C. A. WILLIAMS.

MACHINE FOR FORMING MULTIPLE UNIT TUBES.

APPLICATION FILED FEB. 25, 1910.

1,028,312.

Patented June 4, 1912.

2 SHEETS—SHEET 1.

Fig. 2.

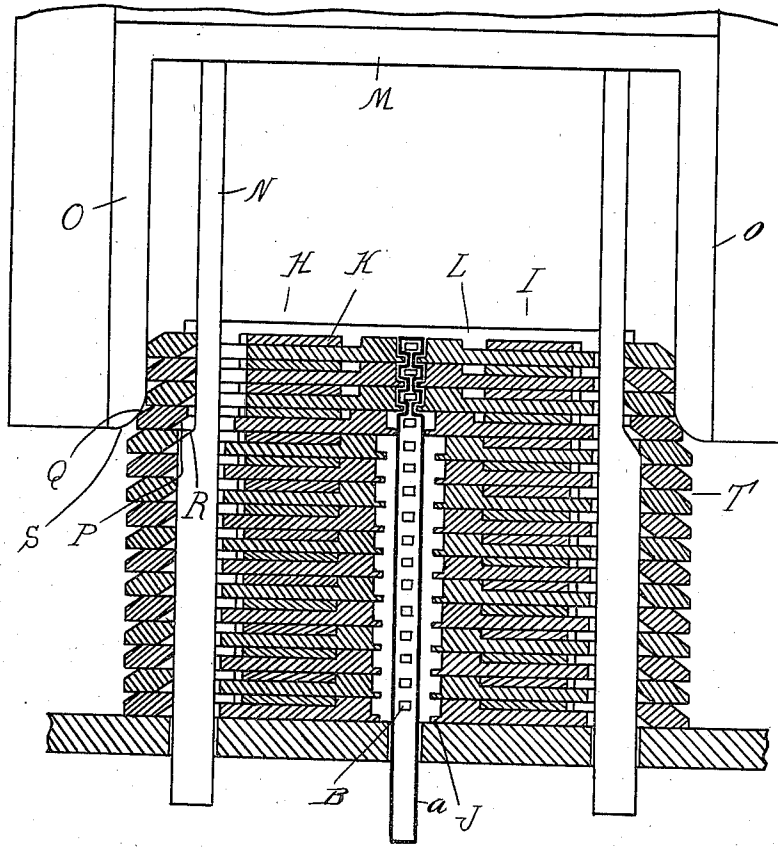
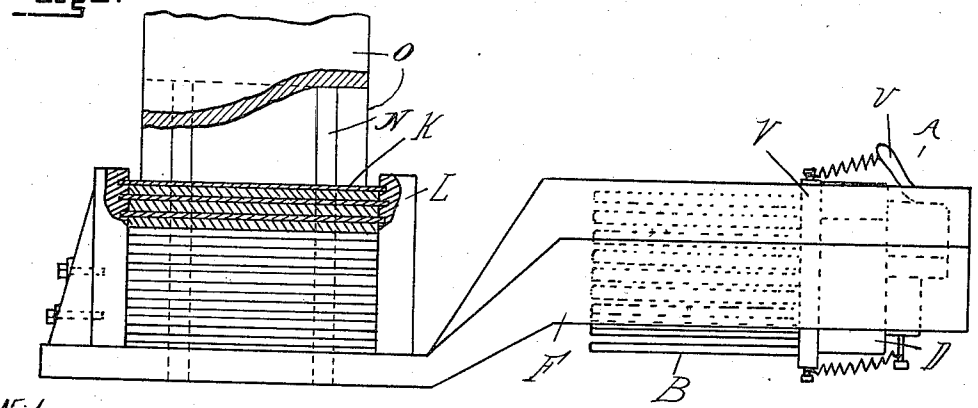


Fig 1.



Witnesses

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Fig3.

