a pair of vertically disposed guide bars 18 that are rigidly secured at their upper and lower ends to the base 2 of the supporting structure. A pair of legs 19 and 20 have their lower ends secured to the supporting frame 17, the upper end of the leg 19 being bolted or otherwise anchored to the brackets 16 and the upper end of the leg 20 being bolted or otherwise anchored to a bracket member 21 rigidly secured to the conveyor frame 14, see Figs. 3 and 4. As shown, the lower ends of the legs 19 and 20 are formed to provide retainer elements 22 which, as shown, are bolted to guide plates 23 that are secured to opposite end portions of the plate or frame 17 and which retain the plate 17 on the guide bars 18.

Contained in the retainer elements 22 are adjustment nuts 24 that have threaded engagement one each with each of a pair of adjusting screws 25. The screws 25 are located adjacent the guide bars 18 and are journaled at their opposite ends in suitable upper and lower bearings 26 and 27, respectively. The nuts 24 are held against rotary movement in the retainer elements 22 so that rotation of the threaded shafts 25 will cause the mounting frame 17 and the conveyor 4 supported thereby to be raised or lowered, for a purpose which will hereinafter become apparent.

The lower ends 28 of the threaded shafts 25 extend through their respective lower bearings 27 and have rigidly secured to their lower extended ends a pair of sprocket wheels 29 over which runs an endless link belt or chain 30. Said chain 30 runs over a third sprocket wheel 31 which is mounted fast on a shaft 32 journaled in a bracket 33 that is anchored to the base 2 of the supporting structure. A bevel gear 34 is secured fast to the upper end of the shaft 32 and has meshing engagement with a bevel gear 35 fast on a shaft 36 journaled in the bracket 33 and extending outwardly of the base 2. A hand crank 37 is secured to the outer end of the shaft 36, manipulation of which will cause the supporting frame 17 and parts carried thereby to be raised or lowered. It will be noted that the chain 30 also runs over an idler sprocket 38 which is carried by a bracket 39 adjustably secured to the base 2 so that the chain 30 may be maintained under proper tension. For receiving the filled bags from the bag holders 7, and lowering the same to the conveyor 4 for removal, I provide a pair of platforms 40 and 41 each comprising a plurality of inverted U-shaped platform elements 42 secured at their lower ends to mounting plates 43. With reference to Fig. 6, it will be seen that each of the platform elements 42 is disposed between a separate pair of the conveyor belts 9 so that the platform elements may move upwardly and downwardly therebetween without interfering with the operation of the conveyor. The mounting plates 43 are rigidly secured to the upper ends of supporting legs 44 which, at their lower ends, are provided with channel-shaped guide members 45 that are vertically slidable on vertically extended mounting bars 46 secured at their upper and lower ends to the base 2 of the supporting structure. The guide bars 46 permit movement of the platforms 40 and 41 in a vertical direction from a lower inoperative position below the level of the top of the conveyor belts 9, as indicated in Fig. 4, to an upper operative bag-receiving position above said level, as shown in Figs. 1 to 3, inclusive, and 5. As indicated in Fig. 4, when the platforms 40 and 41 are in their lower inoperative position, said platforms will be disposed sufficiently below the level of the conveyor belts 9 so that bags x carried by the conveyor will be allowed to pass freely thereover.

Raising and lowering movements are imparted to the platform 40 by power-operated means including a lever 47 pivotally mounted intermediate its ends to the supporting frame 17, by means of a shaft 48. The roller 49 is journaled to the outer end of the lever 47 and works in a channel 50, the sides of which are defined by a pair of laterally spaced parallel bars 51 rigidly secured to the guide member 45. A cam follower roller 52 is journaled on the inner end of the lever 47. A second lever in the nature of a bell crank 53 has its intermediate portion pivotally mounted on the shaft 48. One arm of the bell crank 53 is formed at its outer end to provide a yoke 54 which encompasses the lever 47 and has mounted thereon an adjustable abutment in the nature of a set-screw or the like 55 screw-threaded thereinto and engageable with an ear or lug 56 projecting laterally outwardly from the lever 47. As indicated in Fig. 7, the setscrew 55 is screw-threaded into the top portion of the yoke 54 and is equipped with a lock nut 57. A spring seat 58 is adjustably mounted in the bottom portion of the yoke 54 substantially in alignment with the abutment screw 55 and carries one end of a coil compression spring 59 interposed therebetween and the lug 56. The spring 59 exerts a yielding bias upon the lever 47 in the direction of engagement of the lug 56 thereon with the abutment screw 55. The opposite end portion of the bell crank 53 is pivotally mounted on the outer end of a piston-plunger rod 60, as indicated at 61. The plunger rod 60 is carried by a fluid pressure cylinder 62 that is pivoted at one end to a mounting bracket 63 rigidly secured to the supporting frame 17. As shown in Fig. 3, retracting movement of the plunger rod 60 with respect to the cylinder 62 places the spring 59 under sufficient bias to swing the lever 47 in a direction to cause upward movement of the platform 40 to its operative bag-receiving and supporting position; whereas extending movements of said plunger rod 60 outwardly of the fluid pressure cylinder 62 will cause swinging movement of the bell crank 53 and lever 47 in a direction to lower the platform 40 to its position of Fig. 4.

