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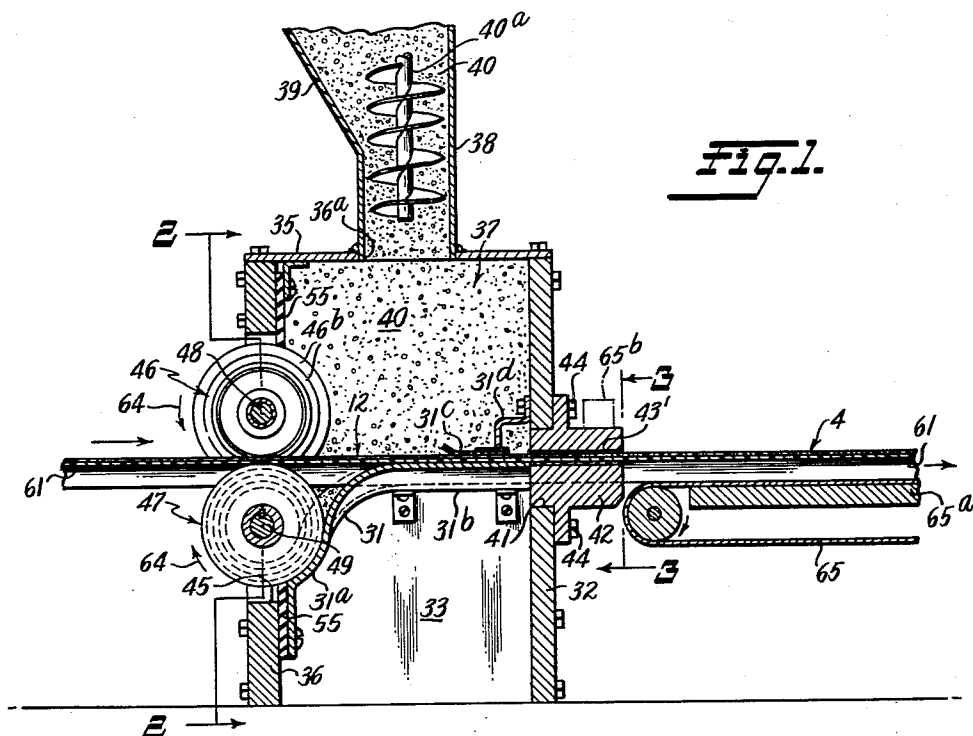
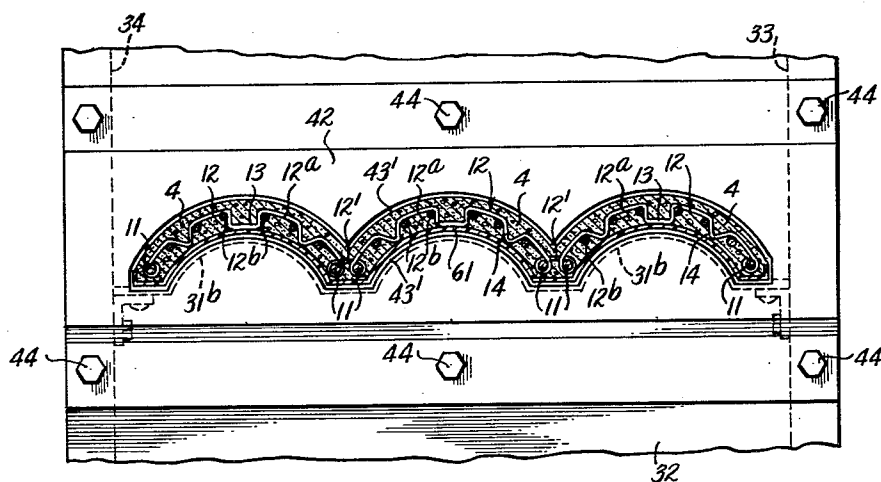
H. A. BERLINER

3,148,431

APPARATUS FOR MAKING STRUCTURAL UNITS AND THE LIKE

Filed Sept. 3, 1959

6 Sheets-Sheet 1



F19.3.

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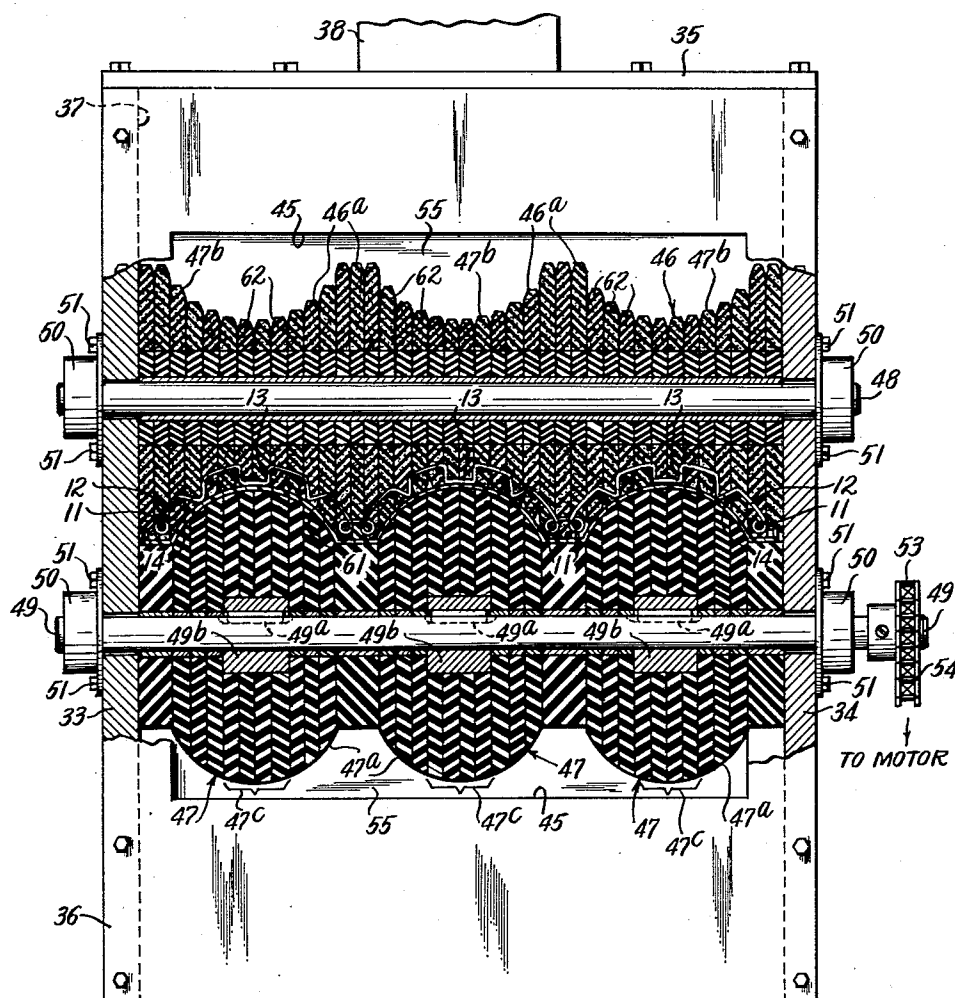


