F. A. STEVENSON.
FISH BELLY PUNCHING DEVICE.
APPLICATION FILED FEB. 10, 1914.
3 SHEETS—SHEET 3.
To all whom it may concern:

Be it known that I, FREDERICK A. STEVENSON, residing at Detroit, Michigan, and being a citizen of the United States, have invented certain new and useful Improvements in Fish-Belly-Punching Devices, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred forms of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a longitudinal vertical section through the same. Fig. 3 is a bottom plan view of the upper part of said machine. Fig. 4 is a horizontal section along the line 4—4 of Fig. 1. Fig. 5 is an end view of the machine. Fig. 6 is a vertical transverse section along the line 6—6 of Fig. 1. Fig. 7 is a sectional detail view, showing the control of the punches through the agency of the gage; and, Fig. 8 shows a diagrammatic fish belly sill as it would appear in plan view, when in place in the machine, disclosing the positions of the holes to be produced along the broken line edge.

Fish belly center sills, and in some instances side sills of this form for railway car underframes, present the problem of avoiding awkward manipulation of the web plate of a built-up sill, in punching those holes which parallel the fish belly outline. If the end of such a web plate be advanced through a multiple punch, the movement of the plate being in the direction of its length, it is impossible to set up a gang of punches which will punch each succeeding hole that parallels the fish belly outline as it arrives in sequence at the line of punches which are disposed transversely of the web plate. That is to say, each succeeding hole to be punched adjacent the diagonal edge of the fish belly outline of the web plate is laterally offset from the preceding one by an insufficient space to permit a side by side arrangement of punches adapted to successively punch the said diagonally disposed holes. Consequently, these holes running beside the fish belly outline must be produced by another operation, usually involving the removal of the plate to another punching machine, and an ungainly action in presenting the broken line fish belly edge of the web plate to the punch or punches which are to perform the work upon it.

An object of the invention herein set forth is to provide simple and effective means to eliminate more than a single handling of sill web plates of the fish belly type, and a further object is to produce the punching of all the holes in said plate by a single passage through the multiple punch in which this device is installed.

Consulting the drawings, 1 indicates a bottom plate secured to the bed of a multiple punch over which web plate, shown in dot and dash lines at A in Figs. 1, 2, 5 and 6, travels intermittently, being halted whenever a punching operation is to take place. A top plate 2 is bolted to the slide 3 of the multiple punch, and is positioned above the bottom plate 1. The latter is provided with a T-shaped slot 8 in which is located a slidable die block 5 containing dies 6 and 7. In the cooperating top plate 2 is another T-shaped slot 8 to accommodate a slidable punch block 9 which carries punches 10 and 11.

The punch block 9 and the die block 5 are caused to slide in unison in their respective T-slots transversely of the fish belly sill through the agency of rack 12 attached to punch block 9 and rack 13 attached to die block. Racks 12 and 13 mesh respectively with pinions 14 and 15, the latter possessing square central holes which fit about a squared vertical shaft 16 and are rotated by it, thereby, of course, actuating punch block 9 and die block 5 through their racks. The rotation of the shaft 16 is produced by turning a hand wheel 17 which also has a squared central aperture surrounding said shaft. The racks, which are rectangular in cross section, are reduced at one end to form a threaded cylindrical stud. The stud on rack 12 passes through a hole in punch block 9 and is fitted with a nut 18 which clamps the rack to said punch block. Similarly rack 13 is provided with a stud fitted with a nut 19 whereby said rack is securely clamped to the die block. Both
punch and die blocks contain a rectangular aperture or pocket 20 to accommodate the nuts for their racks.

The pinions 14 and 15, with which the racks 12 and 13 are seated in recesses 21 in castings 22 and 23, respectively, the former being bolted to the slide 3, while the latter is bolted to the multiple punch body frame, the latter having slots for the passage of slugs from the work. The recesses 21 are of sufficient depth to also accommodate the racks 12 and 13, and restrain them from coming out of mesh with the pinions.

As the pinions propel the racks 12 and 13 in one direction, or the other, upon the rotation of the hand wheel 17, a pointer 24, secured to gag handle bracket 25, which bracket is fastened to punch block 9 by means of tap bolts, rides over a templet 26 that is screwed to the slide 3. On this templet are graduations marked a, b, c, d, etc., by the aid of which the operator can bring the center of one of the punches over any predetermined point on the fish belly sill A to be punched. In other words, the longitudinal position of a proposed hole is determined by the amount of advance of the sill through the machine and its transverse position by moving the punches transversely until the reading on the templet given by the pointer which, of course, travels with the punches, indicates that the proper lateral location of the hole has been reached. The operator may have a tabulated schedule which will tell him whether any particular hole in a given job requires pointer 24 to be brought to a or b or c, etc., to insure that either punch 10 or 11, according to which is to be used, each being of a different diameter, has moved the correct distance laterally to locate the transverse position of the proposed hole. After the positioning of the punch chosen, the gag 27 must now be inserted over the stem of said punch to fill the otherwise present space, so that there will be no lost motion in the downward thrust of the punch, the absence of which lost motion insures the perforation of the fish belly sill.

