US 20140105683A1

(19) **United States**

(12) **Patent Application Publication**

McKinnon

(10) **Pub. No.: US 2014/0105683 A1**

(43) **Pub. Date: Apr. 17, 2014**

(54) **MULTIPLE-AUGER CURB FORMING AND EXTRUDING APPARATUS**

(71) Applicant: **Paul G. McKinnon**, Brigham City, UT (US)

(72) Inventor: **Paul G. McKinnon**, Brigham City, UT (US)

(21) Appl. No.: **13/649,903**

(22) Filed: **Oct. 11, 2012**

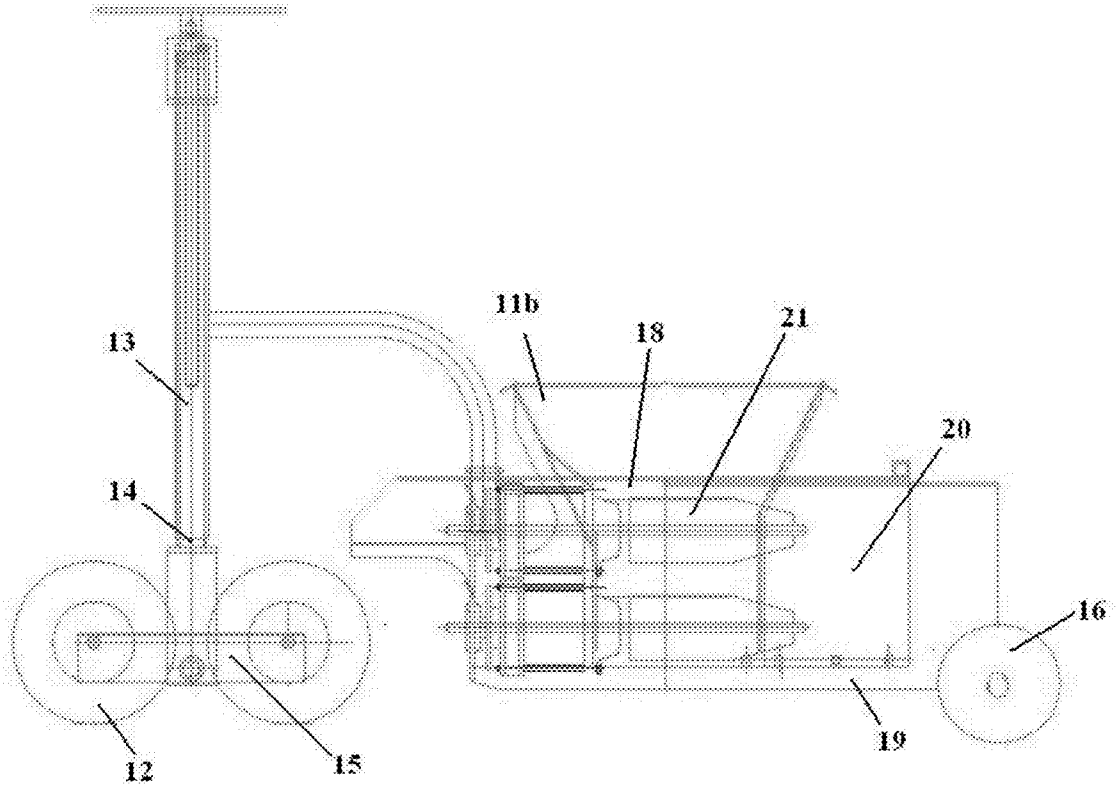
Publication Classification

(51) **Int. Cl.**
E01C 19/48 (2006.01)

(52) **U.S. Cl.**
CPC ***E01C 19/4893*** (2013.01)
USPC **404/97**

(57) **ABSTRACT**

A manually operable and steerable curb extrusion device for extruding curb, barrier, wall, gutter or the like from concrete, cement or some other moldable building material. The curb extrusion device has a segmented vibrating hopper into which building materials are placed to fall onto a plurality of tapered counter rotating vibrating augers which compact and force the building material through an extrusion mold where it is shaped before extrusion; the number of augers adjustable and selected to provide the amount of building material required to be extruded.