Fig. 2.

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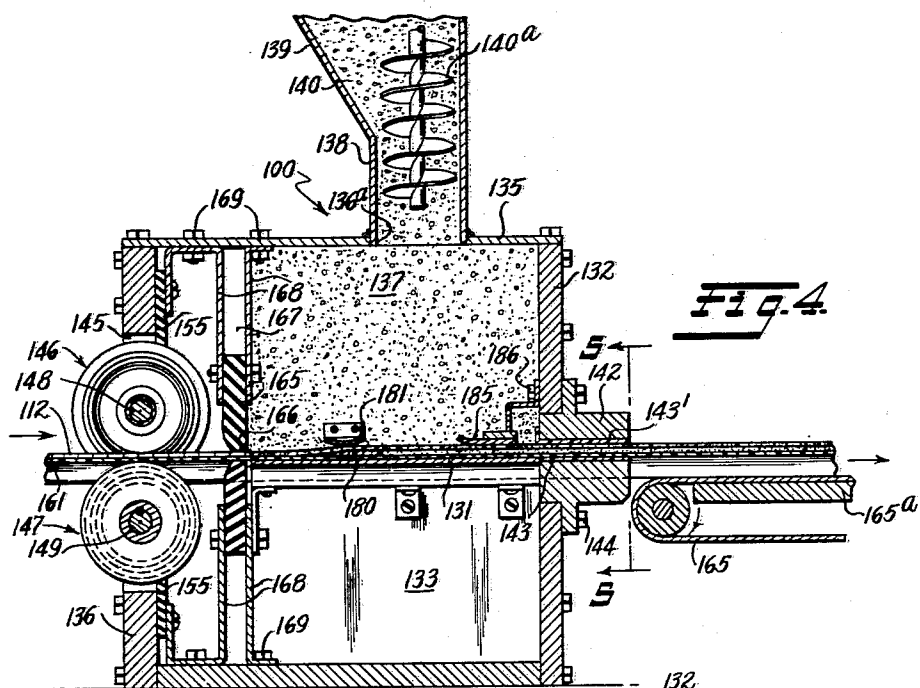
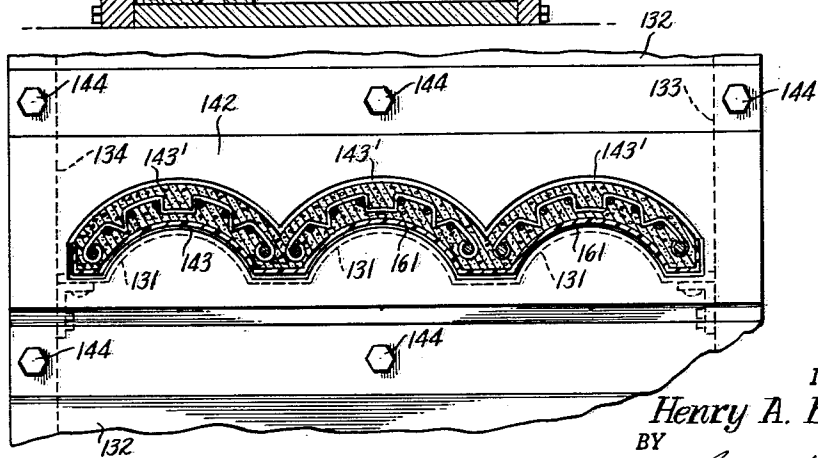


Fig. 5.

