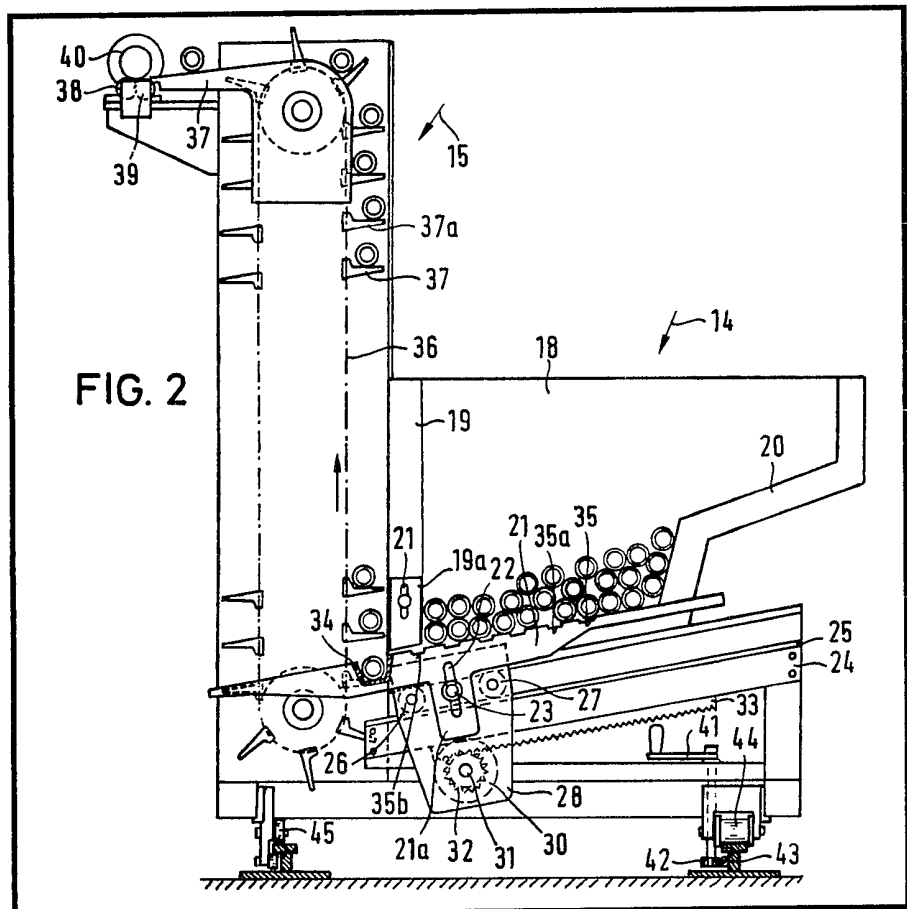


- (21) Application No 8034146
- (22) Date of filing
23 Oct 1980
- (30) Priority data
- (31) 2943769
- (32) 30 Oct 1979
- (33) Fed Rep of Germany
(DE)
- (43) Application published
20 May 1981
- (51) INT CL³ B65G 65/44
- (52) Domestic classification
B8U 101 105 D
- (56) Documents cited
GB 1489983
GB 1327773
GB 1033272
GB 952410
GB 868971
GB 821021
- (58) Field of search
B8U
- (71) Applicant
Rigobert Schwarze
Olperer Str 460-474
5000 Köln 91
Federal Republic of
Germany
- (72) Inventor
Rigobert Schwarze
- (74) Agents
Dr Walther Wolff & Co
6 Buckingham Gate
London SW1E 6JP

(54) Pipe feeding apparatus

(57) Apparatus for feeding individual pipes from a stock, particularly for the charging of a pipe bending machine comprises a supply container (14) from which pipes from a stock are individually passed through a passage barrier (19a) for onward conveying to the pipe bending machine. Arranged at the base of the supply container is a channel (34), which extends in the axial direction of the pipes, receives a pipe and is movable transversely to the axial direction of the pipe out of the container. A transport unit (15) is provided externally of the supply container (14) for onward transport of pipes removed from the container by the channel. Fig. 2.



