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Bernot

[11] **3,837,372**

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[54] **MACHINE AND METHOD FOR PRODUCING AN EXPANSIBLE CYLINDRICAL LATTICE STRUCTURE, IN PARTICULAR FOR A REINFORCEMENT OF A PIPE HAVING A SOCKET**

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[51] **Int. Cl.** **B21f 27/20**
[58] **Field of Search** 140/1, 92.2, 107, 112; 52/653; 72/142

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Primary Examiner—Lowell A. Larson
Attorney, Agent, or Firm—Sughrue, Rothwell, Mion, Zinn & Mackpeak

[57] **ABSTRACT**

Method and machine for producing an expansible lattice structure. A transverse filament is wound in the form of coils round a group of longitudinally extending filaments which are parallel to an axis. The winding of the transverse filament is accompanied, toward the end of the winding, by a corrugation of the transverse filament so as to produce at the end of the lattice structure an end portion which can be expanded radially of the axis. The lattice structure is of particular utility as a reinforcement for a concrete pipe having a socket at one end.

17 Claims, 11 Drawing Figures

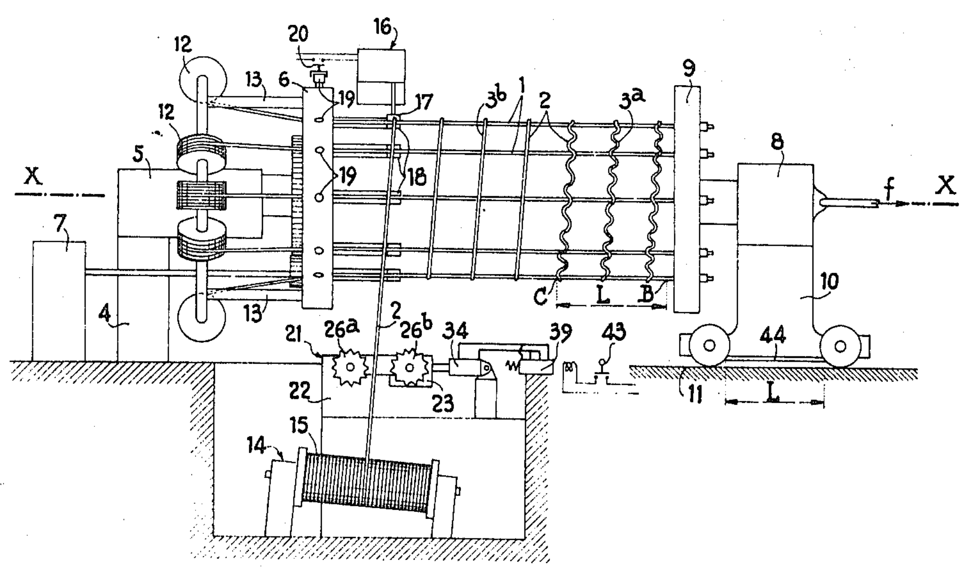
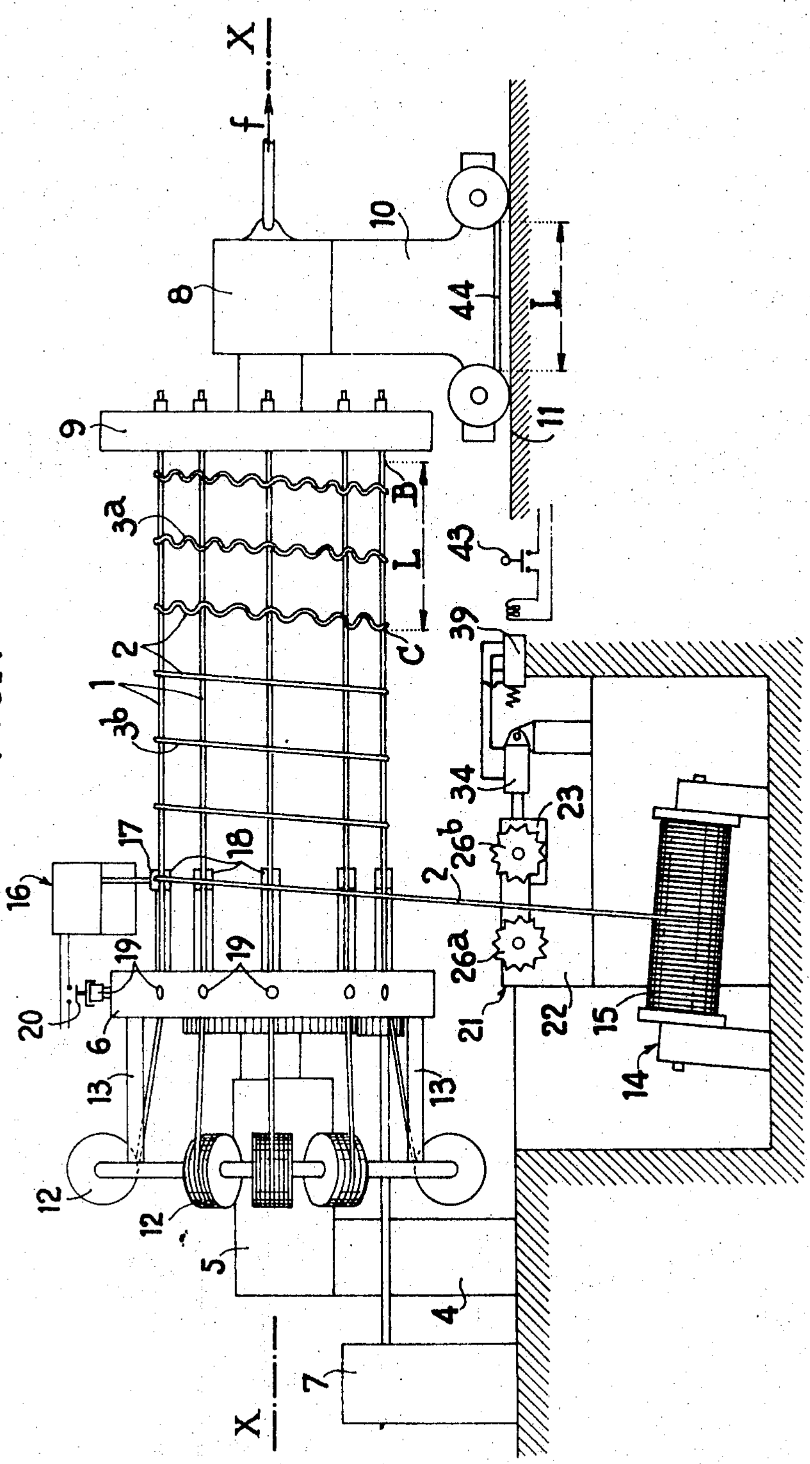