For example, if punch 11 is to be operated, the gag 27 will be in the position shown in Figs. 2 and 7, and, while this punch must accompany the slide 3 throughout its entire stroke, the aperture 28 now present above punch 10 will prevent this last mentioned punch from being forced to penetrate the work. Rotative movement of the gag handle 29 to the left in Fig. 1, (see also Figs. 2, 3, 6 and 7), for a certain distance will remove the gag 27 from over the punch 11 and dispose it above punch 10, which will then be the one in operative condition leaving punch 11 ineffective. By such movement of gag handle 29, shaft 30, is partially rotated, the handle being keyed to it. Inasmuch as the bifurcated arm 31 is also keyed to shaft 30, it revolves in unison with gag handle 29, and the outstanding lug 32 of gag 27, protectively positioned in said T-slot 8, and into the open slot of arm 31, is set into motion thereby, of course, actuating the gag 27. A still further rotation of gag handle 29 to the left would remove the gag from over punch 10 and both punches 10 and 11 would consequently be inoperative. The bottom plate 1 is provided with apertures 33 through which slugs punched from the sill or other work may find escape to a scrap pile.

The operation of the machine above described is as follows: The work, say a fish belly center sill web A, is inserted into the machine, end first, the direction of its feed being perpendicular to said end, that is, the same as the direction of the length of the sill. The sill is advanced until the longitudinal position of the first hole to be punched is directly under the centers of the punches. After consulting a tabulated schedule, by means of which the size of the punch needed is disclosed and also the letter, or symbol, which indicates to what graduation on the templet 26 the pointer 24 is to be moved in order to bring the desired punch in agreement with the lateral position of the proposed hole, the operator revolves hand wheel 17 until the pointer 24 has been brought to correct stopping place over the templet 26. Turning hand wheel 17 imparts rotary motion to the pinions 14 and 15 through the vertical squared shaft 16, and these pinions impel the racks 12 and 13 in one direction or the other, according to the direction of rotation of hand wheel 17. With the racks travel punch block 9 and die block 5, thereby moving the punches 10 and 11 and the dies 6 and 7 across the face of the web plate to be operated upon until the pointer 24 stops at the proper graduation on the templet 26. Gag handle 29 is then rotated, and with it the gag handle shaft 30, and the bifurcated arm 31, the latter, by reason of its connection with the outstanding gag lug 32 bringing the gag 27 over punch 10 or 11, as directed from the tabulated schedule, to render it operative. By means not shown, but well known, the slide 3 is caused to descend, and, if punch 11, for instance, is gagged it will perforate the fish belly sill web A, while punch 10, upon reaching said sill will recede into the aperture 28 in the gag 27, and perform no work. Were the gag 27 withdrawn from over punch 11 by the requisite movement of gag handle 29 to the left in Fig. 1, to a point where it resided above punch 10, this punch would become operative and punch 11 ineffective. Step by step the fish belly sill web A is advanced, and the selection of punches and the lateral positioning of them, continues, as above described, until all the
hundreds longitudinally disposed along the fish belly edge B of the sill web have been punched. The punches shown at 34 and the dies at 35 belong to a gang of punches per- 
manently set up for a particular job and are used to punch all proposed holes in the fish belly sill web that shall be in alignment with them.

While this machine has been described as being adapted to punch holes paralleling the fish belly outline of a center sill of this type, it is to be understood that the machine is not limited alone to this specific task and may be employed in general for producing holes in whatever materials are susceptible to punching operations wherein the contour is irregular and holes are to be produced paralleling such contour. Furthermore, appropriately disposed machines of the type described may be set up in a multiple punching machine and more than one irregular line of holes be produced at the same time.

What I claim is:

1. In a machine of the class described, a slotted supporting member, a multi-aperture bottom plate secured thereto, the apertures of the latter registering with some of the slots of the former, a reciprocatory slide, a top plate secured thereto, punches carried by said slide, means contained in said bottom plate, of a plurality of punches each partly contained either in said top or bottom plate and each locked to and within either said slideable punch or said die-carrying means, auxiliary means for supporting and guiding said racks, and means for synchronously moving said racks.