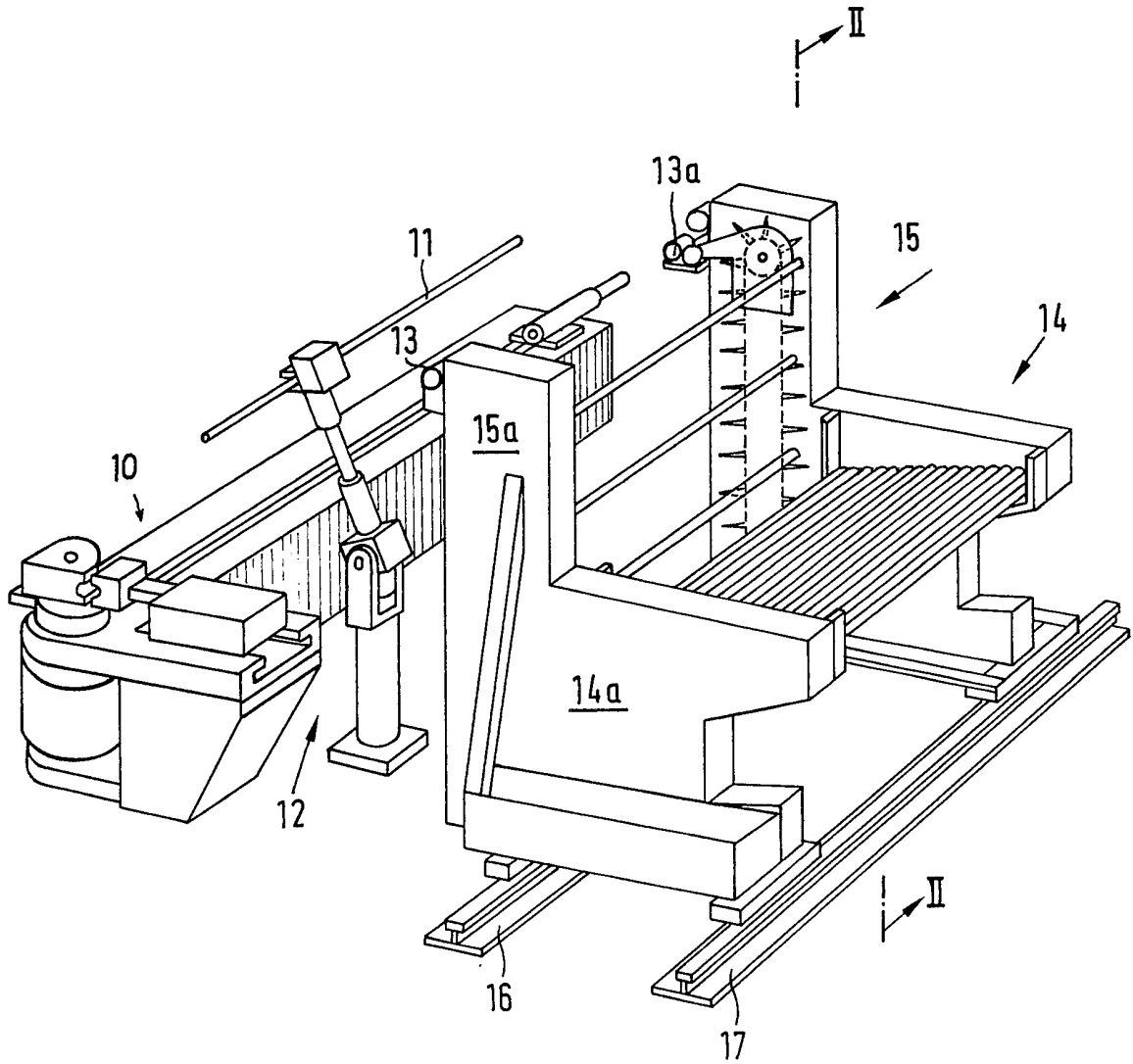


FIG. 1

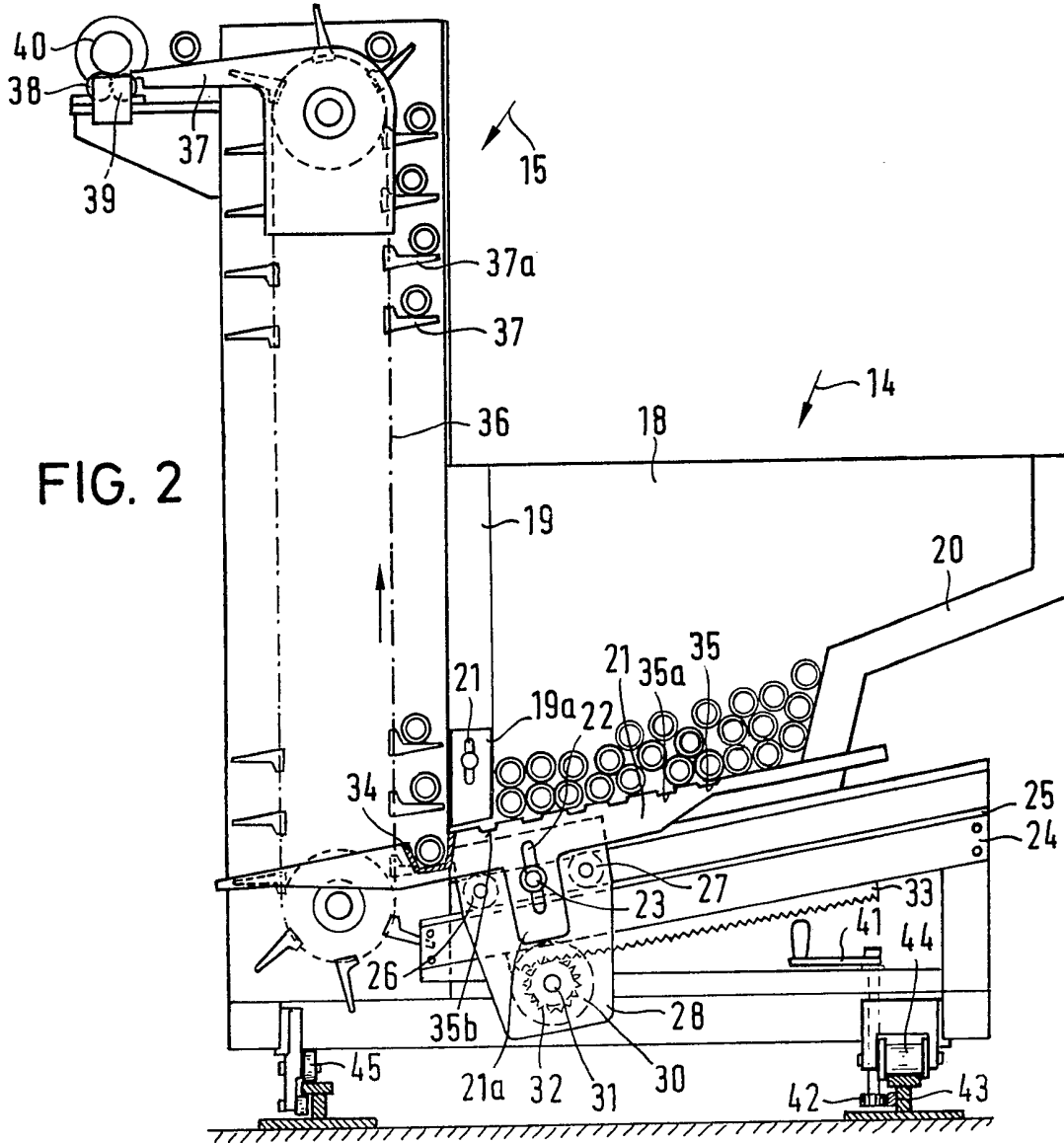


FIG. 2

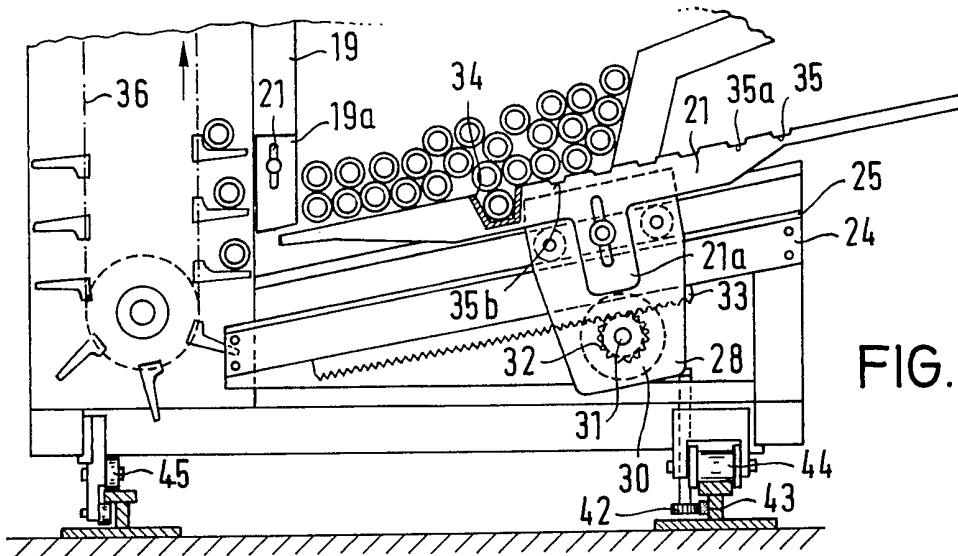


FIG. 3

FIG. 4

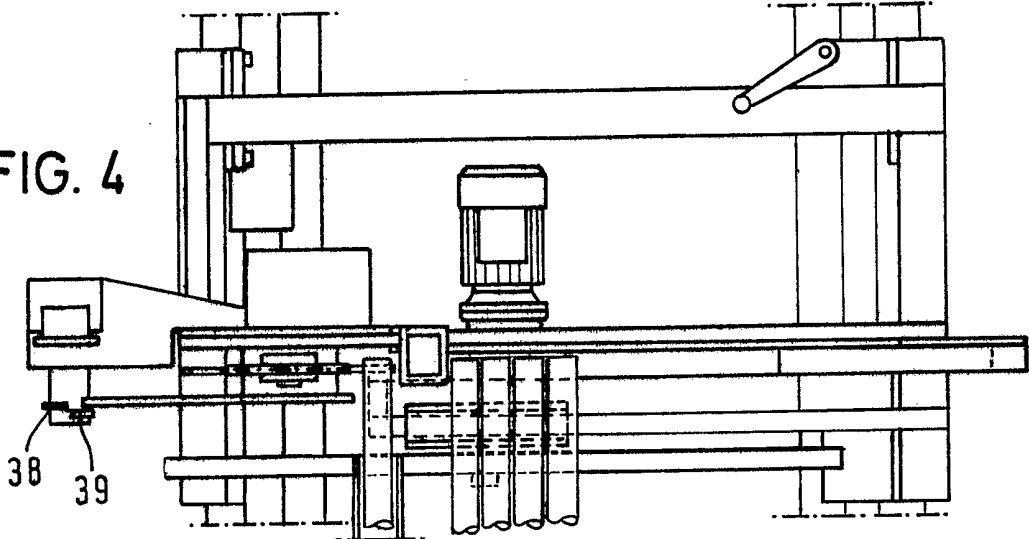
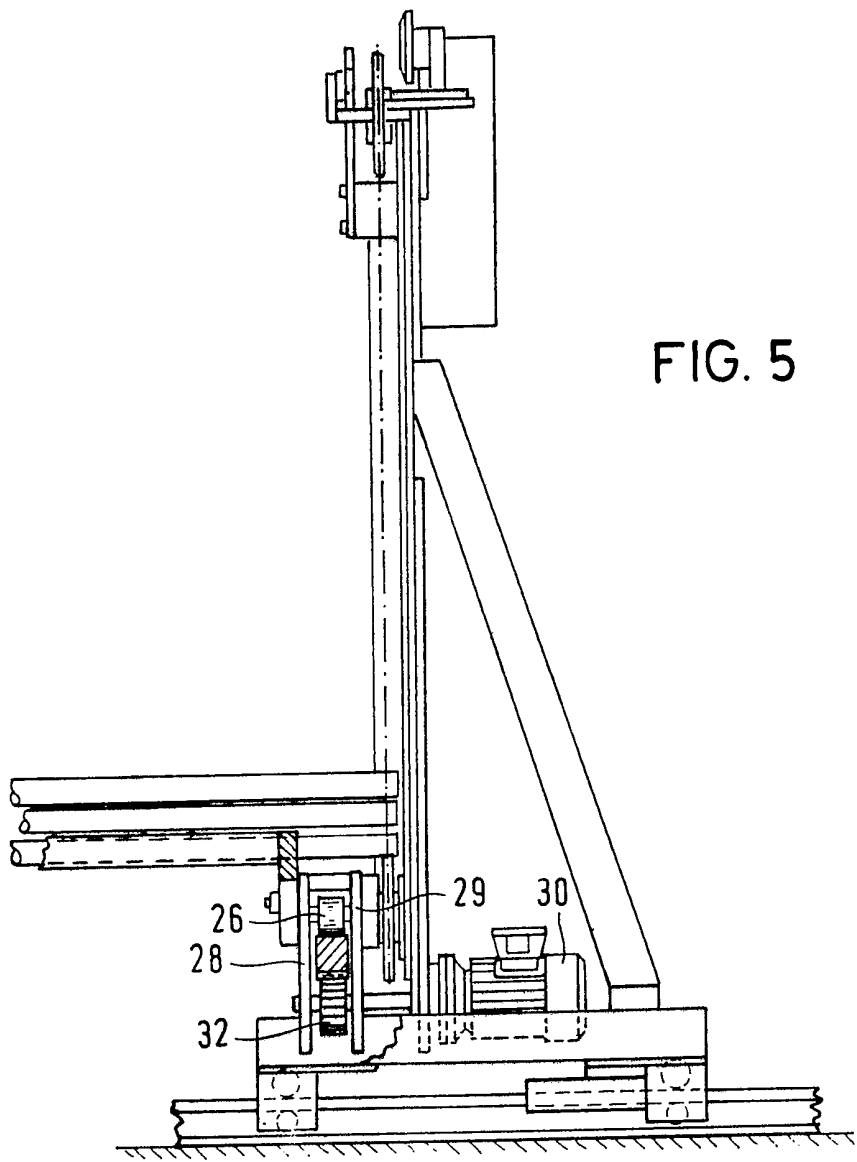


FIG. 5



SPECIFICATION

Pipe feeding apparatus

5 The present invention relates to pipe feed apparatus for feeding individual pipes from a stock.

10 It is known to feed pipes from a store individually through a passage barrier and to then transfer them by transverse movement to a pipe bending machine. A chute is provided for the successive transport of the pipes held in stock and is arranged at a substantial angle, the pipes being arranged at the chute one behind the other. It was previously necessary to isolate individual pipes and then bring them to the chute. However, when a group of pipes is stored in a container, it is very time-consuming to individually remove them from the container by hand. The withdrawal by hand of larger size pipes can also be unduly physically strenuous.