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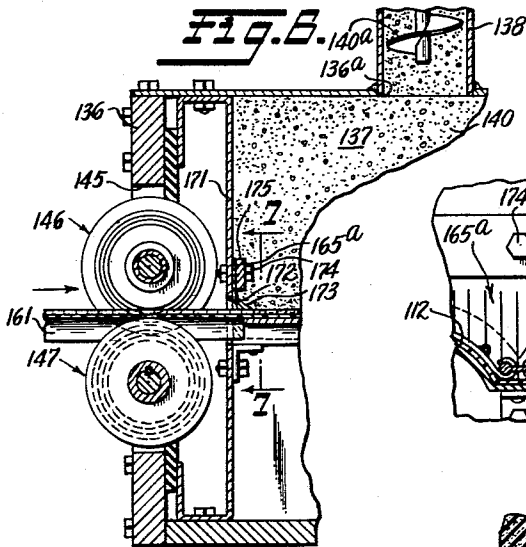
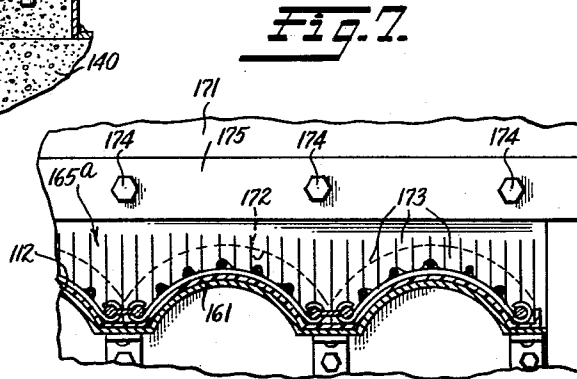
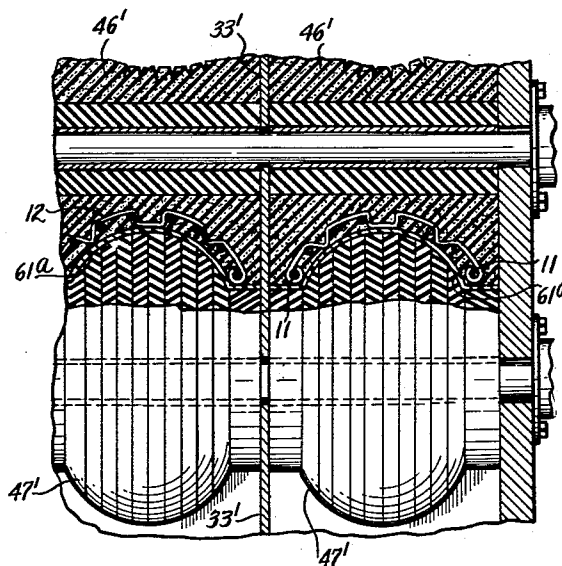
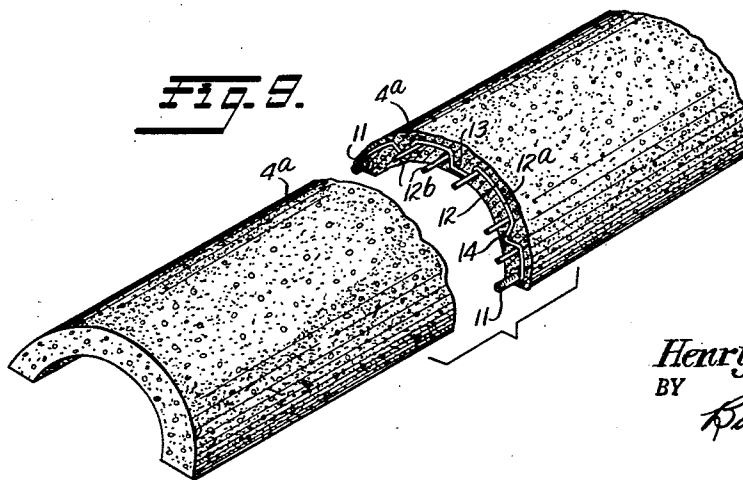


Fig. 8.



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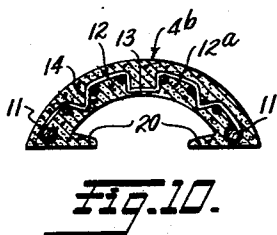
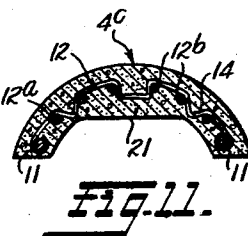
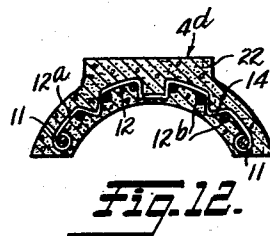
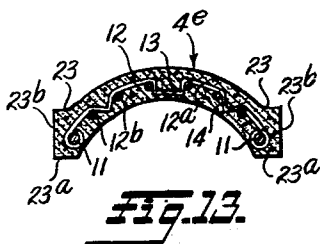
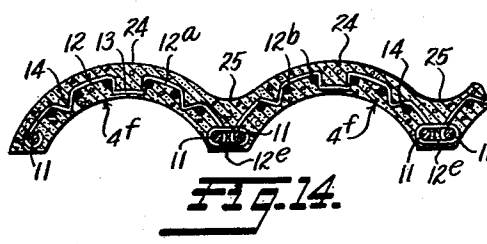
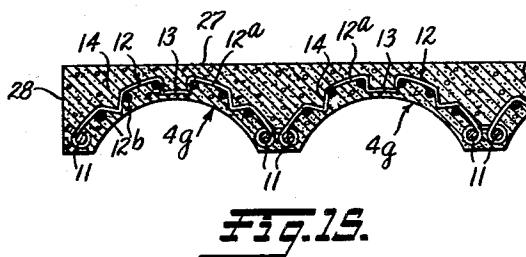
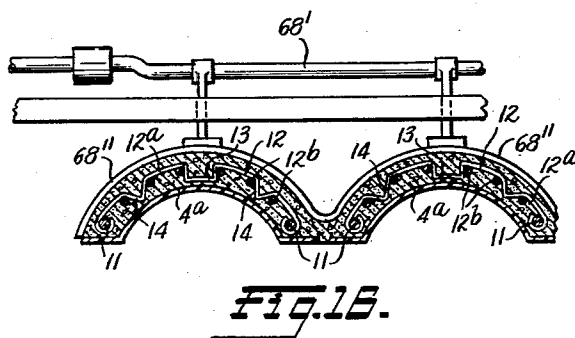
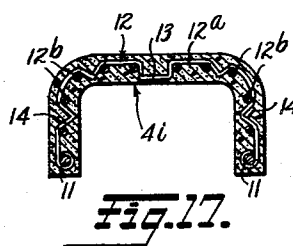
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6 Sheets-Sheet 5