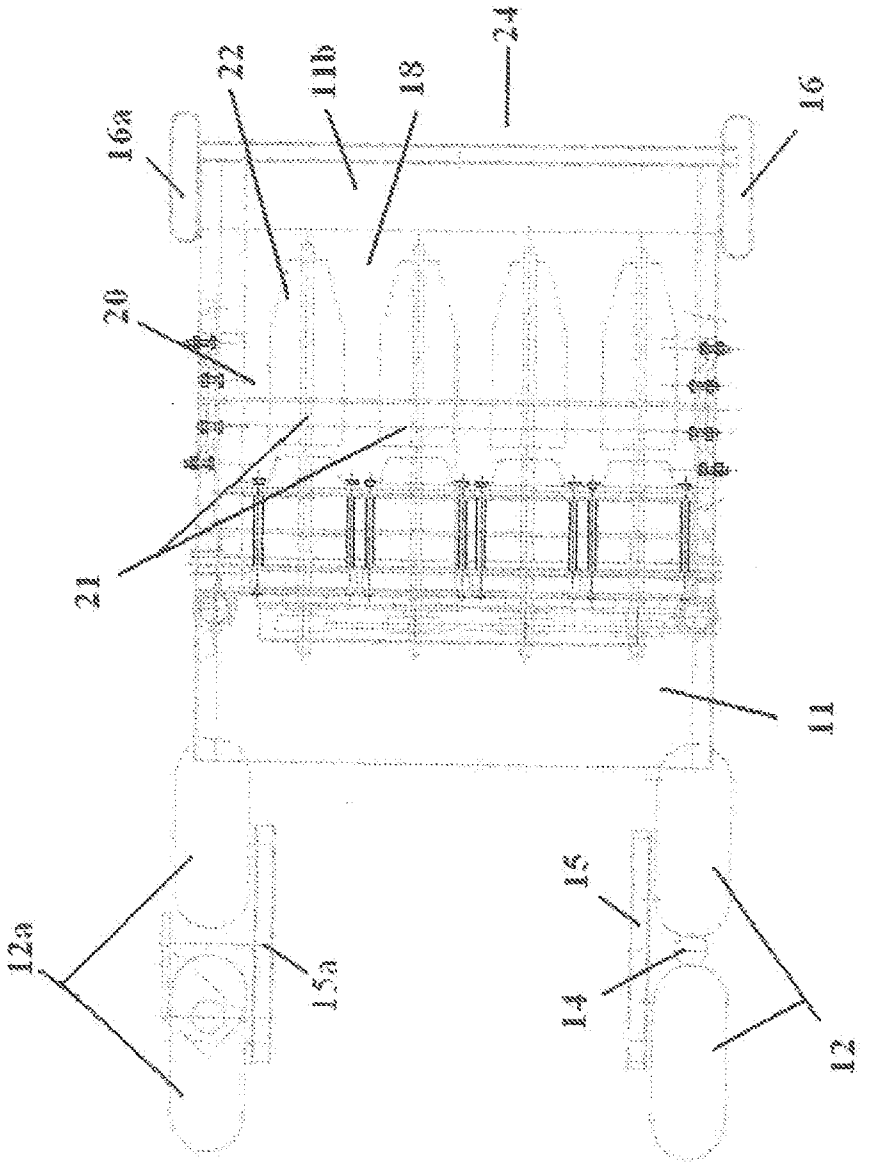


FIG. 1

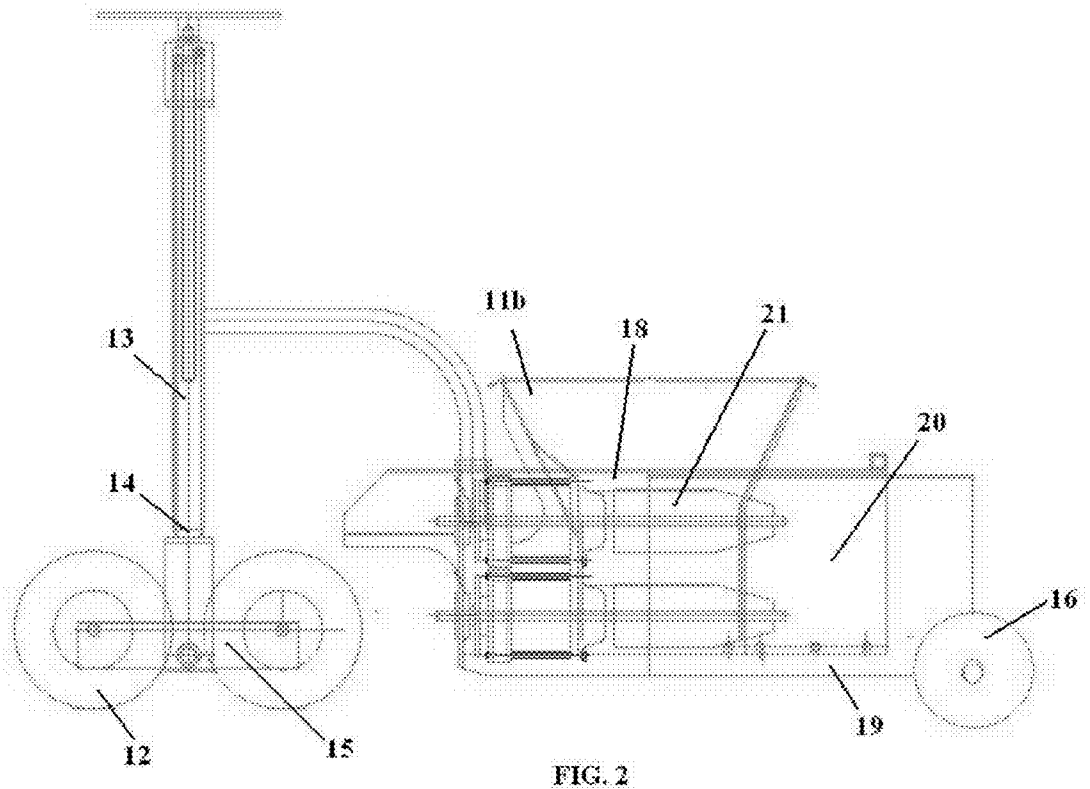


FIG. 2

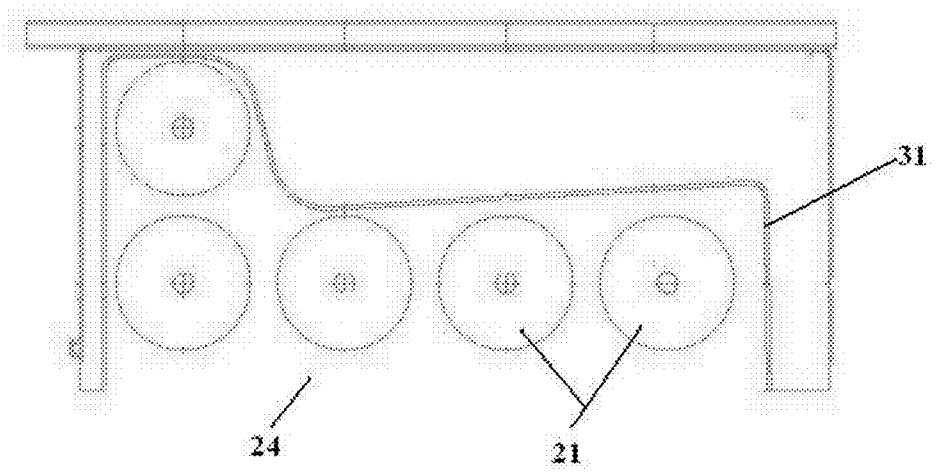


FIG. 3

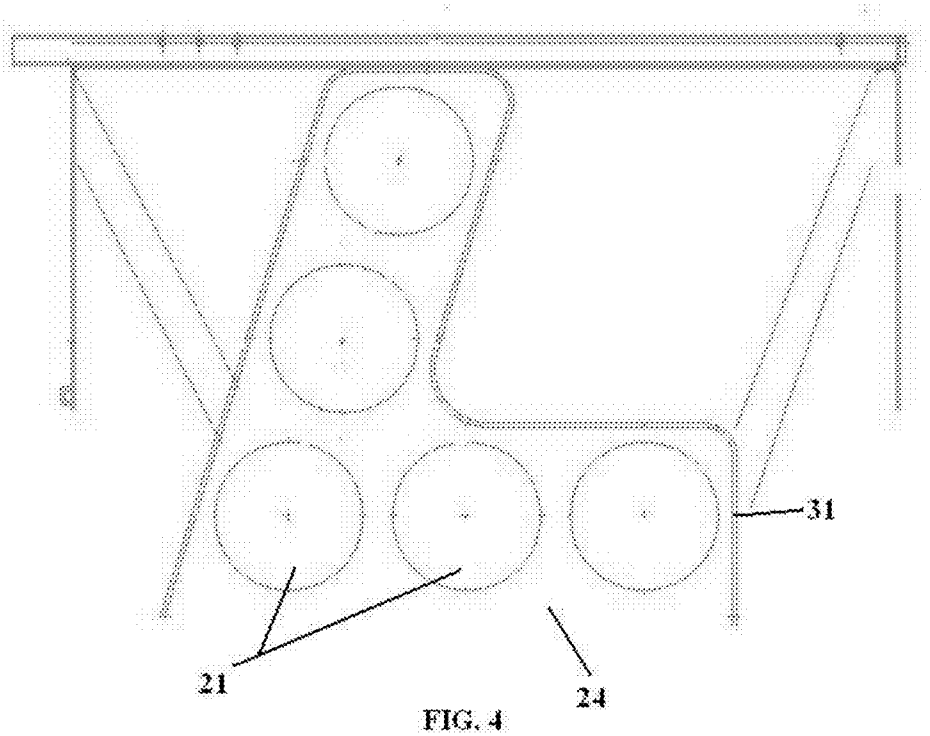


FIG. 4

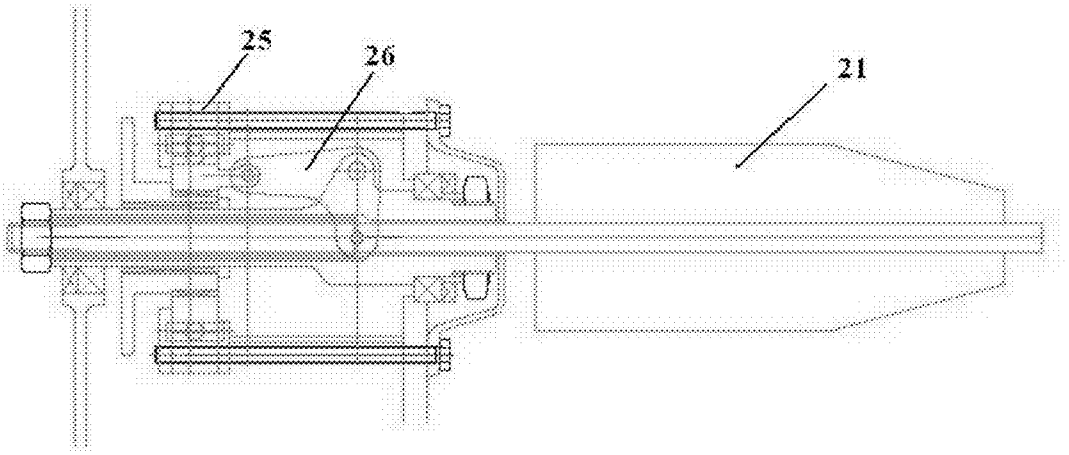


FIG. 5

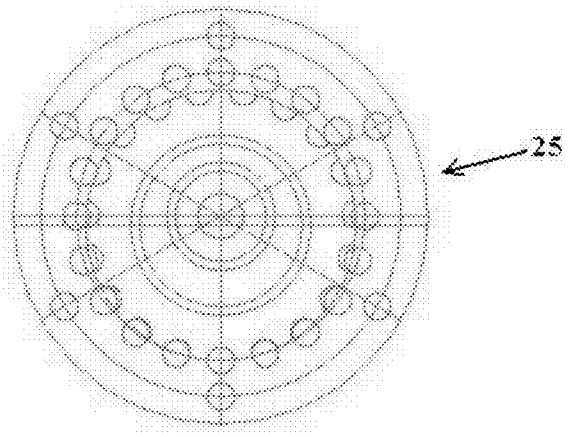


FIG. 6

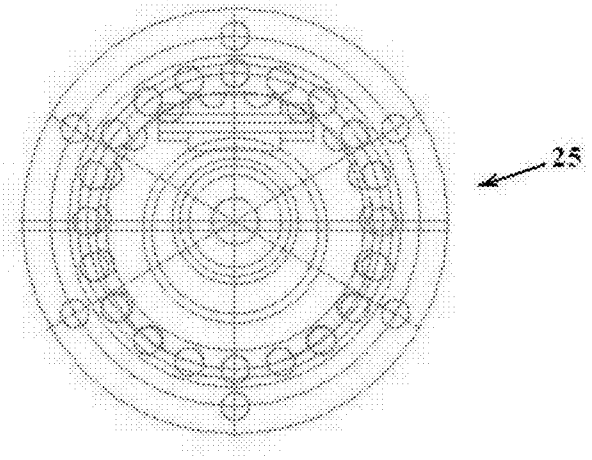


FIG. 7

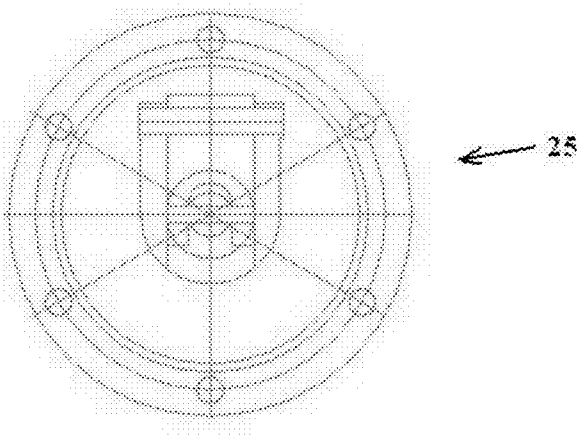


FIG. 8

MULTIPLE-AUGER CURB FORMING AND EXTRUDING APPARATUS

RELATED APPLICATIONS

[0001] This application is a continuation-in-part application of Provisional Patent Application 61/627,574 filed Oct. 14, 2011 entitled "Multiple Auger Curb Forming and Extruding Device"

BACKGROUND OF THE INVENTION

[0002] 1. Field

[0003] This invention relates to concrete curb forming and extruding apparatus. More particularly, it relates to a concrete curb forming and extruding apparatus with 1) a frame with steering castering wheels and adjustment locks, 2) a slip form forming the curb cross-section with a straight-up side for getting close to vertical surfaces, 3) an extruder