20 For the sake of rational production, mechanical introduction of a pipe stock into a supply container and mechanical withdrawal of individual pipes from the container are desirable. Since individual pipes can easily be firmly wedged in a quantity of pipes stored in a container and jointly form a so-called "bridge", the removal of individual pipes in succession from the container can be difficult. To achieve this, it is known to provide in the region of the container base a hydraulically or pneumatically actuated slide which displaces the pipes at the base of the supply container in a direction transverse to their longitudinal axes and brings the front pipe into a channel which extends in longitudinal direction of the pipes. Due to the effect of mechanical forces acting on the pipes, there is a risk that individual pipes may be bent. This is particularly so as a consequence of the application of axial force through a drive piston-cylinder unit to the pipe in the channel, because movement of the pipe out of the channel is possible which could lead to bending of the pipe and in some circumstances wedging of the pipe in the container.

45 There is accordingly a need for apparatus whereby pipes can be fed individually and securely, and without risk of damage, from a store containing a quantity of such pipes.

50 According to the present invention there is provided pipe feeding apparatus for feeding individual pipes from a stock, the apparatus comprising storage means for storing a quantity of pipes, pipe withdrawal means arranged at the base of the storage means and provided with a channel for receiving a single pipe from the stored quantity, the withdrawal means being displaceable to move a pipe received in the channel transversely to its axis past a barrier and out of the storage means, and transport means arranged externally of the storage means to transport each pipe with-

drawn from the storage means.

70 In apparatus embodying the invention, pipes may be stored on a movable base of the storage means and the movable base may be in the form of a carriage with the channel, whereby extraction of individual pipes from the storage means can be carried out without damaging the pipes.

75 Preferably, the upper side of such carriage is provided with spaced apart recesses extending in the axial direction of the pipes. If the pipes in the storage means bear against front and back walls thereof and the base of the storage means is reciprocatingly displaceable in a direction transverse to the pipe axes, the pipe support surface formed by the recessed upper side of carriage results in raising and lowering of the pipes during the displacement of the base. If a bridge has been formed by the pipes due to their close contact, this is destroyed. In addition, the movement process during the withdrawal of each individual pipe shakes the pipes as a consequence of the unevenly formed carriage upper side, i.e. base of the storage means, so that one of the pipes will always drop into the channel in the carriage. The carriage can then be driven to move the channel into a region outside the storage means, from where the pipe can be withdrawn from the channel and transported to, for example, a pipe bending machine.

90 Preferably, the storage means comprises two side elements which are, for example, arranged on rails so as to be adjustable in their spacing from each other, a respective such carriage, which provides support for the pipes in the region of the ends, being associated with each side wall element. The side wall elements themselves can also be provided at their inner edges with front and rear supports for the pipes. Through this measure, a simple adaptation of the storage means to the length of the pipes is possible.

100 Expediently, a toothed rack is arranged at the lower side of each side wall element and is engaged by a drive wheel of the associated carriage, the wheel being driven by a respective electric motor.

105 For preference, the transport means comprises a respective chain conveyor associated with each side wall element and arranged to circulate in a vertical plane, the conveyors being provided with gripper elements to engage the pipes at their ends and to convey the pipes away from the storage means. This provides a method of removing the pipes from the channel and conveying of the pipes to, for example, a pipe bending machine without exposing the pipes to risk of damage.

110 Preferably, the transport of the individual pipes away from the storage means by the conveyors is so related to the withdrawal of the pipes from the storage means that the conveyors are stopped for as long as the carriages are in the path of the conveyors. In

addition, to avoid idle cycles in charging of the pipe bending machine, the conveyors may be controlled to be displaced through several-steps simultaneously in the event of arrival at a pipe delivery station of gripper members without entrained pipes.