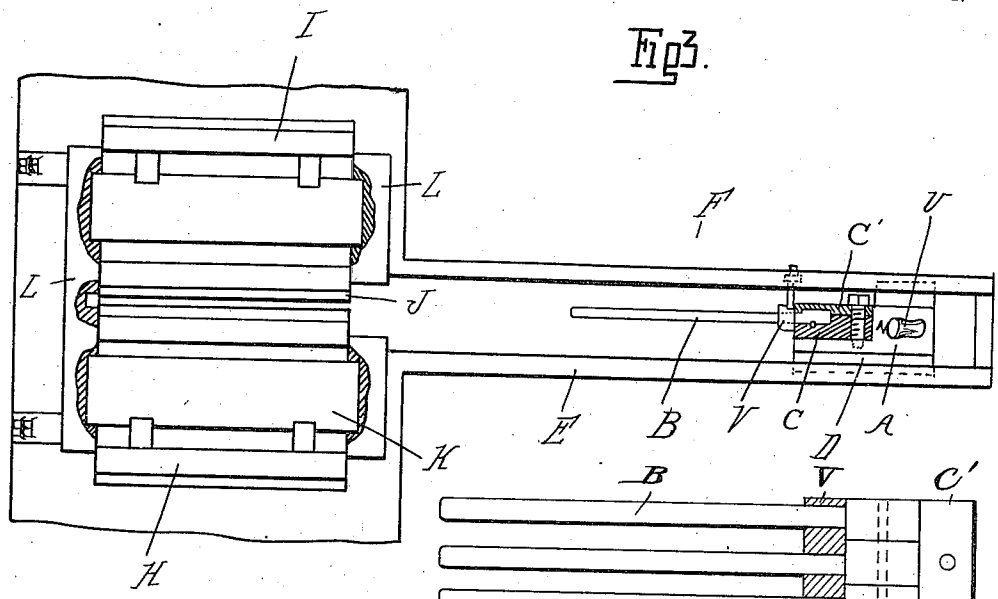

Fig4.

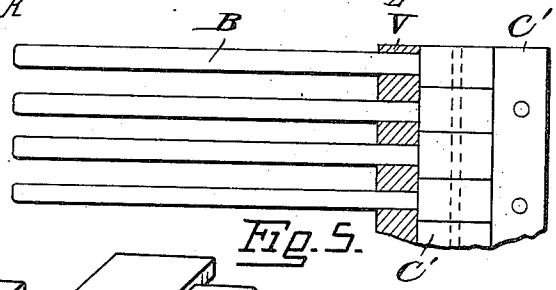

Fig. 5.

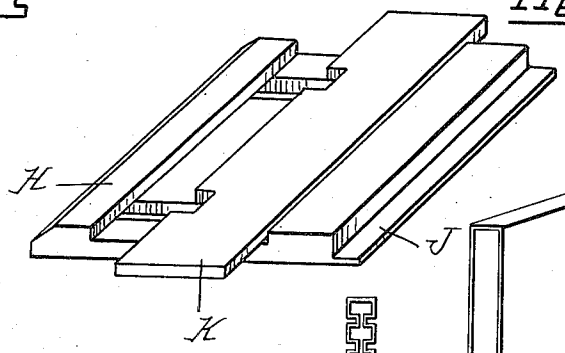

Fig. 6

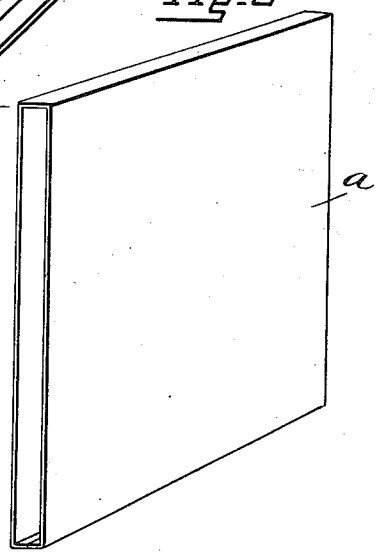

Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES A. WILLIAMS, OF DETROIT, MICHIGAN, ASSIGNOR TO BRISCOE MANUFACTURING COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

MACHINE FOR FORMING MULTIPLE-UNIT TUBES.