The platform 41 is movable between its upper and lower extreme positions in a manner identical to that in which the platform 40 is moved and by similar means including a lever 47' pivotally mounted intermediate its ends to a shaft 48' and connected at its outer end to the guide member 45 of the platform 41 by means, not shown, but which may be assumed to be identical with the coupling means associated with the lever 47 and as illustrated in Fig. 8. The lever 47' and the bell crank 53' are similar to the lever 47 and the bell crank 53 except that one is left hand and the other is right hand. The abutment and spring connections between the lever 47' and 53' are identical to that illustrated in Fig. 7 in connection with the lever 47 and bell crank 53. Power-operated means in the nature of a fluid pressure operated cylinder 62' and a plunger rod 60' pivotally secured to one arm of the bell crank 53', as indicated at 61', are identical with the fluid pressure cylinder 62 and parts associated therewith and are utilized to impart swinging movements to the lever 47' and bell crank 53'. With reference to Fig. 3 and 6, it will be seen that the cam follower roller 52' is journaled on the inner end of the lever 47'.

As above indicated, certain granular or powdered materials such as flour, corn meal and the like are of such fluffy character that they do not readily pack down in a bag or like container as do other materials such as sugar or rice. In order to wholly or at least partially cause the material to assume a packed down condition in the bag x immediately upon the filling thereof, I provide means for shaking or vibrating the bags x prior to their being lowered to the conveyor 4. Such means comprises a cam 64 mounted fast on a shaft 65 that is journaled in a bearing 66 mounted on the central portion of the mounting frame 17. The shaft 65 is driven by a

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motor 67 through an endless belt 68 running over a relatively large pulley 69 mounted fast on the shaft 65 and a relatively small pulley 70 rigidly secured to the shaft 71 of the motor 67. With reference to Fig. 3, it will be seen that when the platforms 40 and 41 are moved to their bag-engaging positions, the cam follower rollers 52 and 52' engage the cam 64. Rotation of the cam 64 causes the levers 47 and 47' to oscillate against bias of the springs 59, the oscillations or vibratory movements of said levers being transferred to the platforms 40 and 41. The vibratory or jogging movements of the platforms are in an upward direction against the bottoms of the bags *x* whereby to jar the contents of the bag into a settled or packed down condition at the time the bag is being filled. After a predetermined amount of vibration is imparted to the contents of the bags *x* by the platforms 40 and 41, the fluid pressure cylinders 62 are operated to cause the bags *x* to be lowered into engagement with the conveyor belts 9, whereupon said conveyor belts will transfer the filled bags to a predetermined station for further operations. Preferably, the platforms are lowered at a rate of speed which will cause the bags *x* to strike the conveyor belts 9 with sufficient impact to further settle the contents of the bags. Although control means for the various operating devices of this machine are not disclosed herein, the production of such control means is well within the skill of a person familiar with the art, and it may be assumed that the machine is timed so that, as soon as the bag *x* carried by the platform 40 has been conveyed beyond the platform 41, the said platforms will be elevated to engage a subsequent pair of bags being filled.

The mounting of the conveyor 4, the platforms 40 and 41 and the mechanisms associated therewith on the supporting frame 17 permits a simple vertical adjustment of the entire structure to accommodate bags of various heights and capacities, so that the machine is not limited in its use to the filling of bags with but a single predetermined quantity. In other words, a machine constructed in accordance with my invention is sufficiently flexible to accommodate relatively small bags and dispensing relatively small quantities therein as well as relatively large bags being filled with relatively large quantities, as the situation demands. With the above described structure, I have found that smaller bags than heretofore required could be used in the filling thereof with a predetermined quantity of material by reason of the fact that the material is packed within the bag at the moment of filling thereof and that subsequent vibrating or jogging required prior to the closing and sealing of the bag is dispensed with altogether or at least reduced to a minimum.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives set forth; and while I have shown and described a preferred embodiment of my novel structure, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In a machine of the class described, an endless conveyor comprising a plurality of laterally spaced conveyor belts for transporting open bags, means for filling said bags with bulk material, a bag-shaking platform underlying said bag-filling means and disposed between adjacent conveyor belts, said platform being engageable with the bottom of a bag, means mounting said platform for vertical movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and operative bag-supporting position above said level at which position the bags are filled by the filling means, power-operated mechanism for raising and lowering said platform and including a lever, and power-operated means for imparting vibratory movements to said platform when the platform is moved to its operative bag-supporting position, said last-mentioned means including a vibration producing member positioned in

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spaced relation to said lever when the platform is moved to its lower inoperative position, said lever being moved into operative engagement with said member when the platform is moved to its upper bag supporting position the lever transferring said vibratory movements to the platform.