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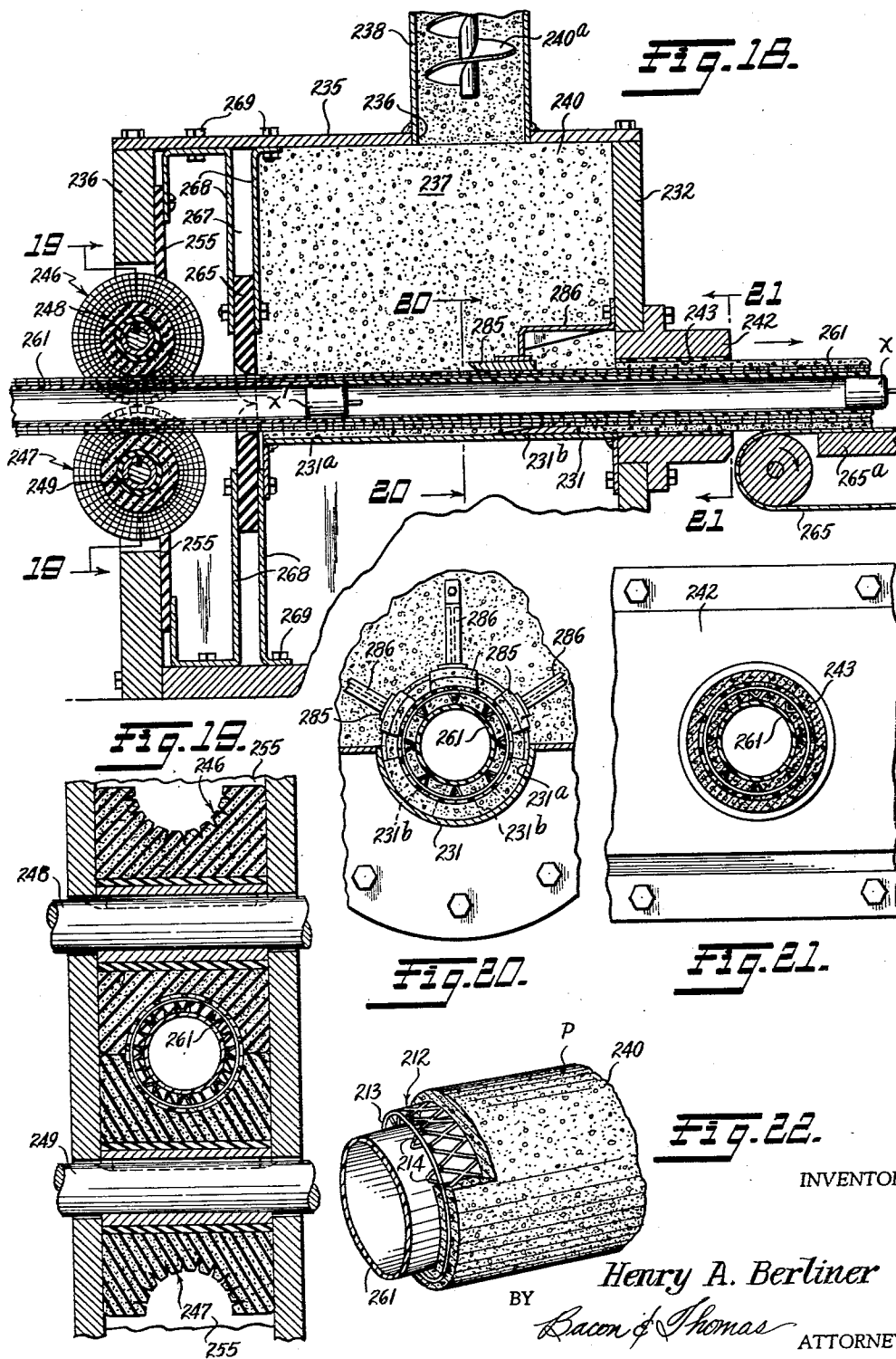
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APPARATUS FOR MAKING STRUCTURAL UNITS AND THE LIKE

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APPARATUS FOR MAKING STRUCTURAL
UNITS AND THE LIKE
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Filed Sept. 3, 1959, Ser. No. 837,995
7 Claims. (Cl. 25—11)

The invention relates to apparatus for extruding concrete and other material to form novel structural units and the like.

These members in various forms may be employed either individually as supporting columns, walls, roofs, canopies or the like, or else as elements of an improved prefabricated wall, roof or floor panel.

The primary object of the present invention is to provide apparatus for extruding a structural unit which has a maximum of strength and rigidity with a minimum volume, weight, and cost.

Another object is to provide means for extruding a reinforced structural unit that can be used itself as a building component, or used as a reinforcing core for another building component. In this connection, the units may be single or integrally connected at their sides to form a multiple unit.

Another object is to provide an apparatus for forming structural members of various sizes and cross-sectional shapes by extrusion and wherein either cementitious or other plastic material is introduced into an extrusion chamber at one point, simultaneously with the introduction of rigid reinforcing members into the chamber at another point, and both are passed through an extrusion orifice to form the final product, without loss of the cementitious or plastic material at said points of introduction.

A related object is to provide apparatus for forming reinforced structural members by an extrusion process wherein means are provided for continuously feeding relatively rigid reinforcing members of non-uniform cross-section into an inlet of an extrusion chamber for incorporation into an extruded product, and wherein a seal is provided to prevent leakage of material from the extrusion chamber at said inlet.

Still another object is to provide an apparatus for extruding reinforced structural units wherein the cementitious or plastic material may be supported by a preshaped sheet against sagging after extrusion and during setting, to assure uniformity in the cross-sectional configuration and dimensions of the units.