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic perspective view of pipe feed apparatus according to the said embodiment, in conjunction with charging apparatus for a pipe bending machine;

Figure 2 is a sectional view, on the line II-II of Fig. 1, of the pipe feed apparatus;

Figure 3 is a view, similar to Fig. 2, of part of the apparatus showing a carriage of the apparatus in a different setting;

Figure 4 is a plan view of the apparatus as shown in Fig. 2; and

Figure 5 is a side elevation of the apparatus as shown in Fig. 2.

Referring now to the drawings, there is shown a pipe bending machine 10 which is charged with individual pipes 11 by a pipe charging device 12, which withdraws the pipes 11 from a delivery deposit 13 and 13a. This is disposed at a relatively high elevation in order that the pipe charging device 12 only has to transverse about 90° in the vertical plane. The pipe charging device 12 is subject of German (Fed. Rep.) patent application P 29 27 753.0 of the applicant.

Pipes are fed to the deposit 13, 13a by pipe feeding apparatus comprising a pipe storage container 14 and a conveyor 15 downstream thereof. The container and conveyor are provided by a first unit 14, 15 and a second unit 14a and 15a. The two units are movable on rails 16 and 17 so that their spacing can be changed to accept different pipe lengths. Details of one such unit are evident from Fig. 2.

The pipe receiving container part of each unit is formed by a side wall 18, which at its front end has a support wall 19 projecting towards the respective other unit and at its rear end has a similar support wall 20. The two walls 19 and 20 form, in the region of the pipe ends, front and back wall sections of the container. The front wall 19 has a barrier element 19a, which is provided with a slot 21 and is so mounted by a screw engaged in the slot as to be adjustable in height.

The base of the container at each of the units is formed by a carriage, which comprises a member 21 provided with a downwardly directed projection 21a, the projection having receiving a bolt 23 whereby the member 21 is mounted, so as to be adjustable in height, on side plates 28 and 29 (c.f. Fig. 5). The plates 28 and 29 carry wheels 26 and 27, which are secured to both of the plates and run on the upper surface 25 of a rail 24

mounted by screws on a frame of a respective unit 14, 15 or 14a, 15a. Such a carriage, consisting of the member 21, side plates 28 and 29, and wheels 26 and 27, is associated with each of the units.

Mounted on the carriage of each unit is an electric motor 30 which has a shaft 31 driving a toothed pinion 32, which meshes with a toothed rack 32 on the rail 24. By means of its motor 30, each carriage can be driven to and fro between the positions illustrated in Figs. 2 and 3.

During travel towards the conveyor 15, each carriage receives a respective end of a single one of the pipes 11 in a channel 34 thereof. The channels 34 only extend over a short length, as it is only necessary for the pipe to be engaged at its ends. The channels 34 are matched to the external diameter of the pipe. The cross-section of the channel is preferably relatively large, so that for pipes of smaller external diameter, a channel-shaped insert can be placed in each channel 34. It is important that the width and the height of each channel are matched to the external diameter of the pipe so that the received pipe does not protrude above the channel or lie below the upper edge of the channel. One pipe from the stock stored in the container is received in the channels during displacement of the carriages. At which location this occurs is unpredictable and unimportant. Once a pipe has been received in the channels, further pipes cannot get into the channels. To avoid formation of bridges, the lower layer of the pipes is shaken during the movement of the carriages and to achieve this, recesses 35, 35a and 35b are provided at uniform spacings on each member 21.

Once the carriages have moved out of the path of the conveyor 15, in particular an upward run 36 thereof, then the conveyor, which comprises a respective chain associated with each of the units and provided with a plurality of regularly spaced grippers 37, 37a etc., is displaced through a step equal to the spacing of the grippers. The conveyor transports the pipes one after the other to downwardly inclined rails 37 at the deposit 13, 13a, the downward incline of the rails 37 allowing the deposited pipes to roll down onto two rollers 38 and 39, which are driven by a motor 40 to align the pipe with respect to its longitudinal welding seam. From this location, the pipe is picked up by the pipe charging device 12 and transferred to the pipe bending machine 10.