FIG. 1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f
10
8
44
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3a
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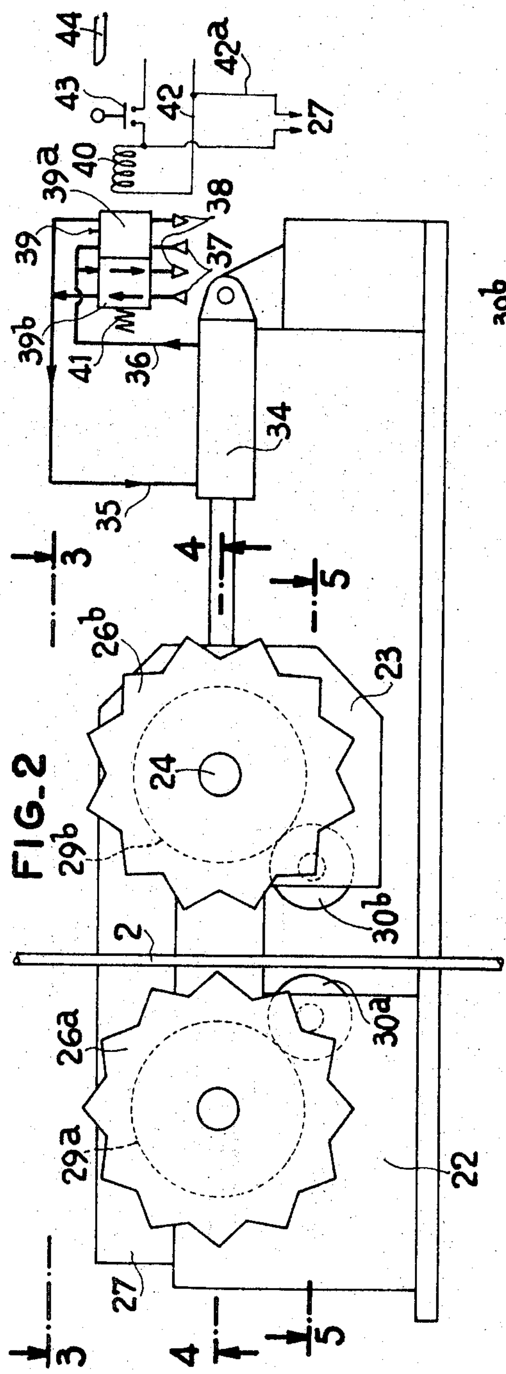