Other objects and advantages will be apparent from the following specification when taken in conjunction with the drawings, in which:

FIG. 1 is a vertical sectional view taken through the center of an extrusion apparatus adapted to form an extruded reinforced unit for use as a structural unit or as a reinforcing core in a wall panel or the like, in accordance with the principles of the present invention;

FIG. 2 is an enlarged sectional view through the feed rolls for the reinforcing material and the supporting sheet taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view particularly showing the shape of the extrusion orifice, taken on the line 3—3 of FIG. 1;

FIG. 4 is a sectional view similar to FIG. 1 through the center of a modified extrusion apparatus wherein a seal is located beyond the feed rolls for the reinforcing material;

FIG. 5 is an enlarged fragmentary view similar to FIG. 3, taken on the line 7—7 of FIG. 4;

FIG. 6 is a fragmentary vertical sectional view of another embodiment of the invention;

FIG. 7 is a fragmentary sectional view taken on the line 9—9 of FIG. 6;

FIG. 8 is a fragmentary view, partly in section, showing a modified form of feed rolls for the core reinforcing material and supporting sheet;

FIG. 9 is a fragmentary perspective view illustrating an extruded reinforced product formed by the apparatus illustrated in FIG. 8;

FIGS. 10 through 17, inclusive, illustrate various other types of reinforced extruded products that can be formed in accordance with the principles of the present invention;

FIG. 18 is a sectional view similar to that of FIG. 1, showing an apparatus for extruding a reinforced tubular unit or pipe;

FIG. 19 is a fragmentary sectional view taken on the line 21—21 of FIG. 18;

FIG. 20 is a fragmentary sectional view taken on the line 22—22 of FIG. 18;

FIG. 21 is a fragmentary sectional view taken on the line 23—23 of FIG. 18; and

FIG. 22 is a fragmentary perspective view showing a product at the apparatus of FIGS. 18—21, certain portions having broken away to show the structure thereof.

Referring now more specifically to the drawings, various products formed by the apparatus of the present invention are illustrated, for example, in FIGS. 3, 9 to 14, and 16, and in these forms the vertically reinforced members are generally arcuate in transverse cross-section. In most of these examples, they are substantially semi-circular transversely and have a uniform radial thickness of approximately one inch, and an inner radius of three inches. It will be understood, however, that these dimensions are not critical, and, where more or less strength is desired, or more or less thickness in the reinforced member itself, or in the finished panel, is desired, the dimensions may be varied accordingly.

Referring to FIG. 10 by way of example, steel reinforcing rods 11 are positioned at both sides of the structural unit and extend throughout the length thereof. The rods 11 are ridged or otherwise provided with an irregular outer surface. An arcuately shaped wire mesh 12, comprising transverse wires 12a and uniformly spaced longitudinal wires 12b welded together, extends through substantially the full arc of each member 4, the ends of the transverse wires 12a being secured about the steel rods 11. In the embodiment illustrated in FIG. 3, the transverse wires 12a are crimped so that each includes a centrally disposed U-shaped formation 13 and a pair of V-shaped formations 14 forming spacers or legs, the formations 14 being positioned approximately midway between the formation 13 and the steel rods 11. The formations 13 and 14 extend inwardly to the inner face of the members 4. The wires 12b are located at the juncture of the formations 13 and 14 with the arcuate portions of the wires 12a.

The metallic reinforcing means 12 may be extended as an integral unit, as shown in FIG. 3, to accommodate a plurality of sections or members 4 arranged in side-by-side relation and integrally interconnected along the adjacent side edges thereof. In this form, the wire meshes 12 of the sections 4 are joined together as shown at 12' in FIG. 3. Alternatively, the reinforcing means 12 can be formed individually for each section and the adjacent side reinforcing rods 11 joined after forming, by wire loops or oval rings 12e, as is illustrated in FIG. 14.

The cross-sectional shape of the structural units or reinforced members 4 may be varied whether used individually or in multiple array to suit the particular purposes of the user. For example, in member 4b, shown in FIG. 10, inwardly projecting flanges 20 are formed at the sides of the member and serve to stiffen it and also to retain

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the aggregate composition therein. The member 4c of FIG. 13 includes a thickened central portion 21 for added arch strength. A similar effect is obtained in the member 4d of FIG. 12 where a flat-topped stiffening rib 22 is disposed on the outer surface of the member at the crest thereof. In FIG. 13, a member 4e is provided with stiffening ribs 23 at the side edges thereof. Each rib 23 has a flat base portion 23a and a flat side portion 23b to facilitate use as a wall section or floor beam.

Also, as shown in FIG. 14, a plurality of integrally connected members 4f may have a sinuous outer surface including peaks 24 and gullies 25. The unit thus formed is considerably strengthened at the points of juncture of the respective members, and is better adapted to be used independently of the remainder of the wall panel as a canopy or roof.

Another variation is shown in FIG. 15, where the upper surface of the integral unit of members 4g is substantially flat and provides a continuous smooth surface 27, and a flat end surface 28 at right angles thereto.

In FIG. 17 is shown a substantially channel-shaped member 4i.

In forming reinforced members of the type illustrated in cross-section in FIG. 3, an extrusion apparatus (FIG. 1) is employed including a base or bottom 31, front wall 32, side walls 33 and 34, a top 35 and a rear wall 36, all serving to define a chamber 37. The top 35 has an inlet opening 36a connected by a feed conduit 38 to a hopper 39. A relatively dry mix of concrete material 40 to be extruded is delivered by a conventional feed screw 40a or pump (not shown) from the hopper 38 into chamber 37. A conventional mix of water, cement, sand and gravel or small size aggregate capable of being forced through the extrusion orifice 43 can be used in making the material 40. A pressure of about 300 p.s.i. in the chamber 37 is adequate for most extruding operations.

An aperture 41 is formed in the front wall 32, and a die 42 having an extrusion orifice 43 is secured therein by bolts 44. The orifice 43 may be lined with a layer of "Teflon" 43' or the like to facilitate the passage of the cementitious material 40 and reinforcing mesh 12 there-through and to resist any attendant abrasive or corrosive action. The desirable degree of hardness may also be obtained by the use of chromium-plated or carburized steel.