having a variable capacity hopper with a flexible liner, and 4) a plurality of augers rotating in opposite directions beneath the hopper in varying orientations to compact the concrete forcing it through the slip form via a flexible member between the compaction chamber and the slip form to isolate the vibration. The number of augers is variable and selected to extrude the amount of material required to pass through the slip form extrusion mold

[0004] 2. State of the Art

[0005] Present concrete curb forming and extruding machines have a compaction member, such as a reciprocating ram or an auger to force concrete material into a slip form forming a running curb. The concrete material is usually of a dry consistency to hold the form of the curb after being extruded from the machine. The dry consistencies of the material cause it to bridge from side to side in the hopper and not fall through into the compaction chamber. It is common practice to have two men run the machine-one to steer and control the machine while the other shovels small amounts of material into and through the hopper.

[0006] The ram type of curb forming and extruding machines use a gear box to reduce the speed with a crank arm connected to a flat faced member, which is pushed by the crank through the compaction chamber or housing displacing the curbing material through the slip form to form the curb. May, U.S. Pat. No. 4,566,823 issued Jan. 28, 1986 is an example of a manually operable curb extrusion device with interchangeable molds and compacting members wherein building material is placed in a receiving hopper and falls into a compacting chamber where a power driven and reciprocating compacting member compacts the material into the extrusion mold where it is shaped and extruded. The curb extrusion device is manually directed or steered along the desired course via an adjustable steering mechanism, and has a hopper with one straight upright side, screw-on molds, and adjustable legs connected to the wheels. Eggleton, U.S. Pat. No. 4,310,293 issued Jan. 12, 1982 is another example of a ram driven concrete curb molding apparatus.

