

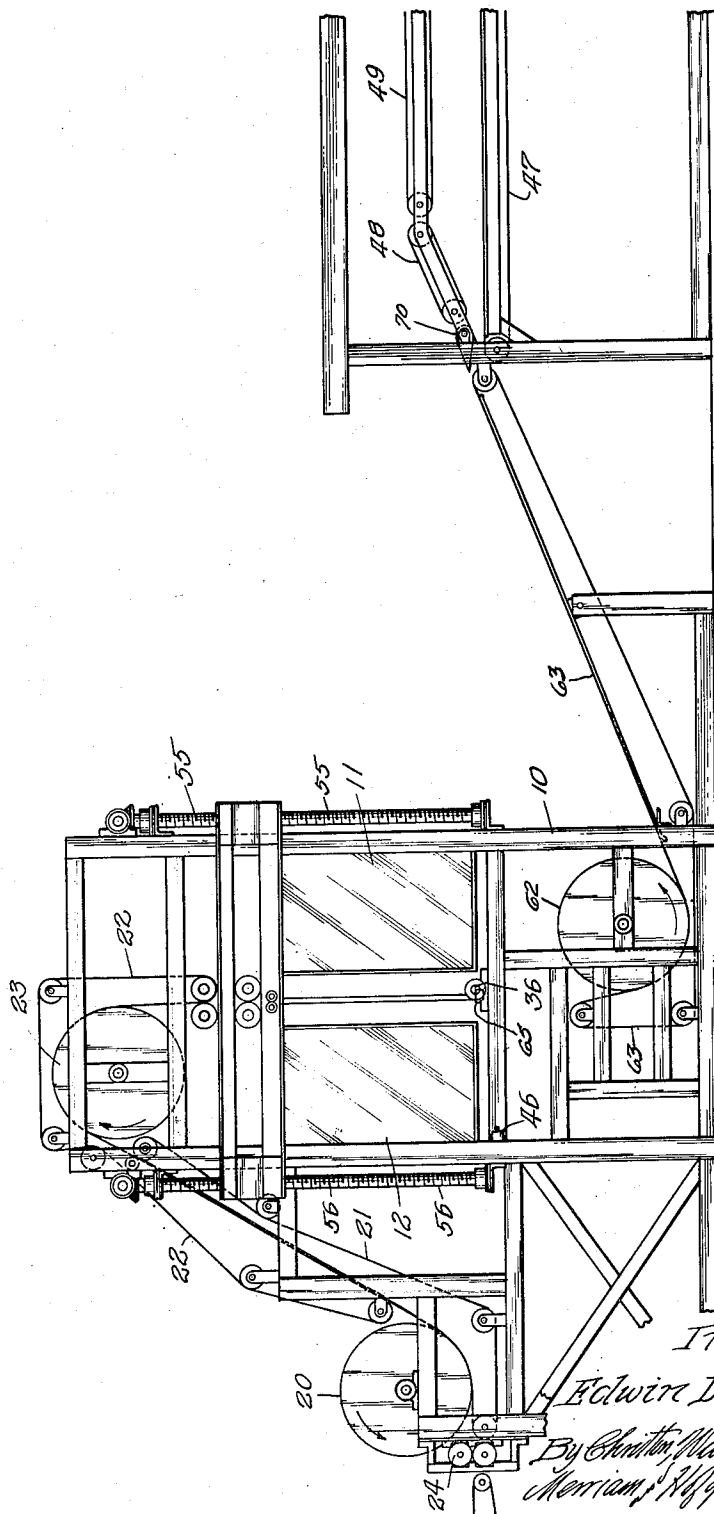
April 4, 1950

E. D. MARTIN
APPARATUS FOR USE IN THE VISUAL
INSPECTION OF SHEET MATERIAL

2,502,469

Filed Sept. 19, 1945

4 Sheets-Sheet 1



Inventor:

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By Christian Miles Schroeder,
Merriam, N. H. 1909, 427 pgs.