While the orifice 43 has been shown in the shape illustrated in FIG. 3 adapted to form the extruded product as a unit of three integrally connected arcuate sections 4, this configuration can be readily changed by altering the extrusion orifice 43 to form units having a cross-section such as shown in FIG. 14 or 15, or to simultaneously form a plurality of individual members having the cross-section shown in FIGS. 10 to 13, or 17.

Referring to FIG. 1, an opening 45 is formed in the rear wall 36, and a pair of rollers, i.e., upper and lower rollers 46 and 47, respectively, for feeding the mesh 12 and a preshaped supporting sheet 61, are mounted therein in superimposed relation on horizontal shafts 48 and 49, respectively. The shafts 48 and 49 are mounted at their ends in bearings 50, FIG. 2, secured to the side walls 33 and 34 as by bolts 51. One end of shaft 49 extends through the respective bearing 50 and has a sprocket 53 mounted at the outer end thereof for connection by a chain 54 with a drive motor (not shown). It will be understood, however, that either or both of the shafts 48 and 49 may be positively driven to effect rotation of the rollers 46 and 47.

The ends of rollers 46 and 47 have a close working fit with the side walls 33 and 34 of the chamber 37 and with the edges of opening 45 to prevent leakage of the material 40 at these points. Sealing strips 55 formed of "Teflon," or the like, and conforming to the contour of rollers 46 and 47 are secured along the upper and lower edge of opening 45, as shown, and engage the rollers 46 and 47 to form a seal against leakage.

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The rollers 46 and 47 have generally complementary peripheral surfaces, each formed of a configuration to accommodate the shape of materials that are fed there-through. Thus, the lower roller 47 has convex peripheral surfaces 47a conforming with the undersurface of the preshaped sheet form 61 made of fiber glass or any other suitable material. The bottom wall 31 has a portion 31a which is complementary to and has a close fit with the periphery of the roller 47 to minimize entry of material 40 between said wall and roller. The upper roller 46 has generally complementary concave surfaces 47b adapted to engage the wire mesh 12, which is fed into the extrusion chamber 37 in overlying relation with the form 61. The longitudinal wires 12b of the mesh 12 are positively spaced from form 61 by depressions or "chairs" 13 and 14 so that they assume a position approximately midway of the radial thickness of the section 4, as shown in FIG. 3. In the apparatus shown, both rollers 46 and 47 are formed of rubber, or the like, but the lower roller 47 may be formed of steel with or without a peripheral rubber section. The upper roller 46, in the present embodiment, has a peripheral surface formed of flexible rubber fingers 62 adapted to cooperate with and extend through the openings in the wire mesh 12, and form a seal with the upper surface of the sheet form 61. Alternatively, the outer periphery of the roller 46 may be free of fingers and formed of very resilient rubber, or the like, to accomplish the same result. Thus, as the rollers 46 and 47 are driven in the direction indicated by arrows 64, the form 61 and the reinforcing means, including the steel rods 11 and wire mesh 12, are simultaneously fed therebetween into the extrusion chamber 37, while the cementitious material within the chamber is prevented from escaping by the means aforesaid.

The rollers 46 and 47 each have surface portions of non-uniform radii, and the points at which the opposing roller surfaces make contact with the sheet form 61 are not all equally spaced from the axis of the respective shafts 48 and 49. Thus, the peripheral speed of the points of different radii varies along each roller and between those points on the respective rollers that are in contact with the undulated sheet form 61. Here, the resiliency of the rubber is relied upon to minimize the effect of slippage, one contacting surface portion stretching slightly and another contacting surface portion compressing slightly to accommodate the difference in speeds without excessive wear. Both surface portions return to their original form, after passing out of contact with the sheet form 61.

Where the difference in peripheral speeds is too great for compensation by the resiliency of the roller surfaces, the rollers 46 and 47 may be split into narrow coaxial sections. One set of sections 47c on the roller 47 having peripheries of a substantially common radius may be positively driven by a key 49a fixed to the shaft 49, the remainder of the sections being free to rotate on the shaft 49 to suit the speed of the particular portion of the surface in contact therewith. The key 49a is engaged with a bushing 49b to which the sections 47c are bonded. The roller 46 may be divided into narrow sections 46a all of which have a hard rubber core and are free to rotate on the shaft 48.

The form 61 and reinforcing means comprising the rods 11 and mesh 12 are simultaneously fed into chamber 37 in predetermined lengths corresponding with the desired length of the reinforced member 4. As the leading end of the form 61 advances, it engages a horizontal portion 31b of the bottom wall 31, which has a configuration complementary to the lower face of the form 61, and is guided thereby into accurate registration with the extrusion orifice 43. The crest portions of the overlying mesh 12 are engaged by shoes 31c, carried by a bracket 31d secured to the wall 32, and the mesh as a whole is guided by said shoes to register accurately with the orifice 43, the mesh 12 and form 61 serving as a support for the extruded product emerging at this point. The reinforcing wires

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12b are embedded in the product medially of its thickness during passage through the chamber 37 and orifice 43. A conveyor belt 65, or any other similar means, such as rollers or the like, is employed to receive the extruded member 4. The upper run of the conveyor 65 lies in a plane coincident with the lower side of the orifice 43 and is supported by a plate 65a to relieve the extruded product of all bending stresses as it emerges from the machine.

Successive forms 61 and overlying reinforcing mesh 12 are fed into the machine in end-to-end relation to provide for continuous and efficient operation of the machine. The rate of feed of material 40 by the feed screw 40a is correlated with the rate of lineal feed of the mesh 12 and form 61 by the rollers 46 and 47, so that the material 40 is forced into the chamber 37 at a rate about equal to the extrusion requirements at the orifice 43. In this way, the building up of pressure above a desirable level in chamber 37 is avoided, with the result that leakage at the rollers 46 and 47 is minimized.

It is to be understood that the foregoing method of feeding the cementitious material is applicable to the remaining embodiments of the invention described hereinafter.