2. In a machine of the class described, a supporting member and a reciprocatory slide, punch and die blocks slideable longitudinally thereof, punches carried by the former and die by the latter, a plurality of racks each projecting into a pocket in said punch or die block and being held in fixed relation with such block, auxiliary members, one attached to said slide and one to said supporting member, and each adapted to support and guide one of said racks, a pinion in each auxiliary member meshing with one of said racks, a shaft rotatably fixed in one of said auxiliary means, and guided by the other auxiliary means in reciprocating therethrough, said shaft being capable of rotating said pinions, and means for rotating said shaft.

3. In a machine of the class described, a reciprocatory slide, a top plate having a retaining slot therein attached to said slide, a slideable punch block contained in said slot, a plurality of punches carried by said punch block, a gag also carried thereby, said gag being adapted to slide over all of said punches, but to render only one operable.

4. In a machine of the class described, a reciprocatory slide, a top plate adjustably attached to said slide and having a retaining slot therein, a slideable punch block contained in said slot, a couple of punches carried by said punch block, a gag retained in a guideway in said punch block, said gag containing an aperture adapted to be located over one punch to render it inoperable while said gag is rendering operable another punch, said gag being adapted to render neither punch operable.

5. In a machine of the class described, a reciprocatory slide, a top plate having a retaining slot therein attached to said slide, a slideable punch block contained in said slot, a couple of punches carried by said punch block, a gag adapted to render either of said punches operable also carried thereby, said gag extending beyond said punch block and being provided with a lug protectively positioned in said retaining slot, a bracket carried by said punch block and projecting therebeyond in the same direction as said gag, a rock-shaft borne by said bracket, means for actuating the same, and a bifurcated arm rigidly secured to said shaft, its bifurcated end embracing said lug and thereby being adapted to move said gag upon the movement of said rock-shaft.

6. In a machine of the class described, a reciprocatory slide, a top plate having a retaining slot therein attached to said slide, a slideable punch block contained in said slot, a couple of punches carried by said punch block, a gag adapted to render either of said punches operable also carried thereby, said gag extending beyond said punch block and being provided with a lug protectively positioned in said retaining slot, a bracket carried by said punch block and projecting therebeyond in the same direction as said gag, a rock-shaft borne by said bracket, means for actuating the same, and a bifurcated arm rigidly secured to said shaft, its bifurcated end embracing said lug and thereby being adapted to move said gag upon the movement of said rock-shaft, a graduated scale on said slide and an indicator carried by said bracket, both cooperating to determine the location of one or the other of said punches.

7. In combination in a punching machine, a plurality of punches transferable to different locations in work, and a single perforated selective means adapted to render a selected punch operable or all of said punches inoperable.

8. In combination in a punching machine, a plurality of punches, means for supporting said punches, including space for a movable gag; a gag movable in said space and provided with a perforation and rockable means adapted to cause the perforation in said gag to register with either of said punches.
9. In combination in a punching machine, a plurality of punches, means for supporting and for actuating said punches, including a space for a gag, a perforated gag movable in said space, a rockable arm operatively connected with said gag, a shaft adapted to actuate said arm and a rockable gag handle connected with said shaft.

10. In combination in a punching machine, a punch carrying member having a gag channel therein, a plurality of punches adapted to move into said channel, a single gag adapted to render operable either of said punches, a rockable gag handle and gag operating arm and a shaft with which said arm is connected.

11. In combination in a punching machine, a pair of punches, a punch carrying member therefor provided with a gag channel, a rockable shaft carried by said member and means operably connected with said shaft adapted to render operable either of said pair of punches.

12. In combination in a punching machine, a pair of punches, a punch carrying member therefor provided with a gag channel, a rockable shaft carried by said member and means operably connected with said shaft adapted to render operable both punches of said pair of punches.

13. In combination in a punching machine, a plurality of punches, a punch carrying member therefor provided with space for selective means, a retainer for said punch carrying member, a perforated selective means within said retainer and operative in said space to render a selected punch operable, and actuating means connected with said selective means and extending to and operated from the exterior of said retainer.

14. In combination in a punching machine, a retaining member, a punch carrying device slidably mounted therein, a plurality of punches carried by said device, perforated selective means within said retaining member adapted to render a selected punch operable, and actuating means operatively associated with said selective means within said retaining member and extending to and operable from the exterior thereof, said selective and operating means being movable with said punch carrying device.

15. In combination in a punching machine, a plurality of punches, a carrying device therefor, perforated selective means adapted to render a selected punch operable and actuating means for the selective means, all adapted to be shifted in unison, and a retainer for said carrying device, said selective means being contained therein and said actuating means being operated from the exterior thereof.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FREDERICK A. STEVENSON.

Witnesses:
ELIOT W. STUDER,
ARNOLD L. PEPPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D.C."