FIG. 2

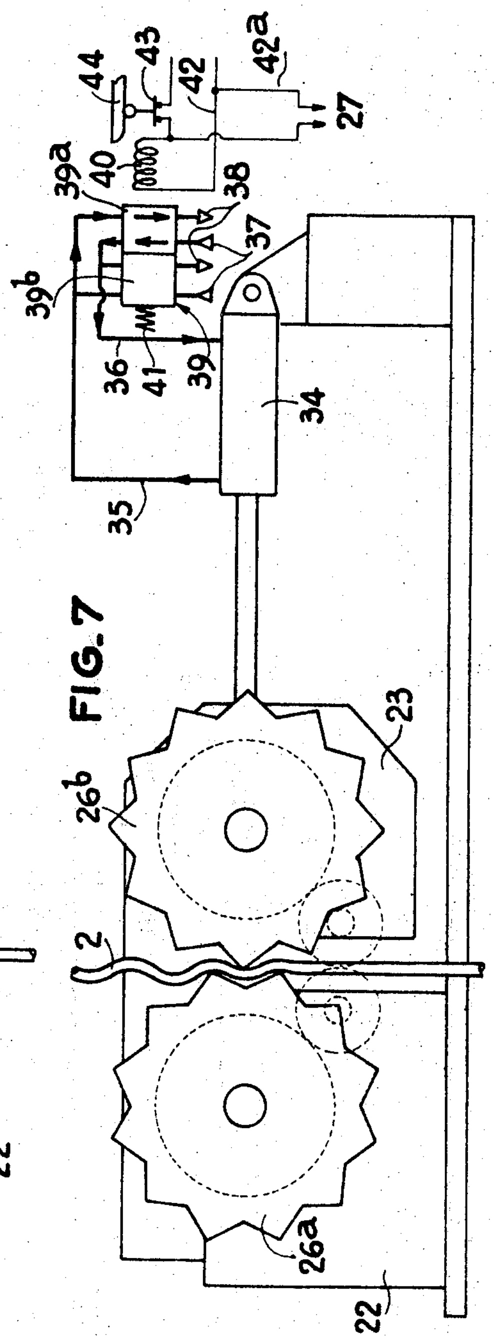


FIG. 7

FIG_3

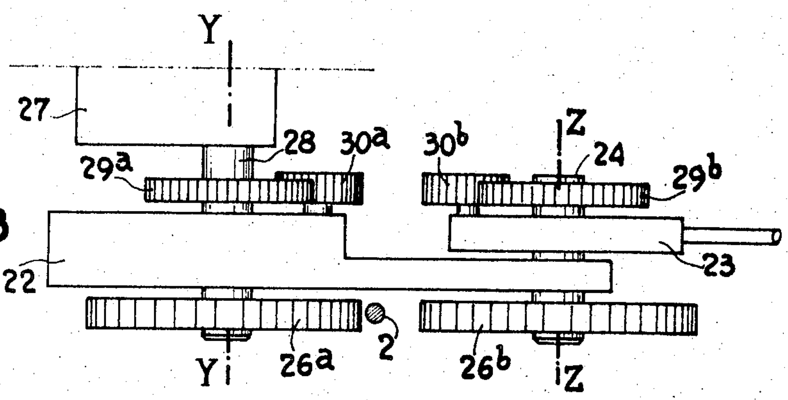


FIG_4

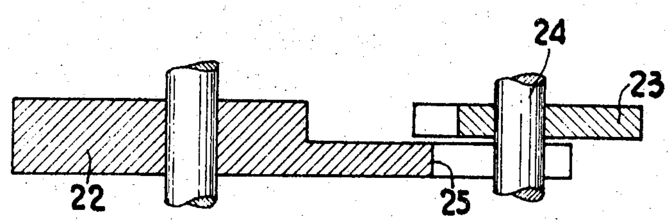


FIG_5

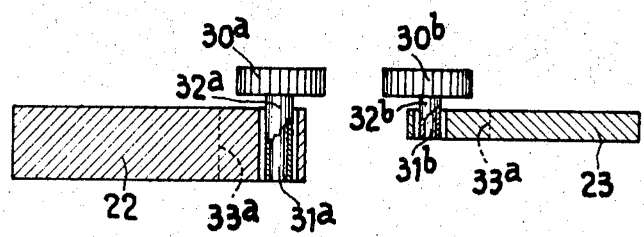
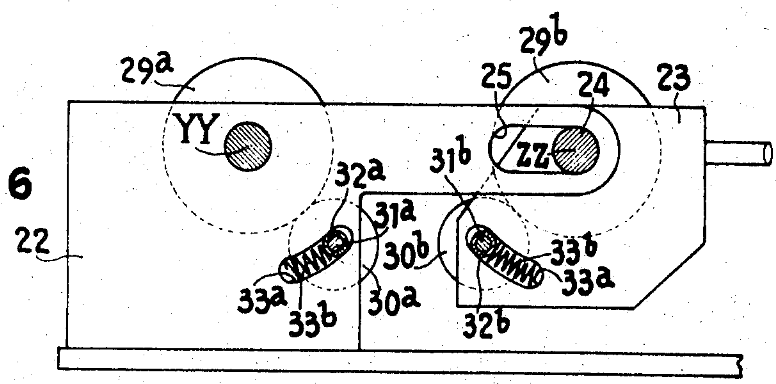


FIG_6



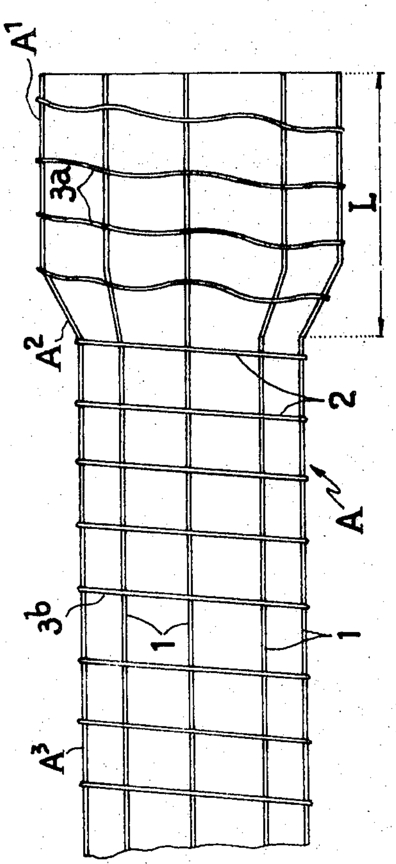
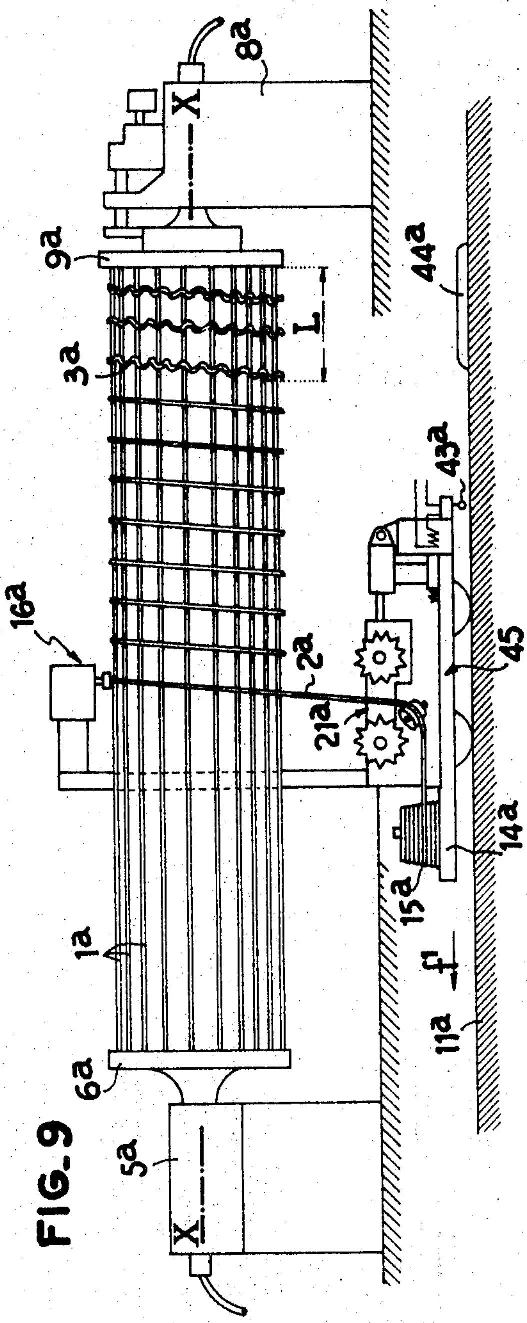