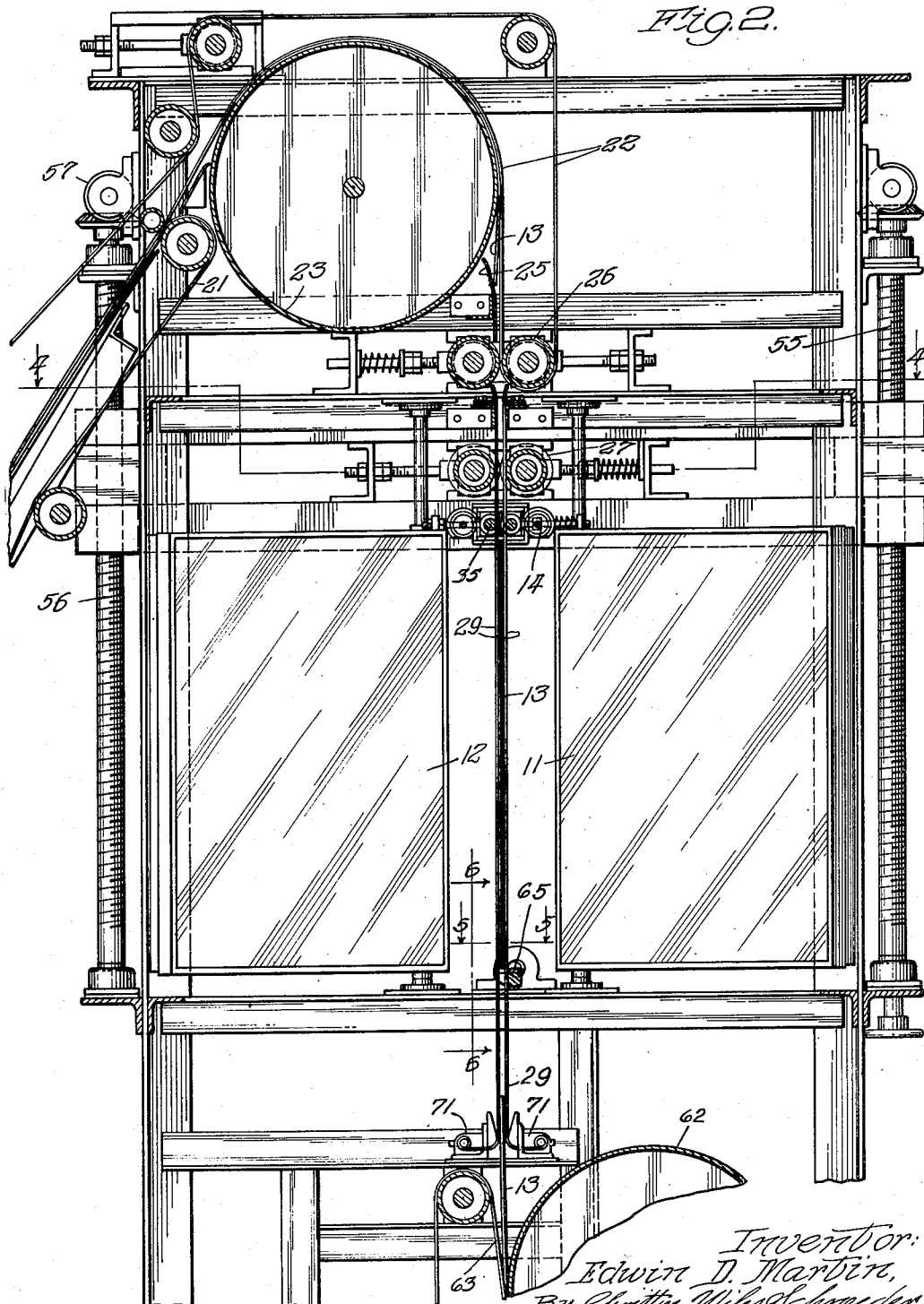
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4 Sheets-Sheet 2