The movement of the conveyor 15 takes place as soon as the carriages have moved out of the path of the conveyor, as shown in Fig. 3. The operation is such that every upwardly moved pair of associated grippers should be occupied by a pipe. If, however, following movement of the carriages, a pipe is not received in the channels 34 and conse-

quently a gripper pair is not occupied by a pipe, then the stepped movement of the conveyor has to be continued, as it is required that a pipe should always present on the rollers 38 and 39 at the deposit 13, 13a for each cycle of the charging device 12, this cycle depending on the cycle of the pipe bending machine 10. In order to achieve this, the conveyor is displaced through two steps if one gripper pair is not occupied. If two successive gripper pairs are not occupied, the conveyor is displaced through three steps in order to ensure that a pipe is always deposited at the deposit 13, 13a as soon as the previous pipe has been withdrawn by the charging device 12.

To enable adjustment of the spacing of the two walls of the receiving container and the conveyor chains in accordance with the length of the pipes, a crank 41 is provided at each wall to drive a toothed wheel 42, which engages with a toothed rack 43 on the rail 17. The units 14 and 15 are mounted on the rails 16 and 17 by means of wheels 44 and 45.

CLAIMS

1. Pipe feeding apparatus for feeding individual pipes from a stock, the apparatus comprising storage means for storing a quantity of pipes, pipe withdrawal means arranged at the base of the storage means and provided with a channel for receiving a single pipe from the stored quantity, the withdrawal means being displaceable to move a pipe received in the channel transversely to its axis past a barrier and out of the storage means, and transport means arranged externally of the storage means to transport each pipe withdrawn from the storage means.

2. Apparatus as claimed in claim 1, the withdrawal means comprising a carriage which forms a base of the storage means for supporting the stored pipes.

3. Apparatus as claimed in claim 2, wherein the carriage is provided in an upper side thereof with a plurality of spaced apart recesses to effect agitation of the stored pipes through displacement of the carriage.

4. Apparatus as claimed in either claim 2 or claim 3, the storage means comprising two side wall elements arranged at an adjustable spacing from each other and each provided with support surfaces for supporting stored pipes at their end portions, a respective such carriage being associated with each of the elements to support the pipes in the region of their ends.

5. Apparatus as claimed in claim 4, wherein the side wall elements are mounted on rails to be relatively movable towards and away from each other.

6. Apparatus as claimed in either claim 4 or claim 5, wherein each of the side wall elements is provided with a rack and the

associated carriage is provided with a drive pinion meshing with the rack and with a drive unit operable to drive the pinion thereby to effect said displacement of the carriage.

7. Apparatus as claimed in any one of claims 4 to 6, the transport means comprising a respective upright endless conveyor associated with each of the side wall elements and provided with entraining members for entraining individual pipes and conveying them upwards from the storage means.

8. Apparatus as claimed in claim 7, comprising drive means operable intermittently to drive the conveyors.

9. Apparatus as claimed in either claim 7 or claim 8, comprising means for stopping drive of the conveyors when, on displacement of the carriages to move a pipe out of the storage means, the carriages move into the path of the conveyors.

10. Apparatus as claimed in any one of claims 7 to 9, comprising control means to so control driving of the conveyors as to cause the conveyors to deliver the conveyed pipes at a delivery station at substantially constant intervals.

11. Apparatus as claimed in claim 10, wherein the conveyors are drivable in steps corresponding to the distance between successive ones of the entraining members, said control means being adapted to so control the driving of the conveyors that, in the event of arrival at the delivery station of entraining members without an entrained pipe, the conveyors are continuously displaced through a sufficient plurality of steps to bring entraining members with an entrained pipe to the delivery station.

12. Pipe feeding apparatus for feeding individual pipes from a stack, the apparatus being substantially as hereinbefore described with reference to the accompanying drawings.

13. Apparatus as claimed in any one of the preceding claims in conjunction with a pipe bending machine, the pipe bending machine being synchronised to receive pipes from the transport means of the apparatus.