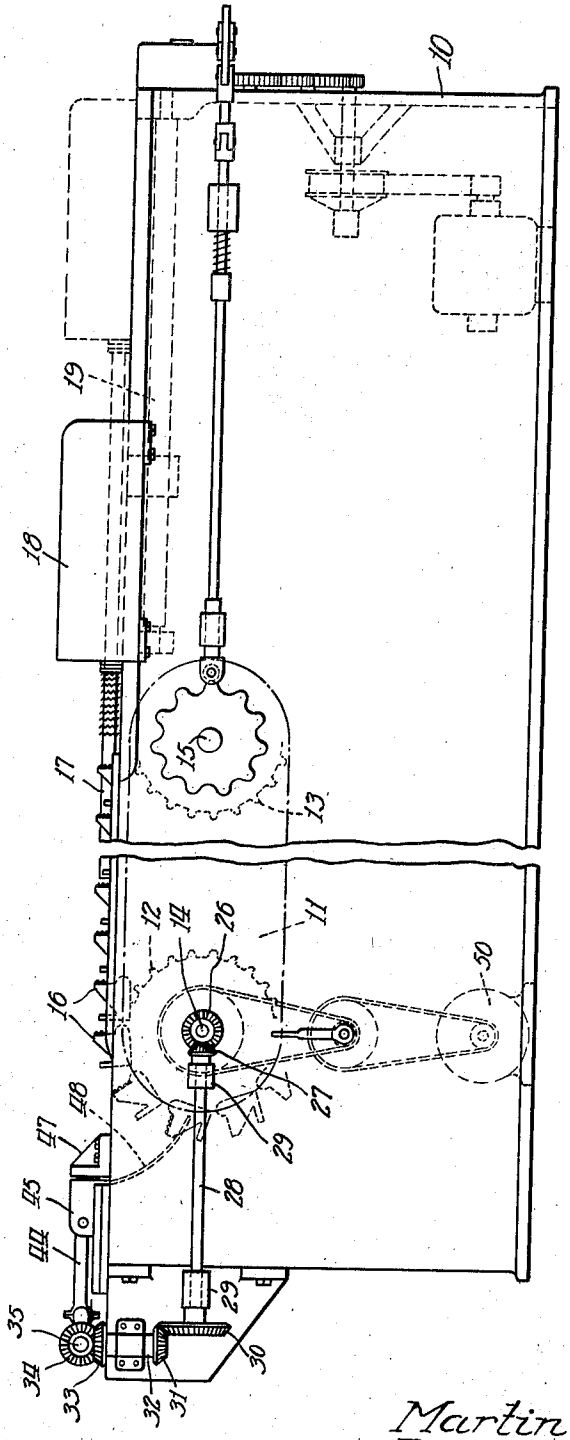
July 2, 1935. M. G. BOERGER 2,006,383

MACHINE FOR FABRICATING RADIATOR CORES

Filed Nov. 22, 1932 4 Sheets-Sheet 1

Fig. 1



Witness:
V. Silgander

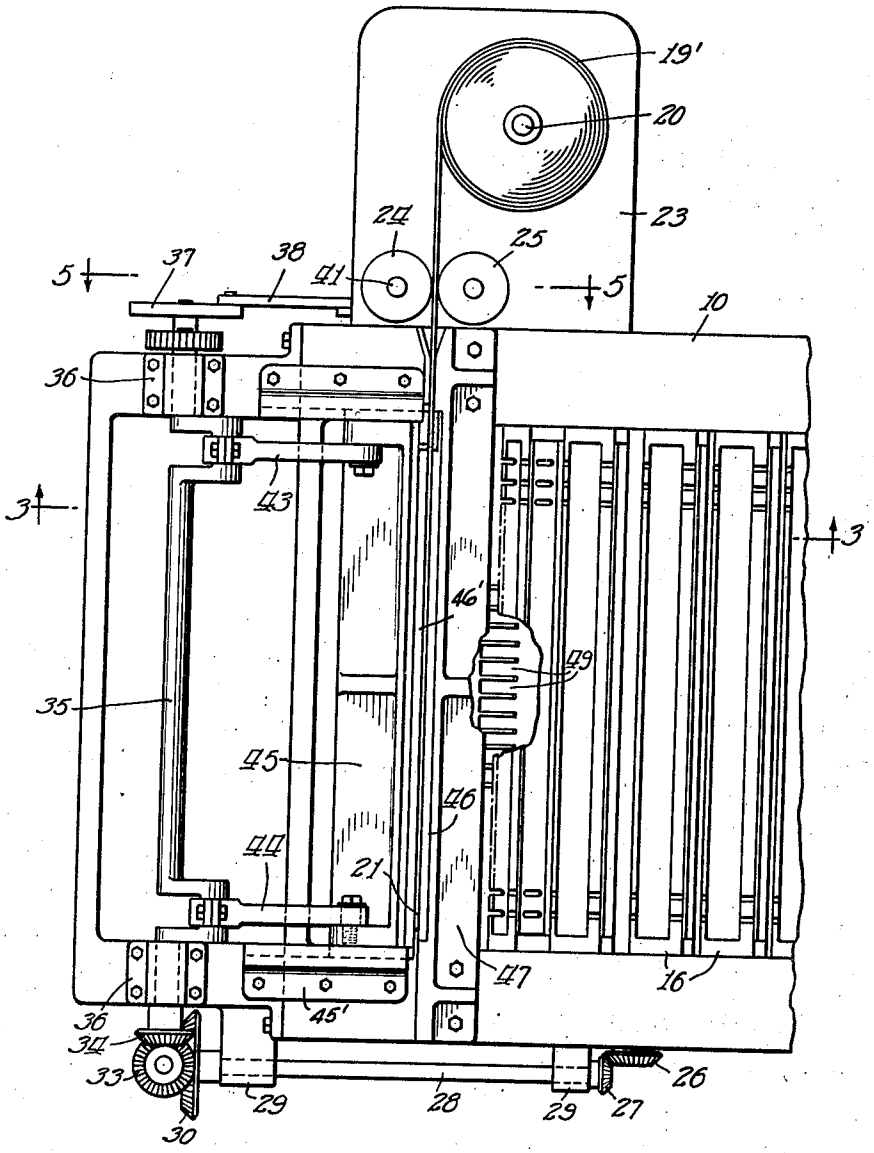
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MACHINE FOR FABRICATING RADIATOR CORES

Filed Nov. 22, 1932 4 Sheets-Sheet 2

Fig. 2



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MACHINE FOR FABRICATING RADIATOR CORES