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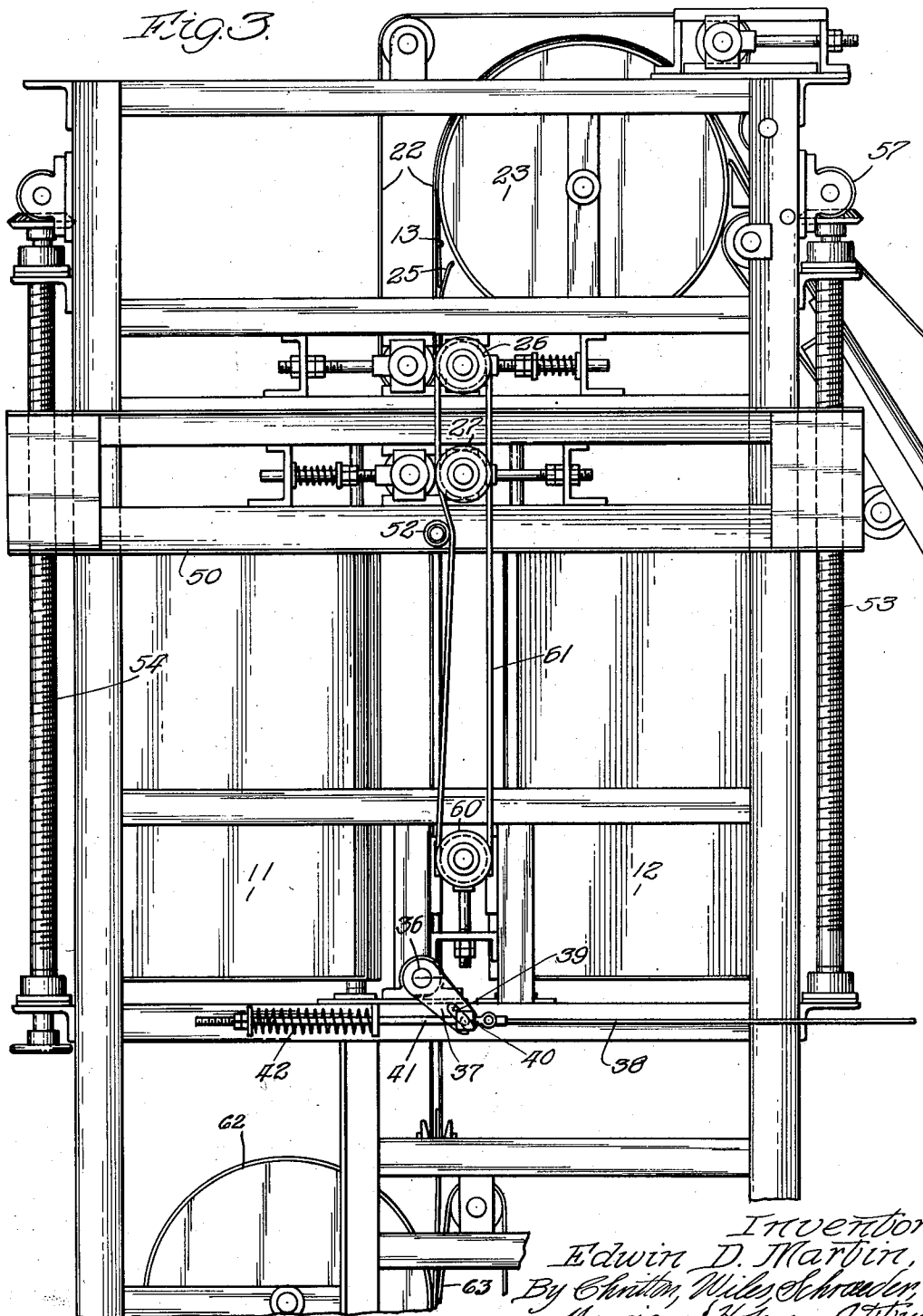
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

Fig. 4.