[0007] Ram machines have been the most popular because of their positive travel. However, straight compressive forces are not conducive to better compaction. Varying sizes of particles resist compaction and stack one against another, leaving voids or cavities between the particles. Voids cause porous concrete with diminished compressive test strengths. The ram of the ram curb-forming machine also picks up some of the concrete material on the return backstroke, which is then deposited as a trail of material down the sides of the curb as waste. This slag has to be cleaned up or pressed down out of sight and buried. Ram machines, as the speed of the ram is increased, tend to jump ahead and then coast forward at the end of the stroke, which pulls cracks in the top surface of the curb. Loose parts on the machine, such as wheels, can also leave marks in the extruded curb.

[0008] Auger type curb forming machines use an auger to move material through a compaction chamber into the slip form, are not as positive as the ram machines. They will not travel as effectively up and down hills. The auger applies pressure for compaction and forces material through the mold rearward, thereby propelling the machine forward. If the material becomes captive and turns with the auger, pressure is required to propel the machine. The compacting chamber, thus filled, causes wear and power consumption with little forward propulsion pressure being created. McKinnon, U.S. Pat. No. 5,354,189 issued Oct. 11, 1994 discloses a concrete curb forming and extruding apparatus with wheel adjustment locks, a slip form for the curb cross-section, and a straight-up side for getting close to vertical surfaces, with an extruder having a hopper with a flexible liner, a dual augers rotating in opposite directions to compact the concrete, and a flexible member between the compaction chamber and the slip form to isolate the vibration. This auger is very efficient, but has limited fixed capacity for forming curbing so it is not capable of extruding sidewalks, walls, and other larger jobs.

[0009] Smith, U.S. Pat. No. 3,137,220 issued Jun. 16, 1964 discloses a curb-laying machine with a number of oppositely rotating augurs to extrude the concrete for forming curbs. Parrish et al, U.S. Pat. No. 5,018,955 issued May 28, 1991 utilizes a single auger to extrude the concrete and features a slip-on curb form with various adjustment options.

[0010] Other examples of curb forming machines employing an auger are: Bunn, U.S. Pat. No. 4,548,565 issued Oct. 22, 1985, Coho. Jr. et al, U.S. Pat. No. 3,915,584 issued Oct. 12, 1975, W. E. Caufield et al, U.S. Pat. No. 2,818,790 issued Jan. 7, 1958. None of these devices avoids the augering captive material problem.

[0011] Cited for general interest are: Aparicio, U.S. Pat. No. 3,915,583 issued Oct. 28, 1975 disclosing a paving machine slip form, Baucum. U.S. Pat. No. 4,298,293 issued Nov. 3, 1981 disclosing a dragline operated slip form curb forming machine, and Leone, U.S. Pat. No. 4,984,932 issued Jan. 15, 1991 disclosing an apparatus for continuous formation of concrete curbs via the raising and lowering of the molding to form thresholds for driveways, and intermediate tapering sections for transitions between full height curbs and thresholds.

[0012] The present invention overcomes above problems and provides an improved curb forming and extruding machine with a constant even flow of material for a wide range of different jobs. It also has variable capacity to not only form small jobs such as curbs, but also larger jobs such as sidewalks, and walls having strong compressive strength with a smooth finish by adjusting the number of augers for a given job.

SUMMARY OF THE INVENTION

[0013] The present invention is directed to an improved manually maneuverable curb forming extruder propelled apparatus to form concrete, cementitious and other similar plastic building materials into linear curbs, sidewalks, walls, and roadways. It comprises a chassis frame and a dividable

expandable/contractible hopper with walls defining a dividable compaction chamber. The compaction chamber has a rear opening through which is rearwardly directed the formed building material; thereby depositing against the ground a formed curb which simultaneously propels the apparatus forward. Two steering and castering wheels are pivotally attached to both sides of the front of the chassis frame via swinging arms which allow the wheels to be adjusted from side to side for steering to avoid obstacles in the path of the apparatus. Rear wheels are attached to the back of the chassis frame to allow the apparatus to back up without having to deal with pivoting wheels locking up and impeding progress. Jack leveling means are generally associated with the swinging arms to adjust the height and level of the chassis frame so that the curb is formed to meet the needs of the user. Preferably, quick releasing arm locks are associated with the wheels to wedge the swinging arms into the desired position to prevent play or looseness.

[0014] Part of the chassis frame defines the lower segment of the dividable flexible hopper having a bottom outlet. An upper vibrating segment of the flexible hopper is associated with the lower segment, and has a feed opening structured to receive, hold, and gravity feed building material into and through the bottom outlet. The lower hopper segment is also dividable and surrounds a building material compaction assembly sized to accommodate a set of a plurality of counter rotating augers rotatably mounted to the chassis frame to receive building material from the hopper and force it rearward into and through the dividable compaction chamber. The set of augers are removably mounted allowing them to be removed as required for smaller jobs to provide the flow of material required to pass through and fill a removable slip form described below without creating voids.

[0015] Preferably the hopper has one straight up vertical side above the compaction chamber making it easier for the operator to see and get close to vertical surfaces next to the path of the new curb. The hopper also includes a flexible rubber or plastic liner in the hopper to flexibly seal the segments of the hopper and prevent the cementitious building material from sticking in the hopper. A vertical cross sectional partition fits within the hopper and may be moved to reduce its capacity. This sectional partition extends to the top of the building material compaction assembly above the augers to direct building material only through the number of augers required for a given job.