1,028,312. Specification of Letters Patent. Patented June 4, 1912.

Application filed February 25, 1910. Serial No. 545,949.

To all whom it may concern:

Be it known that I, CHARLES A. WILLIAMS, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Machines for Forming Multiple-Unit Tubes, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to the manufacture of multiple unit tubes, more particularly designed for use in the construction of radiators for automobiles, and the invention consists in the construction as hereinafter set forth.

In the drawings—Figure 1 is a side elevation of the machine; Fig. 2 is a cross section thereof; Fig. 3 is a plan; Fig. 4 is a perspective view of some of the parts detached; Fig. 5 is a sectional view illustrating certain details; Fig. 6 is a perspective view of the tube in blank form; and, Fig. 7 is an end elevation of the complete multiple unit tube.

My improved machine is more particularly designed for the formation of radiator tubes, where a "square effect" is desired,—that is, the air tubes, instead of being arranged to produce diagonal lines in the radiator frame, are arranged to form vertical and horizontal lines, with each individual tube substantially a square. In the construction of diagonal or honeycomb radiators, multiple unit tubes have been employed, in which a large tube is fashioned by dies to have a zig-zag wall producing a series of adjacent small tubes. Such a structure may be easily produced, but in the formation of multiple unit tubes, to produce a square effect it is necessary to fashion the structure by a successive action of the dies operating from one side toward the other. Furthermore, for the practical requirements of the work, it is necessary to form multiple unit tubes for radiators of different widths and heights. My machine is so constructed that the tubes are formed by a successive operation of the dies, and by a suitable adjustment any desired width or number of individual tubes may be obtained.

In detail, A is a core or mandrel member, which is built up of a plurality of square section units B spaced from each other in any suitable manner as by having the rear ends thereof of enlarged rectangular cross section, as shown in Fig. 5. These units B are assembled preferably by clamping the same between plates C and C′, which are secured to a member D slidably engaging ways E upon a frame F. Any number of units B may be arranged in series between the clamping plates C C′, and when secured by clamping bolts C they are held in properly spaced relation to each other. The core A is arranged to project laterally between a double series of horizontally moving forming dies H and I. Each of these dies is provided with a finger J for insertion in the space between adjacent core members, and the arrangement is such that by operating the pair of corresponding dies in the series H and I simultaneously, the sheet metal blank will be forced inward to form one of the square sections of the multiple unit tube. The dies of the series H and I are formed of superposed plates slidably engaging horizontal cross guides K mounted in a frame L.

M is an actuating cam member, which has parallel portions N and O engaging opposed bearings on the die plates. These opposed bearings P and Q are inclined with respect to the direction of the movement of the cammed member M, and the members N and O are formed with coöperating inclined portions R and S. The arrangement is such that the depression of the member M will successively actuate the slidable plates of the series H and I in one direction, and the raising of the member M will successively actuate said die members in the opposite direction. The member M is arranged to slidably engage suitable bearings T, and is actuated by the reciprocatory plunger of a press, or other suitable mechanism, not shown.

In operation, a flattened tube of sheet metal *a* of the contour illustrated in Fig. 6, having parallel sides, is engaged with the core member A, and is sustained thereby intermediate the series H and I of the slidable die members. The member M is then reciprocated and in its downward movement will cause the successive inward movement of the dies, the fingers J of which will press the sheet metal into the spaces between the members B and form the individual tube. During this operation, the sheet metal is drawn upward, and the blank tube is sufficiently large to provide all the metal need-

ed for forming the inward projections. Upon the return movement of the member M, the dies with their fingers J are successively withdrawn, and upon the completion of this movement, the core A is withdrawn laterally, preferably through the medium of a handle U, thereby disengaging it from the formed multiple unit tube (shown in Fig. 7). A stripper V is arranged to engage with the inner edge of the finished work to hold it from movement as the core is withdrawn.