A1
3a
L
A2
2
A
3b
1
1
A3

FIG_8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9a
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3a
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45
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f1
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5a
X

FIG_9

FIG. 11

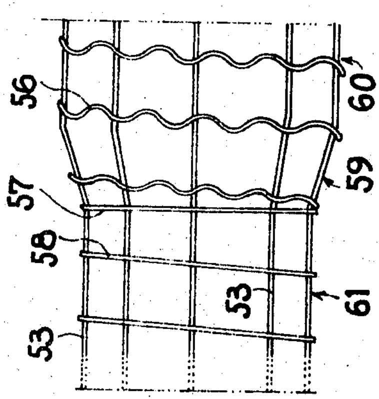
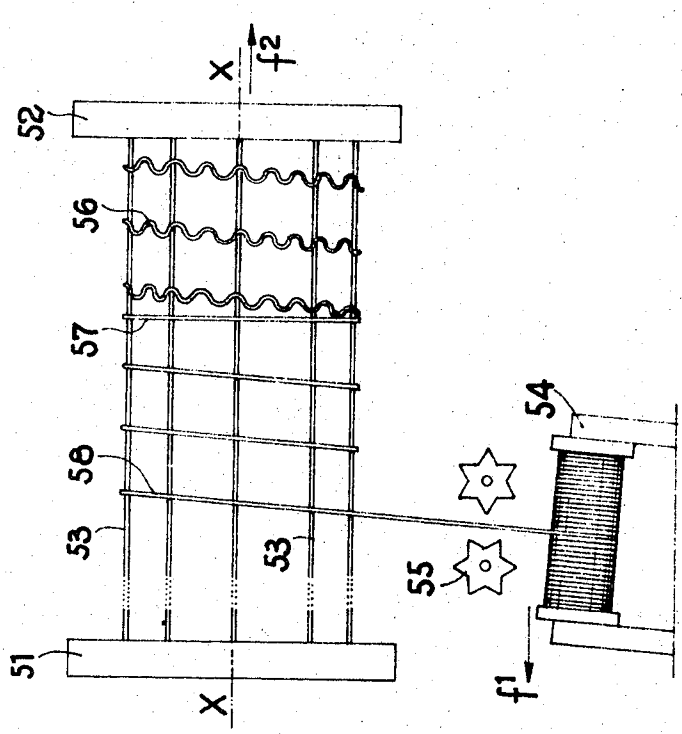


FIG. 10



MACHINE AND METHOD FOR PRODUCING AN EXPANSIBLE CYLINDRICAL LATTICE STRUCTURE, IN PARTICULAR FOR A REINFORCEMENT OF A PIPE HAVING A SOCKET

The present invention relates to machines and methods for producing cylindrical lattice structures comprising longitudinal or generatrix wires or filaments and a transverse wire or filament arranged in the form of coils, for example reinforcements for concrete pipes.

Among the known machines, there is a relatively simple type of machine, for example described in French Pat. No. 1,053,250 filed by the Company PONT-A-MOUSSON, which comprises a rotary support device for supporting longitudinal wires which are parallel to a given axis, a transverse wire feeder disposed on a side of the support device and a device for producing a relative displacement along said axis between the feeder and the support device.

However, such a machine permits the production of only absolutely cylindrical reinforcements, that is to say reinforcements having a uniform section. If these machines are required to produce cylindrical lattice structures having multiple diameters, for example reinforcements for pipes having sockets the cross section of which is substantially greater than that of the body of the pipe, it is first necessary to produce a cylindrical reinforcement cage for the pipe body alone and then another shorter cage having a larger diameter for the socket and then assemble these two cages. This first type of machine is therefore not very convenient to use and manufacture of the lattice is costly since it requires various successive, separate and discontinuous operations and modifications in the setting.

Another known type of machine, for example described in the U.S. Pat. No. 3,437,114, permits a continuous production of a reinforcement cage comprising an expanded part of larger diameter for reinforcing a socket. However, this second type of machine is complicated and expensive.

An object of the present invention is to provide a machine for the first mentioned simple known type which is so improved as to permit the production of a cylindrical lattice structure which is expansible in a part of its length by laying a number of coils of a filament of corrugated shape.

The invention provides a machine which is of the aforementioned first known type wherein a filament or wire corrugating device is interposed between the feeder and the support device.

Owing to this arrangement, the machine is simple and easy and cheap to make and may even be obtained by merely adapting a corrugating device to an existing machine of the aforementioned known first type.

The invention also provides a method for producing an expansible cylindrical lattice structure comprising winding in the form of a helix a transverse filament around a group of longitudinal filaments, an end step of said winding being accompanied by a corrugation of the transverse filament before it is wound around said group.

In this way a cylindrical lattice structure is produced whose end portion has a transverse winding of a corrugated filament, so that it may be radially expanded to constitute a cylindrical portion of larger diameter, the lattice structure thus obtained being of utility in particular as a reinforcement for a concrete pipe having a socket.

The expansion is usually carried out in such manner that the end portion of the lattice structure including the corrugated transverse filament has, when expanded, in succession a frustoconical flared connecting portion and the cylindrical portion of larger diameter.