[0016] Vibration means are associated with the set of counter rotating augers and the lower segment of the expandable/contractible hopper such that the augers and the lower segment of the hopper vibrate in opposite directions, thereby alternatively squeezing and then separating to drop the building material to continuously feed said building material into the compaction chamber by the augers to prevent bridging in the hopper and provide a more compacted building material. By vibrating the augers and compaction chamber, a more compact material is provided for producing a stronger concrete requiring less finishing because of fewer voids. It also insures that the compaction chamber is always filled, minimizing power consumption and maintaining propulsion pressure.

[0017] Preferred vibration means constitute the eccentric gear of an eccentric dual stepping gear roller bearing system, such as that described in Ser. No. 12/804,286 filed Jul. 19, 2010 to simultaneously drive and vibrate the auger drive shaft. This eccentric dual stepping gear roller bearing system is not only efficient, but provides a number of gearing ratios suitable for different applications.

[0018] Also, a drier, better hydrated concrete material may be used to better hold the form of the curb, sidewalk, wall, etc. after being extruded from the machine. The number of men required to operate the machine varies based on the size of the job. For example, for smaller jobs using curbing machines with fewer augers operated by one man once the hopper is filled. For larger jobs, the number of men increases and usually involves one to steer and control the machine, while the other shovels small amounts of material into and through the hopper.

[0019] A removable slip form mold with open forward and rearward ends and an open bottom is positioned in communication with the compaction chamber rear opening to receive and sectionally form the building material into a continuous curb, sidewalk or wall form. Preferably, the slip form is releasably attached via a spring bar retainer so that other interchangeable slip forms can be readily inserted to provide a design and width of the desired cross-section. Thus, a removable slip form is first selected providing the cross-sectional of the curbing, sidewalk, or wall. Then the number of augers is selected to provide the continuous building material feed for filling the form, and any excess augers removed from the set of augers. The sectional partition is then moved in the hopper above the augers to only direct material from the hopper onto the remaining augers of the set required for continuously feeding the building material through the form.

[0020] Where a patterned or textured finish is desired, a rolling pattern member may be mounted to the chassis frame and positioned after the rear opening of the slip form to impress onto the surface of the newly formed curb, sidewalk, wall, etc. a desired pattern finish.

[0021] A drive motor, such as an electrical or internal combustion engine, is operably associated with the rotating augers and vibration means to vibrate and turn the augers. This is accomplished by including with the drive motor a gear box mounted to the chassis frame. The walls of the gear box are then structured to form the lower segment of the hopper. An eccentric bearing is mounted and connected to the augers via an input shaft geared to run faster than the augers; thereby shaking the hopper housing in opposition to the compaction assembly.

[0022] To relieve stack up and binding and provide a more even continuous flow of the cementitious building material passing through the slip form for shaping into a continuous curb, a flexible transition member with open ends is mounted in communication between the compaction chamber rear opening and the forward opening of the slip form. This flexible member contracts and expands to stabilize the pressure buildup in the apparatus; thereby providing a more uniform pressure casting material to provide better curb forming, thereby minimizing the loss of excess slag extruded material while minimizing finishing time.

[0023] Where reinforcing bars or rods are required, a guide with an opening sized to accommodate the rods is attached to the chassis frame beneath the apparatus. In addition, the transition member is generally formed of two hinged half sections of a pipe forming an open slot directed toward the ground which passes over the rod or rods; thereby forming a curb, walk or wall about the reinforcing bars or rods.

[0024] The present invention therefore provides an efficient curb, sidewalk, and wall forming machine for a wide variety

of different sized jobs, which minimizes waste, and provides exceptional compacted concrete curbs, which require minimal finishing.

DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** is a top view of a preferred embodiment of the invention.

[0026] FIG. **2** is a side view of the preferred embodiment shown in FIG. **1**.

[0027] FIG. **3** is a cross section view of a removabl3e slip form with aligned augers.

[0028] FIG. **4** is a side cross-sectional view of the embodiment shown in FIG. **1**.

[0029] FIG. **5** is a top view of the set of multiple augers of the embodiment shown in FIG. **1**.

[0030] FIG. **5** illustrates the manner in which the augers are associated with a stepping gear drive.

[0031] FIG. **6** is a cross-sectional view of the stepping gear drive shown in FIG. **5**.

[0032] FIG. **7** is another cross-sectional view of the stepping gear drive shown in FIG. **5**.

[0033] FIG. **8** is another cross-sectional view of the stepping gear drive shown in FIG. **5**.

[0034] FIG. **9** is a cross-sectional view of a motor driven multiple auger belt drive.

[0035] FIG. **10** is a top view of the auger drive gearing of the embodiment shown in FIG. **9**.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0036] FIG. **1** is a top view of a preferred embodiment of the multiple auger curb forming and extruding apparatus invention **10**. A chassis frame **11** has a castering pair of steering wheels **12** pivotally attached to a wheel leg **13** and secured via a position-locking pin **14** shown in FIG. **2**. The pair of steering wheels **12** is coupled together in alignment as shown in FIG. **5** with one allowed to pivot additionally on the coupling to better aid in steering. Thus the steering wheels **12** are better able to pivot more freely to aid in steering for even larger jobs as the front end is moved along the line of travel to lay a curb, sidewalk, or wall.