Filed Nov. 22, 1932 4 Sheets-Sheet 3

Fig. 3

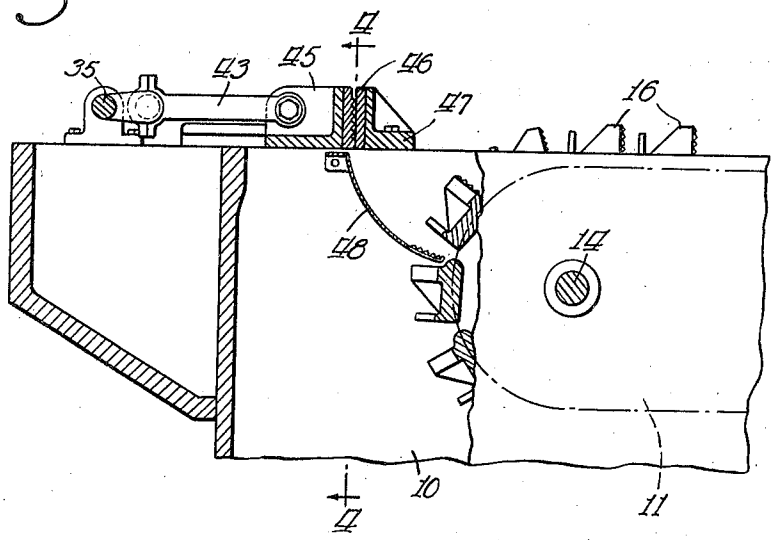


Fig. 4

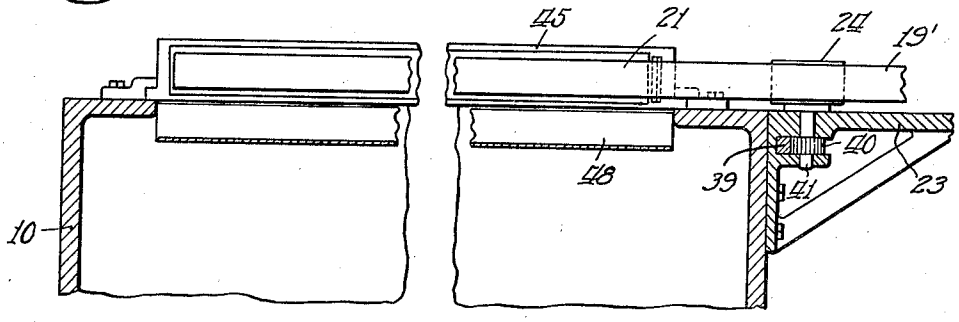


Fig. 8.

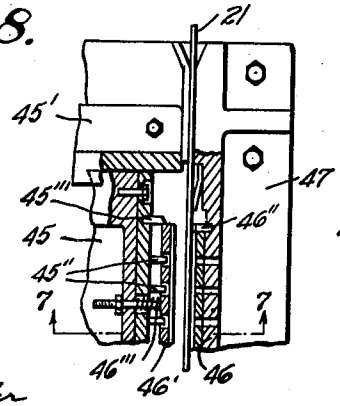
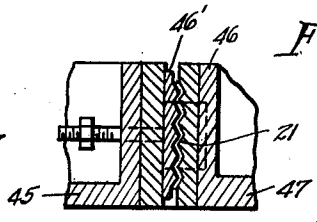


Fig. 7.



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MACHINE FOR FABRICATING RADIATOR CORES

Filed Nov. 22, 1932 4 Sheets-Sheet 4

Fig. 5

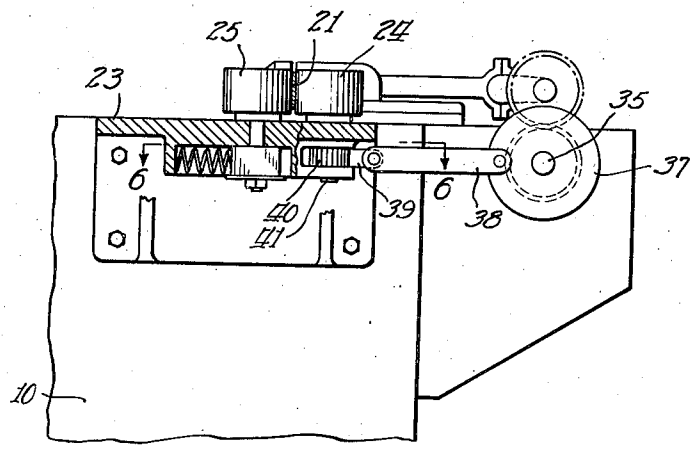
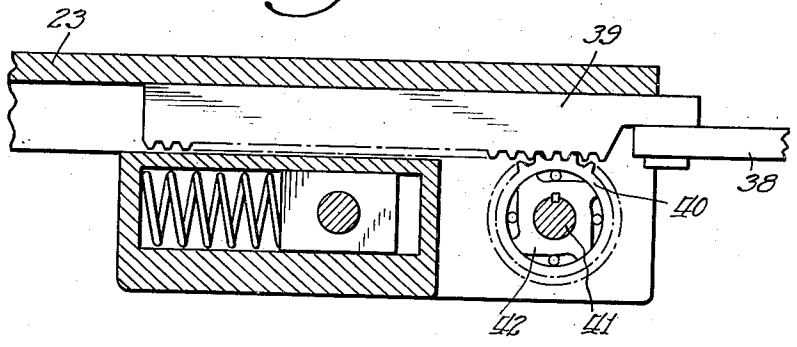