In specific embodiments of the invention, the helical winding is carried out in an absolutely continuous manner. Thus the expansion forms a frustum of a cone having an inclined base and consequently an axis which is inclined with respect to the axis of the unexpanded cylindrical portion of the structure. Consequently, in the case of the application to the production of a reinforcement for a concrete pipe having a socket, there is an imperfect centering of the reinforcement in the region of the pipe socket and even a danger of the reinforcement appearing on the surface of the pipe. Moreover, the out-of-centre of the reinforcement may result in an uneven resistance of the pipe in the socket part and possibly localized brittle regions.

This is why in another embodiment of the invention there is provided between the coils of transverse corrugated filament and the coils of uncorrugated transverse filament a circular coil of uncorrugated filament which is closed onto itself in a plane perpendicular to the axis of the winding.

Thus, upon expansion, a frustum of a cone is formed which has a circular base perpendicular to the axis of the winding and an axis which is in the extension of the axis of the unexpanded cylindrical portion.

Further features and advantages of the invention will be apparent from the ensuing description with reference to the accompanying drawings.

In the drawings:

FIG. 1 is a diagrammatic view of a machine according to the invention in the course of production of a reinforcement of steel wire for a concrete pipe having a socket and illustrates a first manner of carrying out the method according to the invention;

FIG. 2 is a diagrammatic detail view of the corrugating device of the machine in the inoperative position of the device;

FIG. 3 is a partial plan view of the device shown in FIG. 2;

FIGS. 4 and 5 are partial sectional views of the device taken respectively on lines 4—4 and 5—5 of FIG. 2;

FIG. 6 is a view similar to FIG. 2 the wheels and their drives having been omitted;

FIG. 7 is a view similar to FIG. 2 showing the corrugating device in operation;

FIG. 8 is a diagrammatic view of a reinforcement cage produced by means of the machine shown in FIGS. 1–7;

FIG. 9 is a diagrammatic view of a modification of the machine according to the invention;

FIG. 10 shows another manner of carrying out the method according to the invention, and

FIG. 11 is a partial view of an expanded reinforcement obtained from a lattice structure produced by the method illustrated in FIG. 10.

In the embodiment shown in FIGS. 1–7, the illustrated machine is intended to produce a reinforcement A for a concrete pipe having a socket (FIG. 8) and comprising longitudinal or generatrix steel wires or filaments 1 and a transverse wire or filament 2 wound in the form of a helix. The wire **2** comprises a few corrugated coils **3**a (FIG. **1**) the corrugations of which are intended to be subsequently opened (FIG. **8**) so as to achieve an expansion which produces a cylindrical cage portion A^1 combined with a frustoconical connecting portion A^2, the combination having a total length L, the diameter of the portion A^1 being larger than the diameter of the remaining portion A^3 of the cylindrical cage where the coils of wire 3^a are uncorrugated.

This machine is in the general form of a lathe. It comprises a frame **4** which supports a headstock **5** carrying a rotary plate **6** which has an axis X—X and is driven in rotation by a motor-reducing unit **7** and a tailstock **8** which is movable in translation, carries a rotary plate **9** and is mounted on a carriage **10** movable on a runway **11** parallel to the axis X—X. Longitudinal or generatrix metal wires **1** are held taut between the plates **6** and **9** and disposed parallel to each other on a cylindrical surface, the wires being temporarily fixed at one end to the plate **9** whereas they pass through the plate **6** as they are unwound from wire reels **12** which are carried by a chassis **13** connected to rotate with the plate **6.** The wires **1** are unwound from the reels **12** as the carriage **10** carrying the tailstock **8** and the rotary plate **9** moves in the direction of arrow f (away from the frame **4**).

A transverse wire feeder **14** comprising a reel **15** is fixed on one side of the lathe, for example in a pit, in the region of the rotary plate **6.** It is from this feeder that the wire **2** adapted to be wound in the form of a helix on the cylindrical cage constituted by the longitudinal wires **1** is fed. There is also provided, diametrally opposite the feeder **14** with respect to the cage **1,** a device **16** for welding the coils of transverse wires **2** to the longitudinal wires. This welding device comprises an outer and fixed welding machine electrode **17** and a plurality of rotary electrodes **18** which are fixed to the rotary plate **6** and disposed inside the reinforcement behind each longitudinal wire **1.** The plate **6** carries on its periphery radial lugs or pins **19** which are also located in the region of each generatrix **1** and serve to close, in turn, a contact **20** of the welding device so as to cause current to pass between the electrode **17** and the corresponding electrode **18** when the corresponding longitudinal wire **1** and consequently this electrode **18** are presented under the electrode **17** at the point at which a coil of the wire **2** crosses the wire **1** in the course of winding. The reel **14** is of course oriented in such manner that the path of the wire **2** unwound therefrom passes under the electrode **7** with the desired helix angle.

The machine further comprises a device **21** for corrugating the transverse wire which comprises a vice having corrugating wheels between which the transverse wire **2** is partially corrugated. This vice comprises two members in the form of plates constituting a fixed jaw **22** and a movable jaw **23,** the latter carrying a rotary shaft **24** perpendicular to the plates and slidable in an aperture or slot **25** which is provided in the fixed jaw **22** and is roughly perpendicular to the portion of transverse wire **2** fed by the reel **15** and guided by wire guides (not shown).