[0037] A second castering pair of steering wheels **12***a* is also pivotally attached to a castering wheel strut **15** and secured via a second positioning locking pin **14***a* for said wheels **12***a* to support and allow the curb forming and extruding apparatus to roll in alignment to position the curb or sidewalk to be laid. This second castering pair of steering wheels **12***a* may or may not have one wheel **12***a* allowed to pivot additionally on the coupling to better aid in steering as usually only one pivoting castering pair with addition pivoting motion is sufficient to provide the required mobility guidance.

[0038] The steering wheels **12**, **12***a* are elevated via jack cranks (not shown) which operates a jack screw and jack screw nut operably associated with the steering wheel struts **15**, **15***a* with rear wheels **16**, **16***a* to elevate the curb forming device **10** to the desired height as shown in FIG. **2**. Thus the direction of travel is usually in a straight line, where the direction is controlled with two swiveling castering pair of steering wheels **12**, **12***a* used in combination with two rigid rear wheels **16**.

[0039] Associated with the steering wheel strut assemblies **15**, **15***a* is a steering handle (not shown) to assist an operator in controlling and aligning the curb forming machine **10**. Thus the steering handle located on the end where the swivel casters are located is used to guide the curb forming machine **10**.

[0040] The chassis frame **11** defines the lower segment **11***a* of a segment of a split hopper having an upper segment **11***b* operably associated therewith. The upper segment **11***b* has a feed opening **18** held above the chassis frame **11** and structured to receive, hold, and gravity feed building material through the lower segment **11***a* having a bottom outlet **19**. The lower hopper segment **11***a* surrounds an expandable/contractible building material compaction chamber **20** sized to accommodate a variable number of a plurality of interchangeable removable counter rotating augers **21** with tapered ends **22** rotatably mounted to the chassis frame **11** to receive from the hopper bottom outlet **18** and force the building material rearward into and through the compaction chamber (not shown) defined by the chassis frame **11**. The compaction chamber **20** has a rear opening **24** through which is rearwardly directed the formed building material; thereby depositing against the ground the formed curb which simultaneously propels apparatus **10** forward.

[0041] Preferably the hopper **11** has one straight up vertical side above the compaction chamber **20** as shown in FIGS. **1** and **2** making it easier to see to align and get close to vertical surfaces next to the path of the new curb. The hopper **11** also includes a flexible rubber or plastic liner (not shown) in the hopper to flexibly seal the two segments **11***a*, **11***b* of the hopper **11** and prevent the cementitious building material from sticking in the sides of the hopper **11**. The two segments **11***a*, **11***b* of the hopper **11** are held together with flexible connections (not shown), which allow the segments **11***a*, **11***b* to independently vibrate.

[0042] FIG. **3** is a cross section view of a removable slip form **31** with four aligned and two stacked augers **21** positioned to direct cementitious materials through the entire cross section of the slip form **31**. The number and positioning of the augers **21** are thus inserted and removed the compaction chamber **20** depending upon the cross-section of the desired curbing shape defined by various slip forms **31**.

[0043] FIG. **4** a cross section view of another removable slip form **31** with three aligned and three stacked augers **21** positioned to direct cementitious materials through the entire cross section of this different shaped cross section. The auger **21** alignments is thus varied to provide the right filling of the slip forms **31** mounted in association with the compaction chamber **20** rear opening **24**.

[0044] The removable slip form mold **31** with open forward and rearward ends and an open bottom is selected to provide the desired cross sectional shape for different jobs and positioned in communication with the compaction chamber rear opening **24** to receive and sectionally form the building material into a continuous curb, sidewalk, or wall form. Preferably, the slip form **31** has a button, which is releasably attached via a spring bar retainer (not shown) so that other interchangeable slip forms **31** can be readily inserted to provide a curb design of the desired cross-section. An eye (not shown) is removably attached to the preloaded spring bar (not shown) to secure to a button (not shown) on the form **31**.

[0045] FIG. **5** illustrates the manner in which the augers **21** are associated with a stepping gear drive **25**, and rotation via linkage **26**, which imparts vibration to better compact the building materials as they are forced through the slip forms

31. The differing cross sections of the stepping gear drive **25** are shown in FIGS. **6**, **7**, and **8**.

[0046] As shown in FIG. **9**, the set of counter rotating augers **21** are belt **27** driven via a gear drive **28** with an eccentric stepping gear drive **25** shown in Figs **5**, **6**, and **7** associated with the input shaft **29** and a gasoline motor **30** attached to the chassis frame **11**. The motor **30** does not only drive the augers **21**, but it independently vibrates the augers **21** and lower segment **11***a* of the hopper **11**. This is accomplished using a gearbox drive **28** mounted to the lower segment **11***a* of the hopper **11** defined by the chassis frame **11**. An eccentric bearing mounting connection turns the augers **21**, while at the same time forcing the lower segment **11***a* of the hopper housing in opposition to the augers **21** such that the augers and the lower segment of the hopper vibrate in opposite directions.

[0047] The eccentric stepping gear drive **25** is mounted and connected to the augers **21** via an input shaft **29** driven shown in FIG. **10** by the motor **30**. It is geared to run faster than the augers **21**; thereby shaking the lower segment **11***a* of hopper **11** in opposition to the compaction assembly **20**.