Fig. 6



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Patented July 2, 1935 2,006,383

UNITED STATES PATENT OFFICE

2,006,383

MACHINE FOR FABRICATING RADIATOR CORES

Martin G. Boerger, Racine, Wis., assignor to Modine Manufacturing Company, Racine, Wis., a corporation of Wisconsin

Application November 22, 1932, Serial No. 643,885

7 Claims. (Cl. 113—1)

The invention relates to a machine for fabricating a radiator core, the core being comprised of fins and tubes and the combination thereof with means for producing the fins and presenting them to a means for associating said fins and tubes.

It is an object of the invention to produce a machine for accomplishing the above mentioned advantage capable of successively feeding fins to tubes and spacing said fins a prescribed distance from each other upon the tubes and to associate with a mechanism such as this means capable of forming the fins, this last mentioned means being arranged relatively to the first mentioned means so that the completed fin will be presented to the means for applying the fins to the tubes.

Another object of the invention is to construct a machine such as that above referred to in which fin stock of strip form may be presented to means for fashioning the fin.

Another object of the invention is to provide an automatically operable machine capable of operating upon fin stock to fashion the fin, the stock being automatically fed to the forming device which, after this last mentioned operation is completed, will deliver the completed fins to means for presenting them to the tubes to fabricate the core.

The invention has these and other objects, all of which will be explained in detail and more readily understood when read in conjunction with the accompanying drawings which illustrate one embodiment of which the invention is susceptible, it being manifest that changes and modifications may be resorted to without departing from the spirit of the appended claims forming a part hereof.

In the drawings, Fig. 1 is a side elevation of a machine constructed to accomplish the above enumerated advantages;

Fig. 2 is a plan view of one end of the structure shown in Fig. 1;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 is a section taken on line 4—4 of Fig. 3;

Fig. 5 is a section taken on line 5—5 of Fig. 2;

Fig. 6 is a section taken on line 6—6 of Fig. 5;

Fig. 7 is an enlarged sectional detail taken substantially on line 7—7 of Fig. 8; and

Fig. 8 is an enlarged sectional detail of the die and associated parts shown in Fig. 3.

The structure illustrated contemplates the utilization of a main frame 10 providing a support for the various elements entering into the construction. This frame supports an endless element 11 which is carried by sprockets 12 and 13 mounted upon shafts respectively designated 14 and 15. This endless element 11 is provided with a plurality of elements 16 which are designed to engage the formed fins and present them to a rack of tubes generally designated 17 to arrange said fins in spaced relation to each other thereon, these parts are so constructed and arranged that the tubes are supported by the elements 16 during the period in which the fins are presented to said tubes, and that they are movable in a direction longitudinally of said tubes a prescribed distance for each fin presented to said rack of tubes. A head 18 providing an abutment for said rack is provided which is movable a prescribed distance by means of the worm shaft 19 in the direction of movement of the working side of the endless element 11.

A machine constructed in this manner is shown and described in my application, Serial No. 643,884, filed November 22, 1932. The structure shown in the application just referred to contemplates the utilization of a hopper into which the formed fins are deposited and from which they are dispensed and presented to the elements 16 which, as before stated, present the fins to the rack of tubes generally designated 17.