A conventional vibrator diagrammatically shown at 65b may be applied to the die member 42 to compact the cementitious material 40 as it is being extruded, to thereby increase the density and strength of the extruded product. After extrusion and sufficient setting of the cementitious material, the form 61 may be stripped off the extruded product and reused. In this connection, the form 61 may be coated with ordinary lubricating oil prior to passage through the extruder, to prevent sticking of the material 40 thereto. If the extruded product is of greater length than desired, it may be permitted to set sufficiently to enable handling and removal of the form 61, whereupon the extruded product may be severed into segments of the desired size prior to final setting. In some instances, the form 61 may be made of cheap, rigid cardboard or paperboard, instead of fiberglass, in which event the form sheet may optionally be left in position when the members 4 are severed or incorporated into a panel, such as the panel 1.

In the modification shown in FIG. 8, each roller is divided into a plurality of sections 46' and 47', and the sections are each positioned in a separate compartment from that which receives the material 40, a divider or partition 33' being provided for this purpose. Thus, each of the cooperating roller sections is adapted to feed a single form sheet 61a and a single mesh 12 including a pair of steel rods 11. The extrusion die member (not shown) is suitably modified to provide for the simultaneous extrusion of a plurality of individual reinforced, structural members. The roller 47' is illustrative of a coaxially split roller referred to hereinbefore.

FIG. 9 illustrates a structural member 4a that can be made with the apparatus shown in FIG. 8.

The apparatus illustrated in FIG. 8 is also capable of making a reinforced product comprising a plurality of members similar to the member 4a. Thus, FIG. 16 illustrates three members 4a that can be simultaneously delivered from the die orifice in closely spaced side-by-side relation, as indicated by the dotted lines. The adjacent portions of the members 4a are then merged into each other to form a single unit having the shape shown in full lines. This is accomplished by vertically reciprocating tamping means illustrated diagrammatically at 68', located downstream of the extrusion orifice and having a shoe 68'' to compact and shape the product to the configuration shown. The form sheets 61 resting on the conveyor belt 65 support the extruded material while being compacted and shaped by the tamping shoe 68''.

In the embodiment shown in FIG. 4, the apparatus generally indicated by the numeral 100 is similar to that of FIG. 1, and corresponding parts have been given the same number in the 100 series. In this form, the trans-

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verse wires of the wire mesh 112 are arcuate and uncrimped, as shown in FIG. 5. Mesh 112, therefore, lies flat along the upper surface of the form 161. Accordingly, the upper roller 146 need not necessarily be provided with the rubber fingers or the peripheral section of very resilient material, as described in regard to the first embodiment. The periphery of roller 146, however, if not the entire roller, should be formed of material sufficiently resilient to accommodate the slight irregularities in cross-section of the mesh 112 delivered thereunder and snugly engage said mesh.

As illustrated in FIG. 4, a rubber barrier 165 is positioned immediately downstream of the rollers 146 and 147 and has a generally horizontal, expansible slit 166 therein conforming with the combined cross-sectional configuration of the form 161 and reinforcing means 112, but slightly smaller in size. The barrier 165 is mounted in an opening 167 between opposed pairs of plates 168, which are, in turn, secured to the walls of the chamber 137 by bolts 169. Thus, a second sealing means is provided to prevent the escape of material 140 from the chamber 137.

Alternatively, sealing means and a single plate 171 (FIGS. 6 and 7) may be substituted for the two plates 168 and the sealing assembly 165-169. The plate 171 has an opening 172 formed therein and shaped to correspond with the combined cross-sectional configuration of the form 161 and the reinforcing means 112, the opening 172 being slightly larger. A seal for the opening 172 is formed by a resilient metallic sheet 165a that is slit inwardly from one edge thereof to form a plurality of thin fingers 173 that extend across said opening. The opposite edge of the sheet 165a is secured to plate 171 above opening 172 by bolts 174 and a clamping bar 175. The fingers 173 are of sufficient resiliency, so that they can be displaced inwardly by the mesh material 112 fed from rollers 146 and 147 through the opening 172, while preventing leakage of material 140 through said opening. It will be noted from FIG. 7 that the free ends of the spring fingers 173 conform to the contour of the mesh 112 and form 161.

It will be understood that the sealing assemblies shown may be altered to fulfill the requirements of the various conditions under which the extruder apparatus may be operated, i.e. the configuration of the reinforcements, the composition of the material being extruded or the shape of the extruded product. For example, in some instances the pressure within the chamber and the viscosity of the material being extruded will be such that the rollers 146 and 147 provide a sufficient barrier against leakage and may be used alone without the employment of sealing assembly 165-169 or sealing assembly 171-174. Alternatively, there may be situations where both of the sealing assemblies must be used to prevent any significant amount of leakage. It will be further understood that where necessary the sealing assembly 165-169 and/or the sealing assembly 171-174 may be installed either upstream or downstream of the sealing rollers 146 and 147 or where two or more of the same type of sealing assembly may be desirable.

Referring to FIG. 4, as the reinforcing means 112 and the form 161 enter the extrusion chamber 137, they are supported and guided by a bottom wall 131 having a cross-section complementary to the form sheet 161, and are engaged and separated by a cam 180, which lifts and maintains the reinforcing means 112 out of contact with the form 161. Similar cam means 181 are employed above the reinforcing means 112 and offset slightly downstream from the cam 180 to keep the reinforcing means in the desired spaced relation with respect to the form 161. Cam means 180 and 181 extend entirely across the chamber, being secured at their opposite ends to the side walls thereof. They are formed of a configuration complementary to the respective surfaces of the reinforcing means 112 and the form 161 which

they engage. Thus, the cams 180 and 181 function to center the reinforcing mesh 112 in the extruded product so that it is completely encased by the extruded material 140.

A guide member 185 for the mesh 112 is secured by bolts 186 to the inside of front wall 132 and serves to guide the mesh 112 into proper registration with the opening 143.