Each jaw carries a toothed wheel or rollers 26^a or 26^b for corrugating the wire **2.** These wheels have teeth having plane flanks and acute-angled crests the angles of which are slightly less than 90° whereas the roots of the teeth are slightly greater than 90°. They are driven in rotation in synchronism by a drive mechanism comprising a motor **27,** which is mounted on the side of the fixed jaw **22** and whose output shaft **27** carries the wheel 26^a so that this wheel is the driving wheel, and a gear transmission transmitting motion from the wheel 26^a to the wheel 26^b when the movable jaw **23** is moved toward the fixed jaw **22.** Keyed on the shafts **28** and **24** of the wheels 26^a and 26^b are identical gears 29^a and 29^b which are respectively meshed with two other motion transmitting gears 30^a and 30^b. These gears 30^a and 30^b are also identical and are capable of meshing with each other when the jaws of the vise are moved toward each other. Their spindles are mounted in bearings 31^a and 31^b which are slidably mounted in slots 32^a and 32^b formed in the jaws **22** and **23.** Springs 33^a and 33^b bias the bearings 31^a and 31^b toward each other and consequently tend to cause the gears 30^a and 30^b to mesh with each other. The apertures 32^a and 32^b are arcuate as an arc of a circle concentric with the axes Y—Y and Z—Z of the shafts **28** and **24** so as to maintain the gears 29^a and 30^a or 29^b and 30^b of each jaw always in mesh irrespective of the relative position of the jaws **22** and **23.**

The movable jaw **23** is displaced by means of a double-acting cylinder device or jack **34** actuated by compressed fluid. One of the two chambers of the cylinder device (that adjacent the jaw **23**) is fed by way of a conduit **35** and the opposite chamber is fed by way of a conduit **36.** The conduits **35** and **36** are capable of being alternately connected, one to one of two supply conduits **37** supplying compressed fluid, and the other to one of two conduits **38** returning the fluid to the exhaust, or vice versa, by means of a slide valve **39** of conventional type. This slide valve **39** is shown symbolically by two boxes 39^a and 39^b showing the connection between the conduits **37** and **38** and **35** and **36.** The slide of this slide valve is brought to the position 39^a for supplying fluid to the conduit **36** and for connecting the conduit **35** to the exhaust, position corresponding to moving the jaws toward each other and therefore to operation of the corrugating device (FIG. **7**), by an electromagnet **40** and is returned to the position 39^b corresponding to supplying fluid to the conduit **35** and connecting the conduit **36** to the exhaust, position corresponding to moving the jaws **32** and **33,** and consequently the wheels 26^a and 26^b, apart (FIG. **2**), by a return spring **41** when the electromagnet **40** is no longer energized. This electromagnet is supplied with power by a circuit **42** provided with a normally-open contact **43** placed in the runway **11** for the carriage **10.** This contact **43** is capable of being closed by a ramp or cam **44** carried by the carriage **10.** This ramp **44** has a length L which is equal to the axial length of the part of the reinforcement between the points B and C and in respect of which the transverse wire must be corrugated so that when the contact **43** is depressed and consequently closed by the ramp **44,** the wheels 26^a and 26^b are moved toward each other and when the ramp **44** passes beyond the contact **43** these wheels are once more separated.

The machine just described operates in the following manner:

At the start, the wires **1** are attached to the plate **9** after having passed them through the plate **6,** the plate **9** being positioned near the plate **6.** The end of the transverse wire **2** is then welded to one of the longitudinal wires **1.**

The carriage **10** is then moved in the direction of arrow *f* as the plates **6** and **9** are rotated, the transmission of motion being transmitted from the plate **6** to the plate **9** by the cylindrical cage of longitudinal wires **1.** As the contact **43** is in the non-depressed condition in the departure position of the carriage **10,** the corrugating device **21** is in its open or declutched position. The wheels **26**^{a} and **26**^{b} are separated from each other and the winding of the coils of transverse wire starts without corrugation of the latter. As soon as the ramp **44** depresses the contact **43,** the wheels **26**^{a} and **26**^{b} are moved toward each other and deform the wire **2** between the roots and crests of their teeth while the motion-transmitting gears **30**^{a} and **30**^{b} are applied resiliently together and thus drive the wheels **26**^{a} and **26**^{b} in rotation and complete the synchronism (FIG. 7). Indeed, the motor **27** for rotating the wheels is started up simultaneously with the approach of the wheels **26**^{a} and **26**^{b}, when the contact **43** is closed, by a branch connection **42**^{a} of the circuit **42.** Thenceforth, during the travel L of the carriage **10,** coils **3**^{a} of corrugated wire are wound on the cylindrical cage of wires **1** between the points B and C. These coils of corrugated wire are welded to the longitudinal wires **1** at their intersections with the latter by the electrodes **17** and **18** of the welding device **16.**

As soon as the carriage **10** has past the contact **43,** the latter is no longer depressed by the ramp and opens and causes the separation of the wheels **26**^{a} and **26**^{b} (FIG. **2**). Thenceforth, that is to say beyond the point C, the winding of the wire **2** on the cylindrical cage of wires **1** continues but in the form of coils **3**^{b} of ordinary uncorrugated wire.

As the carriage **10** moves in the direction of arrow f and the plates **6** and **9** rotate, the reinforcement lengthens as the wires **1** are fed through the plate **6** and the winding of the wire **2** continues together with the welding of the coils of wire **2** wound on the wires **1.** When the reinforcement has reached sufficient length, corresponding to the length of the concrete pipe to be reinforced, the wires **1** are detached from the plate **9** and cut near the plate **6.** The reinforcement produced is thus detached from the machine.

To complete the reinforcement prior to its utilisation as a reinforcement for a pipe having a socket, it is merely necessary to expand the reinforcement in the region of the corrugated coils **3**^{a} so as to open the corrugations and increase the length of these coils **3**^{a}, without fracture, until an apparent perimeter in the neighbourhood of their real length is reached (FIG. **8**).

The machine described hereinbefore affords the following advantages:

Owing to the use of a releasable corrugating device in a machine producing a cylindrical reinforcement for a pipe comprising longitudinal metal wires and a transverse metal wire wound into a helix on the longitudinal wires, there is obtained a simple automatic machine which produces perfectly well a partially extensible reinforcement cage. This apparatus is simple and easily adaptable to known machines.