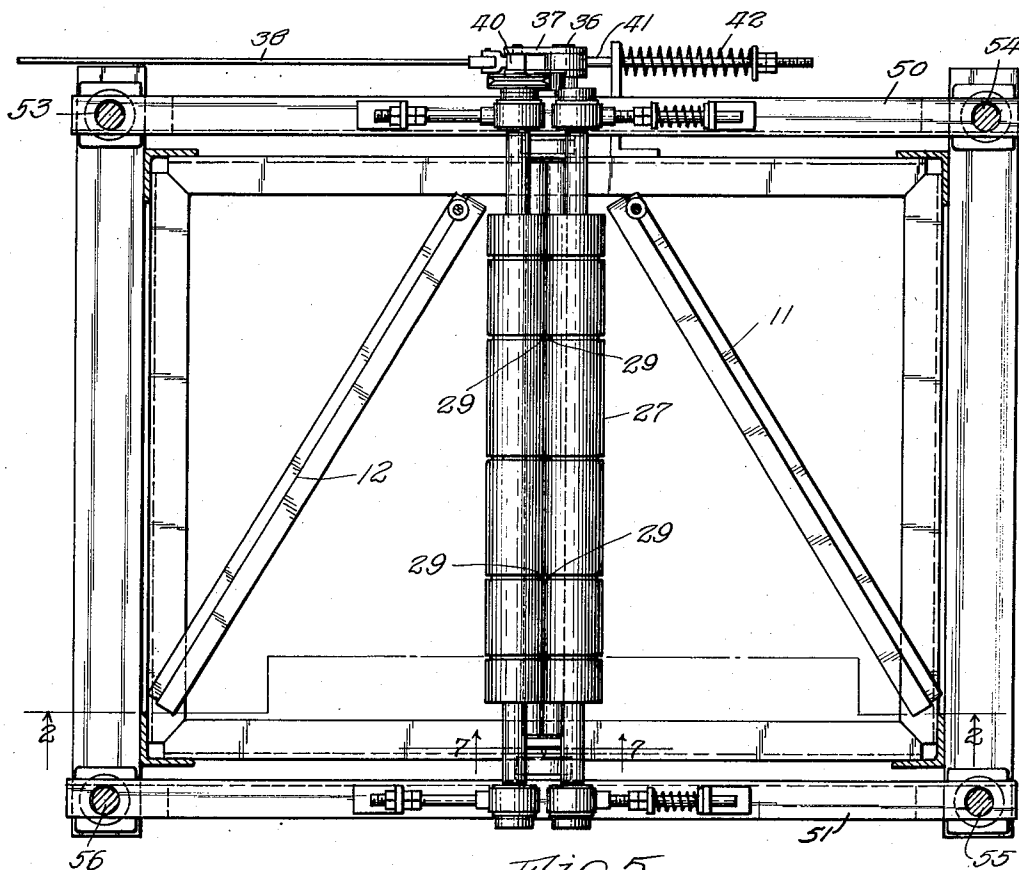


Fig. 5.

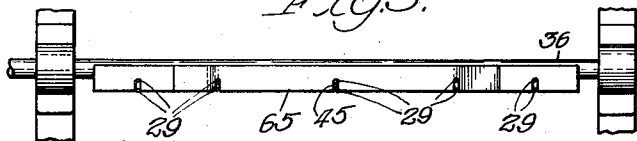


Fig. 6.

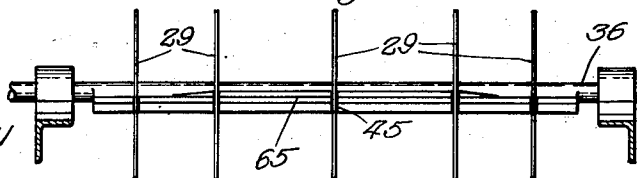
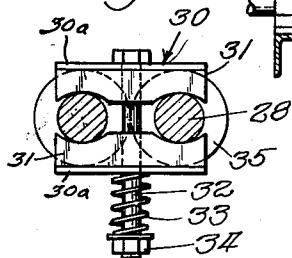


Fig. 7.