FIGS. 18-22 illustrate another embodiment of the invention, parts comparable to those already described being indicated by the same numerals in the 200 series. This embodiment of the invention is adapted to form a pipe of concrete, plastic or other suitable extrudable material 240 having wire reinforcing means embedded therein. In the present instance, the mesh 212 is formed of expanded metal or wire having openings of diamond shaped design, as shown in FIG. 22. The mesh 212 is cylindrical and has wire rings 213 welded therein each having a plurality of "chairs" 214 extending inwardly therefrom. The chairs 214 serve to space the mesh 212 from a removable tubular form 261. The form 261 is placed in the mesh 212 and both are then inserted at the rear of the extruder apparatus between the two driven rollers 246 and 247. A plug X is inserted in the end of the form 261 to prevent entry therein of the material 240. Similar plugs X' are mounted in the end of successive forms 261 to form a seal at their abutting ends, as shown in FIG. 18. The opposed outer peripheries of the rollers 246 and 247 cooperate to define a circular opening therebetween to enable passage of the form 261 and mesh 212. The outer peripheries of the rollers 246 and 247 are formed of very resilient rubber material and, therefore, readily protrude into the openings in the wire mesh 212 to engage the outer surface of the form 261 and tightly seal the rear opening of the extrusion chamber.

The false bottom 231 is provided with a longitudinal concave portion 231a, FIG. 20, coinciding in size with the opening of the extrusion orifice 243 and being at the same level therewith. A plurality of tapered blocks 232 are mounted on the surface of the concave portion to guide the mesh 212 into accurate axial alignment with the extrusion orifice 243 to engage and guide the top portion of mesh 212 as it approaches the orifice. The shoes 285 are secured in position by brackets 286 mounted on the front wall 232 of the extruder above the level of the orifice 243.

In this embodiment, a die member 242 is provided with a circular extrusion orifice 243, FIG. 21. The product emerges therefrom in the form of a reinforced concrete pipe P or the like having the physical structure shown in FIG. 22. The form 261 may be removed by any suitable means when desired or may be left in the pipe. Preferably the form 261 is removed by rotation and pulling prior to final setting to impart a trowel finish to the interior of the pipe.

It will be understood that the various forms of the invention described in detail hereinabove are examples illustrative of the broad novel principles involved in the present invention. Numerous changes can obviously be made therein without departing from the principles of the invention or the scope of the annexed claims. For example, it is contemplated that subject to the dryness of the mix and the configuration of extruded product, the underlying sheet form may be dispensed with entirely.

It will specifically be understood that the word "cementitious" as used herein and in the annexed claims is to be construed as including concrete, plastic or any other extrudable material suitable for the purposes disclosed.

I claim:

1. Extruder apparatus, comprising: means defining an extrusion chamber having an inlet and an outlet for the passage of material to be extruded, said means including a rear wall having an opening therein and a front wall,

said outlet being positioned in said front wall in alignment with said opening and being shaped to define a die orifice; superimposed rollers positioned within and filling said opening to prevent leakage therethrough, said rollers being mounted for rotation about horizontal axes and having normally contacting opposed peripheral portions, at least one of said peripheral portions being formed of resilient material to permit the passage of reinforcing members of non-uniform cross-section therethrough for delivery to said outlet; and means for driving at least one of said rollers to feed said reinforcing members into said chamber.

2. The apparatus of claim 1, wherein the rollers have complementary peripheral surfaces of irregular configurations adapted to accommodate therebetween reinforcing members which are of non-planar cross-sectional shape.

3. The apparatus of claim 2, wherein at least one of said rollers is formed of a plurality of closely spaced transverse roller sections mounted on a common shaft, certain of said roller sections being positively driven and the remaining sections being mounted for rotary movement under the influence of their contact with the reinforcing members and the adjacent roller sections, whereby said roller sections may move independently to effect a substantially uniform peripheral speed.

4. The apparatus of claim 1, wherein at least one of the respective peripheral surfaces of said rollers is sufficiently resilient to permit separation of the roller surfaces for passage therebetween of reinforcing means adapted to be embedded in the extruded product and also of a shaped sheet form adapted to pass through said die orifice and underlie and support the extruded product, said reinforcing means and said sheet form being introduced between said rollers in superimposed, contacting relationship.

5. Extruder apparatus, comprising: means defining an extrusion chamber having an inlet and an outlet for the passage of material to be extruded, said means including a rear wall having an opening therein and a front wall, said outlet being positioned in said front wall in alignment with said opening and being shaped to define a die orifice; superimposed rollers positioned within and filling said opening to prevent leakage therethrough, said rollers being mounted for rotation about horizontal axes; a shaped sheet form adapted to be introduced through said rollers for delivery to said die orifice to underlie and support the extruded product; a wire mesh of irregular cross-sectional configuration shaped to conform with the upper surface of said form and to be delivered to said rollers in overlying, contacting relation thereto, said rollers having normally contacting peripheral surfaces of a complementary irregular configuration conforming substantially with the combined cross-sectional configuration of said mesh and said form, at least one of said surfaces being formed of resilient material to accommodate non-uniform cross-sectional portions of said members; means for driving at least one of said rollers; means upstream of said orifice for separating and spacing said mesh from said form; and a sealing barrier between said rear wall and said last-mentioned means, said barrier having an opening therein aligned with said rear wall opening and with said orifice, said orifice being shaped to conform with said combined cross-sectional configuration and defined by resiliently movable means normally closing said opening and tending to prevent the passage of said material downstream of said inlet.

6. The apparatus of claim 5, wherein said resiliently movable means comprises a thick sheet of resilient material constituting a major portion of said barrier and having said opening formed therein, said opening comprising a normally closed slit.

7. The apparatus of claim 5, wherein said resiliently movable means comprises resilient fingers having their inner end portions secured to said barrier along one end edge of said opening and their outer end portions extending across and substantially covering said opening, said open-

ing being slightly enlarged with respect to the cross-sectional area of said reinforcing members and said form.

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