[0048] To relieve stack up and binding and provide a more even continuous flow of the cementitious building material passing through the slip form **31**, a flexible transition member (not shown) with open ends is mounted in communication with between the compaction chamber rear opening **24** and the forward opening of the slip form **31**. This flexible transition member contacts and expands to stabilize the pressure buildup in the apparatus **10**, as well as isolates the vibration from the slip form **31**.

[0049] The present invention **10** therefore provides a self-feeding curb-forming machine, which smaller versions of which shown in FIG. **2** can be operated by one person for various sized jobs, and provides a very compact extruded curb, which does not have excess slag and requires minimal finishing.

[0050] Although the above description refers to the illustrated embodiments, it is not intended to restrict the scope of the appended claims. The claims themselves contain those features deemed essential to the invention.

1. A manually maneuverable curb terming extruder propelled apparatus for concrete, cementitious and plastic building materials comprising:

a. a chassis frame with walls defining a lower segment of a feed hopper leading into a compaction chamber having a front and rear with a rear opening which directs building material rearward to propel the chassis frame forward,

b. steering and castering wheels attached to the chassis frame via swinging arms which allow the wheels to he adjusted from side to side for manual steering of the apparatus,

c. an upper segment of the feed hopper having a feed opening attached above the lower segment, of the feed hopper structured to receive, hold, and gravity feed building material into and through the lower segment of the feed hopper and said feed hopper having a bottom outlet segment,

d. a compaction assembly in communication with the feed hopper defining a compaction chamber with rear opening structured to accommodate a variable number of spatially positioned juxtaposed removable counter rotating augers positioned relative to one another In vertical stackable and/or horizontal linear alignment at different heights and widths depending on the cross-section of an extruded curb to be formed,

e. a variable number of a plurality of juxtaposed removable counter rotating augers mounted within the compaction, chamber, each having a decreasing tapered cross-sectional diameter with each auger's largest cross-sectional diameter positioned toward the front of the compaction chamber and thereafter gradually decreasing toward the rear of the compaction chamber and rotatably mounted to the chassis frame in communication with, the bottom outlet segment of the hopper within the compaction chamber such that front segments of the augers receive building materials from die bottom outlet segment of the hopper and force the building material rearward into and through the rear opening of the compaction chamber,

f. vibration means associated with the counter rotating augers and the lower segment of the hopper such that the augers and the lower segment of the hopper vibrate in opposite directions, alternatively coming together and then separating to drop the building material onto the augers for continuous compaction and feed of said budding material, to prevent bridging in the hopper and provide a more compacted building material,

g. a removable slip form with open forward and rearward ends and an open bottom in communication with die compaction chamber rear opening to receive and sectionally form the building material into a continuous curb form, the number of augers selected and positional to force building materials uniformly throughout cross sections of slip forms for uniform filling, and

h. a drive motor associated with the rotating augers and vibration means to vibrate and turn the augers.

2. A manually maneuverable curb form extruder propelled apparatus according to claim **1**, wherein the vibration means comprises an eccentric dual stepping gear roller bearing with offset weight system.

3. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, including leveling means associated with the swinging arms to adjust the height and level of the chassis frame.

4. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, wherein the drive motor includes a gear box mounted to the lower segment of the hopper defined by the chassis frame with an eccentric bearing mounting connection turning the augers, while at the same time forcing the lower segment of the hopper in opposition to the augers such that the augers and the lower segment of the hopper vibrate in opposite directions.

5. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, including a rubber liner in the hopper to flexibly seal the upper and lower segments of the hopper.

6. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, including a flexible transition member with sidewalls defining open ends mounted In communication between the compaction chamber rear opening and the open forward end of the slip form, wherein the sidewalls can expand and contract to relieve stack up arid binding to provide a more even continuous flow of building material for shaping through the slip form.

7. A manually maneuverable curb forming extruder propelled apparatus according to claim **6**, including a guide with an opening mounted to the chassis frame beneath the compaction assembly and structured to accommodate and travel

along a reinforcing rod to align the apparatus and form a finished curb about said reinforcing rod.

8. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, wherein the slip form is releaseably attached via a spring bar retainer.

9. A manually maneuverable curb forming extruder propelled apparatus according to claim **1**, inclining a rolling pattern member mounted to the chassis frame and positioned after the open rearward end of the slip form to impress a desired pattern finish onto the surface of the formed finished curb.

10. A manually maneuverable curb forming apparatus comprising a feed hopper having a lower segment defined by wails of a chassis frame and an upper segment attached above the lower segment, the feed hopper having a bottom outlet communicating with a compaction assembly, the compaction assembly of variable dimensions to accommodate two or more counter-rotating augers mounted in differing positions to the chassis frame depending upon the cross section of an extruded curb to be formed, and a compaction chamber having a rear opening communicating with a removable slip form, vibration means associated with the counter-rotating angers and the teed hopper lower segment such that the angers and the lower segment of the teed hopper vibrate in opposite directions, and a drive motor associated with the augers and the vibration means to vibrate and torn the augers.

11. A manually maneuverable curb forming apparatus according to claim **10**, wherein the vibration means comprises an eccentric dual stepping gear roller bearing offset weight system.

* * * * *