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UNITED STATES PATENT OFFICE

2,502,469

APPARATUS FOR USE IN THE VISUAL
INSPECTION OF SHEET METALEdwin D. Martin, Chicago, Ill., assignor to Inland
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Application September 19, 1945, Serial No. 617,293

11-Claims. (Cl. 88-14)

This invention relates to an apparatus by which the visual inspection of tin plate in sheet form may be greatly facilitated. Heretofore, it has been the practice for the inspector in visual inspection of tin plate to lift the sheets manually at one edge so as to view first one face and then the other. The work is hard physical labor and must be done rather slowly. In accordance with the present invention, all physical work of the inspector is eliminated and she is able, at a single glance or at a single operation, to view both sides of the sheet, and then by pressing a button to dispose of the rejects. In order to accomplish this the sheets are momentarily stopped individually before a pair of mirrors angularly adjusted so that the operator sitting in front of them may see both sides of the sheet by a movement of her eyes.

The invention is illustrated in the drawings in which,

Fig. 1 is a side elevation of the apparatus;

Fig. 2 is a section taken on the line 2-2 in Fig. 4;

Fig. 3 is a rear elevation of the apparatus;

Fig. 4 is a section taken on the line 4-4 in Fig. 2;

Fig. 5 is a section taken on the line 5-5 in Fig. 2;

Fig. 6 is a section taken on the line 6-6 in Fig. 2; and

Fig. 7 is a section taken on the line 7-7 in Fig. 4.

The apparatus comprises a frame 10, having a pair of mirrors 11 and 12 centrally located in a line with the eye of an operator seated in front and angularly adjusted so that the operator may simultaneously see both sides of a sheet 13 when it is in viewing position, as shown in Fig. 2. The sheets are suitably illuminated by lights 14.

The individual sheets are fed serially into viewing position by an elevating mechanism comprising a drum 20, a belt 21, a complementary belt 22, and a second drum 23. The individual sheets are picked up by any suitable and well known means, not shown, by which sheets may be picked up one at a time and are fed through the rolls 24 onto the belt 21 where they are contacted on the lower surface by the belt 21 and on the upper surface by the roller 20. The sheets are then passed upwardly until the upper surface is contacted by the belt 22 and are carried between belts 21 and 22 until the lower surface reaches the roller 23 where the sheets are then carried up and over the roller 23 and down the forward side thereof. The belts 21 and 22 may

be driven synchronously, whereas the drums 20 and 23 may be simply idle. The roller or drum 23 is preferably a smooth surfaced steel drum.

As will be best seen in Fig. 2 the individual sheets 13 are passed downwardly from the drum 23. There is a tendency in the sheets to curl somewhat inwardly and they are directed into proper alignment by the guides 25 which direct them between the driven rolls 26, idler rolls 27, and brake rolls 35. From the time that the individual sheets leave the rollers 26 they are also guided by wires 29 which are spaced in pairs across the faces of the sheet.

The distribution of the wires is best shown in Fig. 6. The rollers 27 are, of course, suitably slotted to permit the wires to pass through them and this is also true of rollers 35.

All of the rollers are suitably tapered at the ends to accommodate the added thickness of the sheets which might occur at either edge portion. This thickening, of course, occurs only on hot dipped sheets due to the thickening at the drip or list edge.

The rollers 35 have spindles 38, are preferably of brass, and are provided with a brake 30, illustrated in Fig. 7. This brake comprises clamps 30a, a bolt 32 extending through the clamp, a spring 33 around the bolt held in position by a suitable nut 34, and friction members 31 pressed upon the rolls or their spindles by clamps 30a. Each friction member preferably comprises a pad of piano felt about one inch thick. The nut 34 is adjusted so that the speed of the sheets as they fall under gravity will not accelerate to a point where they will be injured at the conclusion of their fall.

The rollers 26 and 27 are connected with roller 60, as shown in Fig. 3, by means of a belt 61 which is pressed against the rollers 27 by the idler roller 52. Any one of the rollers 26, 27, 52 or 60 may be driven, preferably the roller 60, so that the sheets 13 are positively fed between rolls 26, 27 and 35 until the upper edge of the sheet has left roll 27. It then falls only under the influence of gravity and is retarded by the braking rolls 35.