The present invention contemplates the provision of a device capable of accepting stock from which the fin is to be produced, fashioning the fin and automatically presenting the same to the elements 16 of the conveyor 11 and to operate a device such as that just referred to through a connection preferably made with one of the shafts such as 14. The device for fashioning and presenting the finished fin to the conveyor 11 contemplates means for presenting a strip of material to means for fashioning and severing a portion of the strip from the remainder to thus produce the desired fin and then presenting the severed piece to elements such as 16 of the conveyor. To accomplish this advantage, a roll of fin stock generally designated 19' is mounted upon a spindle 20 and a portion thereof such as 21 is intermittently advanced to a fashioning and severing mechanism generally designated 22 which fashions the stock, severs it and causes the finished article to be presented to the elements 16 of the conveyor. The roll of fin stock is supported through the agency of a bracket 23 which is fastened to the main frame 10. This fin stock is intermittently presented to the device generally designated 22 through the agency of feed rolls 24 and 25 between which the fin stock extends and which are intermittently operated

to advance the stock to the device generally designated 22.

As before stated, the mechanism just referred to and the means for fashioning and severing the fin is preferably operated through the medium of a driving connection with the shaft 14 of the conveyor 11 and to this end, a bevel gear 26 is secured to the shaft 14. This gear 26 meshes with another bevel gear 27 mounted upon a shaft 28 supported in bearings 29. This shaft 28 is provided with another bevel gear 30 which in turn meshes with a bevel gear 31. This bevel gear 31 is connected with a shaft 32 having a bevel gear 33, the latter meshing with a bevel gear 34 provided upon the crank shaft 35 which extends across an end of the machine and is supported upon suitable brackets 36 upon the frame 10.

The crank shaft 35 is provided with a crank disc 37 having one end of a connecting rod 38 secured thereto, the opposite end of the connecting rod 38 being connected with a rack 39 which meshes with a gear 40 secured to a shaft 41. A ball or other clutch 42 is interposed between the gear 40 and the shaft 41. This clutch is of a character which will impart rotative motion to the shaft 41 when the gear thereof is rotated in one direction, but will not impart any motion to said shaft when the gear is rotated in the opposite direction.

The feed roll 24 is connected with the shaft 41 and it is therefore evident that rotative motion is imparted to the feed rolls 24 and 25 when the rack 39 is moved in one direction, but will not be actuated when said rack is moved in the opposite direction which will thus impart intermittent motion to the rolls 24 and 25 and thus intermittently feed a predetermined portion of the strip of fin stock 21 to the fashioning and severing mechanism generally designated 22.

The crank shaft 35 has links 43 and 44 connected therewith. One end of each link is connected to a movable ram 45 which is slidably mounted upon ways 45' attached to the main frame 10. The ram 45 is provided with any desired form or number of piercing punches 45'' rigidly attached thereto each adapted to cooperate with corresponding parts upon a fin die 46 to produce the desired openings in the fins to receive the tubes 17.

The face of the die 46 may be grooved or otherwise formed if desired, so that indentations, corrugations or other forming may be produced in or upon the fin by the closing of the ram 45 toward the die 46. A blade 45''' is also rigidly attached to the ram 45 arranged to cooperate with a blade 46'', or part upon the die 46 to sever the formed and pierced fin from the strip 21.

A stripper 46' is also mounted upon the ram 45 with suitable springs 46''' or other convenient means for yieldingly holding the face of the stripper beyond the outer end of the piercing punches 45'' so that as the ram 45 is retracted the stripper will remove the finshed fin from the punches and permit the same to fall from between the punches and the die. The face of the stripper is preferably formed to correspond with any grooves, indentations or projections upon the face of the die 46, so that when the ram reaches its point of nearest approach to the die 46, the stripper will be thereby forced against the die with the punched and severed fin between the stripper and die to produce the desired form upon the face of the fin.