2. In a machine of the class described, a frame structure, an endless conveyor carried by the frame structure and comprising a plurality of laterally spaced parallel conveyor belts for transporting filled bags, a bag-shaking platform disposed between adjacent conveyor belts and engageable with the bottom of a bag, means mounting said platform for movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and an operative bag-supporting position above said level, power-operated mechanism for raising and lowering said platform, said mechanism comprising first and second levers pivotally connected to the frame, said first lever being operatively connected to said platform, a yieldable connection between said levers biasing one thereof in one direction of movement relative to that of the other thereof, and a power-operated element coupled to said second lever for moving the same in a direction to increase the bias of said yieldable connection against said first lever whereby to move said first lever in a platform raising direction, and power-operated mechanism for imparting vibratory movements to said first lever independently of said second lever, said first lever transferring said vibratory movements to the platform.

3. The structure defined in claim 2 in which said power-operated mechanism for imparting vibratory movements to the first lever includes a cam element engageable with said first lever when said platform is moved to its operative bag-supporting position.

4. The structure defined in claim 2 in which said second lever is in the nature of a bell crank and in which said first and second levers are connected to said frame for pivotal movements about a common axis.

5. In a machine of the class described, a frame structure, an endless conveyor carried by the frame structure and comprising a plurality of laterally spaced parallel conveyor belts for transporting filled bags, a bag-shaking platform disposed between adjacent conveyor belts and engageable with the bottom of a bag, means mounting said platform for movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and an operative bag-supporting position above said level, power-operated mechanism for raising and lowering said platform, said mechanism comprising a lever pivotally secured to said frame and operatively connected to said platform, a bell crank connected at its intermediate portion to said frame for pivotal movements about a common axis with the pivotal connection of said lever to the frame, abutment means on one end portion of said bell crank engageable with said lever, yielding means biasing said lever toward engagement with said abutment means, and a power-operated element coupled to the other end of said bell crank and moving the same in one direction to increase the bias of said yielding means sufficiently to impart platform raising movements to said lever, and power-operated mechanism including said yielding means for imparting vibratory movements to said lever independently of said bell crank, said vibratory movements being transferred by said lever to the platform.

6. In a machine of the class described, an endless conveyor comprising a plurality of laterally spaced parallel conveyor belts for transporting open bags, means for filling said bags with bulk material, a bag-shaking platform underlying said bag-filling means and comprising a plurality of laterally spaced cooperating platform sections one each disposed between a different pair of said conveyor belts and being engageable with the bottom of a bag, means mounting said platform for vertical

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movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and an operative bag-supporting position above said level at which latter position the bags are filled by said filling means, power-operated mechanism for raising and lowering said platform, said mechanism comprising a lever pivotally secured to said frame and operatively connected to said platform, a bell crank connected at its intermediate portion to said frame for pivotal movements about a common axis with the pivotal connection of said lever to the frame, abutment means on one end portion of said bell crank engageable with said lever, yielding means biasing said lever toward engagement with said abutment means, and a power-operated element coupled to the other end of said bell crank and moving the same in one direction to increase the bias of said yielding means sufficiently to impart platform raising movements to said lever, and power-operated mechanism including said yielding means for imparting vibratory movements to said lever independently of said bell crank, said vibratory movements being transferred by said lever to the platform.

7. In a machine of the class described, an endless conveyor comprising a plurality of laterally spaced parallel conveyor belts for transporting open bags, means for filling said bags with bulk material, said means including a pair of discharge spouts in spaced relation longitudinally of said conveyor, a pair of bag-shaking platforms one each underlying each of said discharge spouts and each comprising a plurality of laterally spaced cooperating platform sections one each disposed between a different pair of said conveyor belts and being engageable with the bottom of a bag, means mounting said platforms for independent vertical movements between inoperative positions below the level of the bag-engaging portions of said conveyor belts and operative bag-supporting positions above said level at which latter positions the mouths of the bags on said platforms are positioned closely adjacent said discharge spouts, independent power-operated mechanism for raising and lowering each of said platforms, each of said mechanisms including a lever, and power-operated means for imparting vibratory movements to said platforms when the platforms are moved to their operative bag-supporting positions, said last-mentioned means including a single vibration producing member positioned in spaced relation to both of said levers when the platforms are in their lower inoperative positions, said levers being independently moved into operative engagement with said member when the platforms are moved to their upper bag supporting positions, said levers transferring the vibratory movements to their respective platforms.