Suitable means 65 are provided at the bottom of the mirrors for stopping the sheet and holding it momentarily. This means may be a sliding plate, but is preferably a tilting plate, best illustrated in Fig. 5. The plate is mounted upon a rod 36 extending from one side of the device to the other. One end of the rod 36 is secured to a crank arm 37, illustrated in Fig. 3, and in Fig. 4. This crank arm is secured by any suitable means

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to a reciprocating device 38. In the form here illustrated the arm contains a slot 39 within which is carried a pin 40 secured to a rod 41. This rod is automatically actuated in any suitable manner synchronously with the sheet feeding mechanism so that the plate 65 is tilted periodically immediately after a sheet has been supplied thereto. The compression spring 42, secured on the end of the rod 41, may be relied upon for returning the plate to its original position. If desired, however, the rod may be positively fed in each direction.

The plate 15, of course, provided with slots 45 through which the wires 29 pass.

The lower ends of the wires 29 are secured in brackets 71, best shown in Fig. 2. The wires guide the sheets 13, dropping from the plate 65, into engagement with the surface of the steel drum 62 and the driven belt 63. This belt, and the other belts, are preferably of a fabric material such as canvas. The sheets are carried on the belt 63, as illustrated in Fig. 1, to the separator 70. The separator is actuated by any suitable mechanical means, not here shown and not part of the present invention, through the medium of the button 46. This button operates an electrical system, including a time delay switch, such that the operator may push the button at any time between the time one sheet contacts the plate and the time the next sheet contacts the plate, with the result that the button, when pressed, will elevate the separator 45 at the proper time and thus bring the discarded sheet onto the belt 47. In normal operation the separator 70 is in the position shown in Fig. 1 and the sheets pass along the belts 48 and 49 to a pile where they are stacked and weighed. It will be observed that normally 2 or 3 sheets will be spaced along the belt 42, but that operation of the push button 46 affects the separator 45 only at the appropriate time and for the appropriate interval, discarding the sheet which has last been inspected by the operator before she pushes the button.

Inasmuch as the sheets employed may be of different sizes, it is preferred to provide means for adjusting the level of the feeding system. Such a means is best illustrated in Fig. 3 and includes bridge frames 50 and 51 located respectively at the rear and at the front of the device. These frames carry the rollers 27 and 35 and the idler roller 52, and are adjustable upwardly and downwardly by synchronous movement of the screw posts 53, 54, 55, and 56. The posts may be turned synchronously by any suitable mechanism as indicated at 57.

The operation of the device should be obvious from the foregoing explanation. The frames 50 and 51 are first adjusted to the proper height so that the braking rolls 35 will retain their effect upon the plate until it is substantially in viewing position. Individual plates are then fed at predetermined intervals seriatim through the elevating mechanism over the drum 23 and then dropped into viewing position before the mirrors 12. Ordinarily, sheets are fed at the rate of 54 to 90 per minute, depending upon the ability of the operator and the size of the sheet. The sheets impinge upon the plate 65, and usually bounce a very small fraction of an inch. They are held in position only long enough to produce a retained image on the retina of the eye of the observer. In actual practice, it has been found that the operator will view one side of the sheet in one mirror and then turn her eyes and view the other side of the sheet in the other mirror.

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The sheet should, therefore, be stopped long enough to permit retention of two images and the intervening movement of the eyes of the operator. The plate 65 is then automatically tipped to drop the sheet between the belt 63 and the drum 62. Any sheet which should be discarded is sent to the discard file by pushing the button 46 which operates the separator 70 by delayed action so that the appropriate sheet is discarded when it reaches the separator.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom.

What I claim as new, and desire to secure by Letters Patent, is:

1. Apparatus for use in the inspection of metal sheets, comprising: a viewing station having an entrance at the top and an exit at the bottom, said station being arranged for receiving metal sheets with an edge disposed toward a predetermined viewing position; feeding means on the apparatus for moving sheets toward the viewing station, said means terminating directly above said viewing station and having means for dropping sheets at predetermined intervals in a vertical position into the viewing station; means in the viewing station for simultaneously presenting images of the two faces of a sheet in said station to an observer at the viewing position; a stop element at the bottom of the viewing station for stopping a sheet dropped by said feeding device, said element being movable between a stop position and a release position; stop actuating means for moving said stop element to its release position at said predetermined intervals to release a sheet for removal by gravity from said viewing station; and means for returning said stop element to its stop position.