My machine is adapted for the forming of multiple unit tubes, having any number of individual tubes, not exceeding the number of dies in the series H and I, and whenever necessary these series may be increased by the addition of other dies. Thus the machine is adapted for a large variety of work.

What I claim as my invention is:

1. A machine for forming multiple unit tubes comprising a core member for engaging a blank tube and having a series of recesses or pockets therein, a series of die members each movable in a rectilinear path and laterally with respect to the core member for forcing the metal of the blank into said recesses, and means for operating said die members successively.

2. A machine for forming multiple unit tubes comprising a core member formed of a series of spaced sections and adapted to engage a blank tube, a series of die members each movable in a rectilinear path at substantially right angles to the core member for forcing the metal of the blank into the spaces between the sections of said core, and means for operating said die members successively.

3. A machine for forming multiple unit tubes, comprising a core member formed of a series of spaced sections, a series of pairs of die members respectively upon opposite sides of said core member and adapted to engage the spaces between the sections of said core member, and means for actuating said die members successively with the members of the same pair operated simultaneously.

4. A machine for forming multiple unit tubes, comprising a core member having a series of spaced sections, a series of pairs of die members arranged upon opposite sides of said core member and movable laterally with respect thereto into engagement with the spaces therebetween, and means for successively operating the pairs of dies and for withdrawing the same.

5. A machine for forming multiple unit tubes, comprising a core member formed of a series of spaced sections to which said sections are secured, a series of die members for engaging the spaces between said sections and movable laterally with respect thereto, and a reciprocatory cammed member engaging said dies to actuate the same successively.

6. A machine for forming multiple unit tubes, comprising a core member for engaging a blank tube and having a series of recesses or pockets therein, a series of die members for forcing the metal of the blank into said recesses, and a cam traveling longitudinally of the series of die members for operating the latter successively.

7. A machine for forming multiple unit tubes, comprising a core member for engaging a blank tube and having a series of recesses or pockets therein, a series of die members for forcing the metal of the blank into said recesses, said die members being provided with alining apertures, and an operating member having a portion thereof positioned within said alining apertures.

8. A machine for forming multiple unit tubes, comprising a core member for engaging a blank tube and having a series of recesses or pockets therein, a series of die members for forcing the metal of the blank into said recesses, said die members being provided with alining apertures, one of the walls of each aperture being cammed, the cams arranged upon the outer end of the die members and a reciprocatory cam member having portions positioned in operative relation to the cammed surfaces of the die members.

9. A machine for forming multiple unit tubes comprising a core member formed of a series of spaced sections adapted to engage the blank tube, a series of die members arranged upon one side of the blank, and a second series of coöperating die members positioned upon the opposite side of the blank, and means for effecting a relative movement between the corresponding die members of the two series and for actuating the die members of the series successively.

10. A machine for forming multiple unit tubes comprising a core member formed of a series of spaced sections adapted to engage the blank tube, a series of die members arranged upon one side of the blank and a second series of corresponding die members positioned upon the opposite side of the blank, and means for effecting a relative movement between the corresponding members of the two series and for operating the members of one of the series successively.

11. A machine for forming multiple unit tubes comprising a core member formed of a series of spaced sections adapted to engage the blank tube, a series of die members arranged upon one side of the blank, and a second series of coöperating die members positioned upon the opposite side of the blank, and means for effecting a successive oper-

ation of the die members upon opposite sides of the blank.

12. A machine for forming multiple unit tubes comprising a core member formed of a series of spaced sections adapted to engage a blank tube, a series of die members arranged upon one side of the blank tube, and a second series of corresponding die members positioned upon the opposite side of the blank, and means for effecting a relative movement between the corresponding members of the two series for successively operating upon opposite sides of the work.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES A. WILLIAMS.

Witnesses:
GEO. TAILINGEN,
GRACE NEWELL.