Owing to the corrugating device employing corrugating wheels mounted on jaws **22** and **23** capable of being moved toward or away from each other and owing to the combination of the ramp **44** and the contact **43** which controls these movements of the jaws in accordance with the position of the carriage **10** and therefore in accordance with the relative position of the corrugating device and the cylindrical reinforcement cage, the coils **3**^{a} of corrugated wire are wound at well-determined parts of the reinforcement cage. The position and the length of the corrugated wires **3**^{a} depend solely on the position of the contact **43** on the runway **11** and on the length of the ramp **44.**

Owing to the gears **29**^{a}, **29**^{b}, **30**^{a} and **30**^{b}, the wheels **26**^{a} and **26**^{b} are driven in rotation at the same speed and in perfect synchronism.

Owing to a slidable and resiliently biased mounting of the bearings **31**^{a} and **31**^{b} carrying the gears **30**^{a} and **30**^{b} and owing to the arcuate shape of the grooves **32**^{a} and **32**^{b}, the gears **30**^{a} and **30**^{b} are applied perfectly in mesh with each other while remaining in mesh with the gears **39**^{a} and **39**^{b} by rolling a little along the latter, if required, during the approach movement of the jaw **23.** The end-of-travel of the jack **34** is adjusted in such manner that a root of the teeth of the wheel **26**^{a} is in front of a crest of the teeth of the wheel **26**^{b} at a distance from this crest which corresponds to the diameter of the wire **1** and the dimensions of the slots **32**^{a} and **32**^{b} are such that the bearings **31**^{a} and **31**^{b} of the gears **39**^{a} and **39**^{b} when they are applied against the end of the recesses **32**^{a} and **32**^{b} by the springs **33**^{a} and **33**^{b} put these gears into engagement a little before the end of the travel of the wheels **26**^{a} and **26**^{b} toward each other so that at the end of the approach of these wheels the gears **29**^{a} and **29**^{b} are resiliently engaged, the bearings **31**^{a} and **31**^{b} being at a slight distance from the ends of the recesses **32**^{a} and **32**^{b} and the springs **33**^{a} and **33**^{b} being slightly compressed. This slidable and resiliently biased mounting of the shafts of the gears **29**^{a} and **29**^{b} also constitutes a device for taking up wear.

By way of modification, in the machine for producing reinforcement cages in accordance with the embodiment shown in FIG. **9**, the device **14**^{a} feeding the transverse wire or filament is movable relative to the reinforcement cage of longitudinal wires **1.** The machine is still in the general form of a lathe but instead of one of the plates being movable in translation with respect with the other, the distance therebetween is fixed. This machine comprises at one end a headstock **5**^{a} having a rotary plate **6**^{a} and at the other end a tailstock **8**^{a} having a rotary plate **9**^{a}. Between the plates **6**^{a} and **9**^{a} are secured the longitudinal wires **1**^{a} of the reinforcement on which coils of corrugated or uncorrugated wire or filament must be wound.

The device **14**^{a} for feeding the transverse wire or filament **2**^{a} and the device **21**^{a} for corrugating this wire are mounted on a carriage **45** which is moved in translation in direction of arrow f^1 along a runway **11**^{a} which is parallel to the axis X—X of the reinforcement. The carriage **45** carries a reel **15**^{a} supplying the transverse wire **2**^{a} and a corrugating device **21**^{a} having a fixed jaw and a movable jaw similar to the previously-described device **21.** The carriage **45** also carries a contact **43**^{a} which closes the circuit controlling the jack or cylinder device of the corrugating device so as to corrugate the wire. The contact **43**^{a} co-operates with a ramp **44**^{a} placed on the runway **11**^{a} in a position corresponding to where it is desired to wind coils **3**^{a} of corrugated wire on the reinforcement cage.

This machine operates in the same way as the foregoing machine except that the relative displacement of the corrugating device **21**^{a} and the reinforcement cage is constituted by a displacement of the corrugating device or of the device feeding the transverse wire in a direction parallel to the axis X—X of the reinforcement cage instead of a displacement of the reinforcement cage with respect to the device feeding the transverse wire. Moreover, note that in this machine the device 16^a for welding the coils of wire wound on the longitudinal wires is also mounted on the carriage **45.**

In the embodiment shown in FIGS. **10** and **11,** there are also employed: two rotary plates **51** and **52** which are parallel to each other and spaced apart on a common axis X-X between which a number of longitudinal wires **53** are held taut, a wire feeder **54** disposed on one side of the space between these two plates and a wire corrugating device **55** interposed between the feeder and the space between the two plates. The two plates may be fixed and the wire feeder and the corrugating device may be carried by a carriage which is movable in the direction of arrow f^1 along the axis X—X, or a single plate **51** may be fixed and the continuously fed longitudinal wires passed therethrough, the other plate **52** being movable along the axis in the direction of arrow f^2 whereas the feeder and the corrugating device are fixed. The corrugating device is for example constituted by two jaws which are movable toward each other, each of which jaws carries a corrugating wheel.

Throughout the production of a lattice structure, the plates **51** and **52** are permanently driven in rotation. By first putting the device **55** in operation and by continuously moving in translation either the feeder-corrugating device assembly **54–55** or the movable plate **52,** a number of helical coils **56** of corrugated wire which is inclined with respect to the axis X—X are wound round the group of wires **53,** starting at the plate **52.** The device **55** is then stopped and simultaneously the assembly **54–55** or the plate **52** is made to stop during at least one complete rotation of the plates **51** and **52** so as to produce a circular coil of uncorrugated wire **57** which is closed onto itself in a plane perpendicular to the axis X—X. The assembly **54–55** or the movable plate **52** is then once more made to move in translation but without resuming operation of the corrugating device **55** so that coils **58** of an uncorrugated wire which is inclined with respect to the axis X—X are wound on the wires **53.** The wires **53** and the coils **56, 57** and **58** are interconnected in the known manner, for example by welding.