2. Apparatus as set forth in claim 1 wherein a plurality of pairs of spaced guide wires are provided for receiving the sheets from the feeding device and guiding them to the stop element.

3. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station; means for feeding sheets seriatim at predetermined intervals to said viewing station; means adjacent said viewing station for inspecting both sides of a sheet at the viewing station simultaneously from a predetermined position; a stop element at the viewing station cooperating with the feeding means to receive each sheet as it comes from the feeding means and retain it momentarily in the viewing station; and means to move the stop element to release the sheet for removal from the viewing station.

4. A device as set forth in claim 3 in which means are provided at the viewing station for arranging each sheet in vertical position therein.

5. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station; continuous means for feeding sheets seriatim at predetermined intervals to said viewing station; means adjacent said viewing station for inspecting both sides of a sheet in the viewing station simultaneously from a predetermined position; a plurality of wires extending through the viewing station positioned to guide each sheet into a vertical position in the viewing station as it comes from the feeding means; a stop element at the viewing station to receive each sheet in said vertical position and retain it momentarily in the viewing station; and means to move the stop element to release the sheet for removal from the viewing station.

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6. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station arranged to receive a metal sheet in upright position; means for feeding sheets seriatim at predetermined intervals downwardly into an upright position in said viewing station; means adjacent said viewing station for inspecting both sides of a sheet in the viewing station simultaneously from a predetermined position; a stop element including a movable plate located at the portion of the viewing station directly opposite said feeding means to receive each sheet from the feeding means and retain it momentarily in the viewing station; and means for moving the plate at said predetermined intervals to release the sheet for removal by gravity from the viewing station.

7. Apparatus according to claim 6 in which the movable plate is pivotable about one of its edge portions.

8. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station having an entrance side and an exit side, said station being arranged to receive metal sheets with an edge disposed toward a predetermined viewing position; feeding means on the apparatus for moving the sheets toward the entrance side of the viewing station and feeding them seriatim at predetermined intervals into said viewing station; means adjacent the viewing station for simultaneously inspecting both sides of a sheet in said station from the viewing position; a stop element at the exit side of the viewing station to receive each sheet as it comes from the feeding means and retain it momentarily in the viewing station; means for moving said element between a stop position and a release position; and means for removing a sheet when the stop element is at the release position.

9. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station having an entrance side at its top and an exit side at its bottom, said station being arranged to receive metal sheets in an upright position with an edge disposed toward a predetermined viewing position; feeding means on the apparatus for moving sheets toward the entrance side of the viewing station and feeding them seriatim at predetermined intervals into said viewing station; means adjacent the viewing station for

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simultaneously inspecting both sides of a sheet in said station from the viewing position; a stop element at the exit side of the viewing station to receive each sheet as it comes from the feeding means and retain it momentarily in the viewing station; and means for moving said element between a stop position and a release position to permit a sheet to drop from the viewing station by gravity.

10. Apparatus as set forth in claim 9 wherein the viewing station is provided with a plurality of pairs of spaced guide wires to guide the sheets from the feeding means to the stop element and retain them in a vertical position for inspection.

11. Apparatus for use in the visual inspection of sheet metal, comprising: a viewing station, continuous means for feeding sheets seriatim at predetermined intervals to said viewing station; means adjacent said viewing station for inspecting both sides of a sheet in the viewing station simultaneously from a predetermined position; guide means in the viewing station to guide sheets from the feeding means into a vertical viewing position; a stop element at the viewing station cooperating with the feeding means to receive each sheet as it comes from the feeding means and retain it momentarily in the viewing station; and means to move the stop element to release the sheet for removal by gravity from the viewing station.

EDWIN D. MARTIN.

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