8. In a machine of the class described, a supporting structure, bulk material dispensing and bag-filling means on said supporting structure, a frame, means mounting said frame on said supporting structure for vertical movements toward and away from the bag-filling means, mechanism for imparting raising and lowering movements to said frame, an endless conveyor mounted on said frame and comprising a plurality of spaced parallel conveyor belts for transporting open bags, a bag-shaking platform disposed between adjacent conveyor belts and engageable with the bottom of a bag, means mounting said platform on said frame for movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and an operative bag-supporting position above said level wherein the mouth of a bag supported thereby is positioned closely adjacent the bag-filling means, power-operated mechanism carried by said frame for raising and lowering said platform, said mechanism comprising first and second levers pivotally connected to the frame, said first lever being operatively connected to said platform, a yieldable connection between said levers biasing one thereof in one direction of movement relative to that of the other there-

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of, and a power-operated element coupled to said second lever for moving the same in a direction to increase the bias of said yieldable connection against said first lever whereby to move said first lever in a platform raising direction, and power-operated means carried by said frame for imparting vibratory movements to said first lever independently of said second lever, said first lever transferring said vibratory movements to the platform.

9. The structure defined in claim 8 in which said power-operated means for imparting vibratory movements to the first lever includes a cam element engageable with said first lever when said platform is moved to its operative bag-supporting position.

10. In a machine of the class described, a supporting structure, bulk material dispensing and bag-filling means on said supporting structure, a frame, means mounting said frame on said supporting structure for vertical movements toward and away from the bag-filling means, means for imparting raising and lowering movements to said frame, an endless conveyor mounted on said frame and comprising a plurality of laterally spaced parallel conveyor belts for transporting open bags, a bag-shaking platform disposed between adjacent conveyor belts and engageable with the bottom of a bag, means mounting said platform on the frame for movements between an inoperative position below the level of the bag-engaging portions of said conveyor belts and an operative bag-supporting position above said level wherein the mouth of the bag supported thereby is positioned closely adjacent the bag-filling means, power-operated mechanism carried by said frame for raising and lowering the platform, said mechanism comprising a lever pivotally secured to said frame and operatively connected to the platform, a bell crank connected at its intermediate portion to the frame for pivotal movements about a common axis with the pivotal connection to said lever to the frame, abutment means on one end portion of said bell crank engageable with said lever, yielding means biasing said lever toward engagement with said abutment means, and a power-operated element coupled to the other end of said bell crank and moving the same in one direction to increase the bias of said yielding means sufficiently to impart platform raising movements to the lever, and power-operated mechanism including said yielding means and imparting vibratory movements to said lever independently of said bell crank, said vibratory movements being transferred by said lever to the platform.

11. In a machine of the class described, a supporting structure, a frame, means mounting the frame on the supporting structure for vertical movements relative thereto, an endless conveyor mounted on said frame and comprising a plurality of laterally spaced parallel conveyor belts for transporting open bags, bulk material dispensing and bag-filling means on said supporting structure, said last-mentioned means including a pair of discharge spouts in spaced relation longitudinally of said conveyor and overlying said conveyor belts, a pair of bag-shaking platforms one each underlying each of said discharge spouts and each comprising a plurality of laterally spaced cooperating platform sections each disposed between a different pair of said conveyor belts and each being engageable with the bottom of a bag, means mounting said platforms for independent vertical movements between inoperative positions below the level of the bag-engaging portions of said conveyor belts and operative bag-supporting positions above said level at which latter positions the mouths of the bags on said platforms are positioned closely adjacent said discharge spouts, independent power-operated mechanisms for raising and lowering each of said platforms, each of said mechanisms comprising a lever pivotally secured to said frame and operatively connected to a different one of the said platforms, a bell crank connected at an intermediate portion to said frame for pivotal movements about a common axis with the pivotal connection of an associated lever to the frame, abutment

means on one end portion of each of said bell cranks engageable one each with one of said levers, yielding means biasing each of said levers toward engagement with their respective abutment means, and a pair of power-operated elements coupled one each to the other end of each of said bell cranks and moving the same in one direction to increase the bias of the yielding means associated therewith to impart independent platform raising movements to said levers, and power-operated mechanism including said yielding means for imparting vibratory movements to said levers independently of their re-

spective bell cranks, said vibratory movements being transferred by said levers to their respective platforms.

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