When subsequently the end portion having a corrugated transverse wire **56** is expanded, for example to produce a reinforcement for a concrete pipe having a socket, this end portion has, when expanded, in succession a flared frustoconical connection portion **59** and a cylindrical portion **60** whose diameter exceeds the diameter of the remainder **61** of the reinforcement, the remainder **61** being intended to reinforce the body of the pipe whereas the end portion **59–60** is intended to reinforce the socket of the pipe.

The frustoconical portion **59** has a circular base **57** perpendicular to the axis X—X so that this portion and consequently the whole of the end part of the reinforcement is exactly centered with respect to the socket of the pipe and thus affords a perfectly even resistance devoid of brittle regions. By way of a modification, the coils **56** and **57** of wire are produced continuously without stopping movement of the assembly **54–55** or the plate **52** by merely putting out of action the device **55** as soon as the required number of coils **56** of corrugated wire have been produced. There is then mounted on the lattice structure, in the region between the two series of coils, a collar **57,** for example in two parts, either before starting the winding of the coils **58** of uncorrugated wire or after the whole of the reinforcement has been produced.

It must be understood that the corrugated wire may be wound not only in one end part of the reinforcement cage but anywhere on this reinforcement cage. Further, there may be provided in the same cage having longitudinal wires **1** a plurality of coils of corrugated wire separated by coils of uncorrugated wire. The invention is also applicable to a machine for producing conical reinforcement cages the generatrices of which are those of a cone for reinforcing conical concrete piles or columns.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a machine for producing an expansible cylindrical lattice structure, comprising a support device for supporting longitudinal filaments parallel to a given axis, a feeder for feeding a transverse filament and disposed on one side of said support device, means for producing a relative rotation about said axis between the feeder and the support device, and a device for producing a relative movement in translation along said axis between the feeder and the support device; the provision of a filament corrugating device interposed between the feeder and the support device and adapted and arranged to corrugate the transverse filament as it is fed by the feeder.

2. A machine as claimed in claim **1,** wherein the corrugating device comprises two jaws movable with respect to each other, and two filament corrugating wheels respectively mounted on the jaws and capable of assuming an operative position in which the wheels corrugate the transverse filament.

3. A machine as claimed in claim **2,** wherein a first of the jaws is fixed and the second jaw is slidable relative to the first jaw, control means being connected to the second jaw to shift the second jaw toward the first jaw and bring the jaws to said operative position.

4. A machine as claimed in claim **3,** wherein the support device comprises two rotary plates which are parallel to each other and spaced apart along said axis, a first of said plates being fixed with respect to the axis, a carriage being movable along said axis and carrying the second of said plates, the corrugating device being fixed with respect to said axis and the control means comprising a jack and a circuit controlling the actuation of the jack, a movable member inserted in said circuit for selectively opening and closing said circuit and a ramp co-operative with said member for shifting said member, said member and said ramp being associated with the carriage so that said circuit is opened and closed at predetermined points in the travel of the carriage.

5. A machine as claimed in claim **4,** wherein the ramp is carried by the carriage and said member is fixed relative to said axis.

6. A machine as claimed in claim **3,** wherein the support device comprises two rotary plates which are parallel to each other, spaced apart along said axis and fixed relative to said axis, and a carriage movable along said axis carries the feeder and the corrugating device, the control means comprising a jack and a circuit controlling the actuation of the jack, a movable member inserted in said circuit for selectively opening and closing said circuit and a ramp co-operative with said member for shifting said member, said member and said ramp being associated with the carriage so that said circuit is opened and closed at predetermined points in the travel of the carriage.

7. A machine as claimed in claim **6,** wherein said member is carried by the carriage and said ramp is fixed relative to said axis.

8. A machine as claimed in claim **3,** wherein the control means comprise a hydraulic jack, a hydraulic circuit including a slide valve controlling the position of the jack, an electromagnet associated with the slide valve for shifting the slide valve, an electric supply circuit for the electromagnet, a switch inserted in the supply circuit and a switch closing ramp co-operative with the switch, the relative position of the switch and ramp being dependent on the relative position of the feeder and support device.

9. A machine as claimed in claim **2,** comprising a motor drivingly connected to one of the corrugating wheels, a first gear which is connected to be driven by said one of the corrugating wheels in a direction parallel to said axis, and a second gear which is drivingly connected to the other of said corrugating wheels, said first gear being disposed in facing relation to said second gear in a direction parallel to said axis.

10. A machine as claimed in claim **9,** wherein the two gears have spindles and two apertures are provided in the jaws, the spindles are respectively mounted in the apertures and resiliently yieldable means bias the spindles.

11. A machine as claimed in claim **10,** wherein two bearings are movable in said apertures and are biased by the resiliently yieldable means, the spindles being respectively rotatably mounted in the bearings.

12. A machine as claimed in claim **11,** wherein the apertures are in the form of arcs of a circle centered on the axes of rotation of the corrugating wheels.

13. A method for producing an expansible cylindrical lattice structure, comprising winding a transverse filament in the form of a plurality of helical coils around a group of longitudinal extending filaments, said winding being accompanied toward the end of the winding by a corrugation of a portion of the transverse filament before said portion of transverse filament is wound around the group of longitudinally extending filaments.

14. A method as claimed in claim **13,** comprising winding around said group of filaments in directly succeeding relation to each other: helical coils of a transverse corrugated filament and helical coils of uncorrugated filament.

15. A method as claimed in claim **13,** comprising providing on the group of filaments, between the coils of transverse corrugated filament and the coils of transverse uncorrugated filament, a circular coil of uncorrugated filament which is closed onto itself in a plane perpendicular to the axis of the winding.

16. A method as claimed in claim **15,** wherein said circular coil is provided by winding it between the winding of the coils of corrugated filament and the winding of the coils of uncorrugated filament, the windings succeeding each other in a continuous manner.

17. A method as claimed in claim **15,** wherein said circular coil is provided on the group of filaments in the form of an independent collar.

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