In the form shown, the fin die 46 is mounted upon a stationary bolster or balking plate 47 rigidly mounted upon the frame 10, and is so positioned and arranged in relation to the conveyor 11, that as the fins fall from the fin die 46, they are received upon an apron 48 which preferably extends from a point below and slightly in front of the die 46 and curves downward and toward the adjacent end of the conveyor 11. so that the finished fins released from the punches and the die 46 slide downward to the lower edge thereof. This apron is provided with transverse slots 49 which permit the elements 16 upon the conveyor to pass through the outer margin of the apron and receive and remove any fin resting thereon. The conveyor 11 may be operating in any desired manner, as for instance, through the agency of a motor 50 connected in the usual or any desired manner with the shaft 14 to rotate the same.

From the foregoing description it is believed obvious that when the shaft 14 is rotated, the shaft 28 will be rotated also, which in turn will actuate the crank shaft 35 reciprocating the movable ram, and in addition will cause motion to be imparted to the rack 39. The movement of this rack will operate the feed rollers 24 and 25 and advance a portion of the strip of stock into the space between the ram 45 with its punches, stripper and cutting blade and the fin die 46 which will fashion and sever the fin from the strip and permit the fin to pass to the assembling mechanism and be presented to the element 16 of the conveyor which is also operated positively by the rotation of the shaft 14 as described in my copending application to successively present the fins to the tubes and thus fabricate the radiator core.

It is obvious also that the combination of elements herein described provides a machine which facilitates the production of a radiator core and greatly increases the speed and effciency of producing the same, thus effecting a material reduction in the cost of such cores.

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

1. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming the fins and severing the same from a strip, and means for receiving and supporting said fins as they are released from said forming means, in combination with an endless element mounted on rotatable means and provided with means for supporting the tubes in position and for successively removing said fins from said receiving means, carrying the same one by one to the ends of said tubes and separately moving the same into position upon said tubes.

2. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming the fins and severing the same from a strip, and means for receiving and supporting said fins as they are released from said forming means in combination with rotatably movable means for supporting the tubes in position, said movable means also being arranged for successively removing said fins from said receiving means, carrying the same one by one to the ends of said tubes and separately moving the same into position upon said tubes.

3. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming

the fins and severing the same from a strip one by one, mechanism for automatically feeding said strip to said forming means, and means for receiving and supporting said fins as they are released from said forming means in combination with annularly spaced rotatably movable means for supporting the tubes in position and for successively removing said fins from said receiving means, carrying the same one by one to the ends of said tubes and separately moving the same into position upon said tubes.

4. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming the fins and severing the same from a strip one by one, mechanism for automatically feeding said strip to said forming means and means for receiving and supporting said fins as they are released from said forming means in combination with an endless element mounted on rotatable means and provided with movable means for supporting said tubes in position and for successively removing said fins from said receiving means, carrying the same one by one to the ends of said tubes and separately moving the same into position upon said tubes.

5. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming the fins and severing the same from a strip one by one, and means for receiving and supporting said fins as they are released from said forming means in combination with an endless element mounted on rotatable means and provided with movable means for supporting the tubes in position, said movable means being also formed and arranged to successively remove said fins from said receiving means, carry the same one by one to the ends of said tubes and separately move the same into position upon said tubes.

6. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, means for successively forming the fins and severing the same from a strip one by one, mechanism for automatically feeding said strip to said forming means, and means for receiving and supporting said fins as they are released from said forming means in combination with an endless element mounted on rotatable means and provided with means for supporting the tubes in position, said supporting means also being formed and arranged to successively remove said fins from said receiving means, carry the same one by one to the ends of said tubes and separately move the same into position upon said tubes.

7. In a machine for fabricating radiator cores, said cores comprising tubes and fins mounted upon said tubes, forming mechanism comprising means for successively forming the fins and severing the same from a strip one by one, and means for receiving and supporting said fins as they are released from said forming means in combination with assembling mechanism comprising rotatable means for supporting the tubes in position, said rotatable means being also formed and arranged to successively remove said fins from said receiving means, carry the same one by one to the end of said tubes and separately move the same into position upon said tubes, a driving element and means positively connecting said forming mechanism and said assembling mechanism to said driving element to operate the same synchronously.

MARTIN G. BOERGER.