This invention relates to metal cutting or notching machines in general and in particular to such machines intended to notch large billets in order that they may be broken into short lengths required in shell manufacture.

In ordering large sizes of metal bar they are ordered by weight with the weight figured to give approximately the correct length of material. However, the mills in furnishing these metal bars, commonly known as billets or blooms, have imposed a weight tolerance permitting variation of a plus or minus 2 1/2 percent. This weight tolerance will mean that in cases of an 8 x 8 billet or bloom approximately 100 inches long the length may vary 5 inches. In the past it has been necessary for one man to gauge the length of a bar of metal, then divide the bar into the proper number of equal lengths for cutting into the desired length of pieces. Such gauging and division permits of errors occurring with the result that some of the small chunks of billet may be unfit for use, also such gauging and marking consumes considerable time and under the present conditions time in the manufacture of shells and other equipment is of vital importance. It is also of vital importance that once gauged the billet be notched accurately in order that the chunks or slugs destined to become a shell may have the proper weight and dimensions and that there be no poor or undersize slugs. It is an object, therefore, of the present invention to provide a metal cutting or notching machine which includes as a component part thereof a gauging device for dividing the billet into the proper number of slugs.

A further object of the invention is the provision of a metal cutting or notching machine having a gauging device attached thereto, which gauging device controls the positioning of the metal cutting or notching tips.

A still further object of the invention is the provision of a metal bar cutting or notching machine adapted to simultaneously notch opposites sides of a billet or bar and at predetermined points.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which:

Figure 1 is a side elevational view of the improved machine.

Fig. 2 is an end view of the machine, and

Fig. 3 is a plan view thereof.

Referring now to the drawings in detail, it will be seen that the machine consists of three main parts, namely, frame A, across which can be moved a torch carrier or truck B, which in turn alidably carries a torch head assembly C. The machine frame is shown as composed of four vertical posts or supports 10 anchored to the floor or other supporting structure by foot plates 11. The upper ends of the posts or uprights 10 are joined together by end channels 14 and side pieces 16 of I-beam cross section, thus forming a rigid frame. This frame supports channels 18 joined together by any suitable means and carrying a plurality of rollers 20, which rollers are adapted to support the billet or bar W. Movement of the billet or bar through the machine upon the rollers is controlled by means of a vertically movable stop 22 connected by means of a thrust rod to a foot treadle 24 journaled as at 25 on the machine base frame. The stop portion 22 is of sufficient weight as to constantly tend to lower, clearing the path of the billet across the rollers, but when the foot treadle is depressed the stop will be projected upwardly and prevent movement of the billet through the machine. Supporting brackets 27 are attached to the machine frame adjacent the end remote from the removable stop and provide support for a rock shaft 28 journaled in the brackets and carrying at one end an index or pointer 30 (Fig. 1). This index or pointer is adapted to move across index plate 31 fastened to the machine frame and carrying numerals or other identification to indicate the exact position of the pointer. Fastened to the rock shaft 28 intermediate the brackets is an angle shaped finger or feeler 32 adapted to contact the end of the billet or bar W, thus it will be seen that when the billet or bar W is against the stop 22 and the feeler or finger 32 is against the remote end, the pointer 30 will give an indication of the length of the billet. In the present instance the index plate is numbered with numerals from 1 to 9 inclusive and since it is so numbered the division bar 34 is of octagonal form giving eight faces which are numbered to correspond with the numerals on the index plate. The division bar is journaled in bearings 35 fastened to the machine frame and each face of the division bar has cut therein four equally spaced notches 37, thus permitting equal division of the billet into five slugs. As clearly shown in Figs. 1 and 3, the notches 37 on the various faces are staggered in such a way that if the index pointer, when in contact with the billet, indicates numeral 4, then if the division rod 34 is turned so that the face number 4 is upwardly, the notches 37 will...
be so spaced as to permit the notching of the billet at four equally spaced points giving five equal sized slugs. The torch carrier or truck B, previously referred to, consists of a carriage frame 40 supported on axles 41 which in turn are supported by wheels 42. These wheels are adapted to run upon split T-beams or T-bars 44 welded or otherwise secured to the frame of the machine, and forming a track. Movement of the carriage along the frame track is obtained through the use of a hand wheel 46 driving a pinion 47 meshing with a rack 48 carried upon the machine base frame. Excessive movement of the carriage along the frame track is prevented by means of stops 49 located adjacent each end of the track and in the path of the wheels 42. In order to positively locate the carriage in a predetermined position it has attached thereto a bracket 50 of channel form and in which slides a plunger 51 urged downwardly by a spring 52 interposed between one leg of the channel and the plunger. The lower end of the plunger is fitted with a head adapted to closely engage the notches 57 of the division bar, while the upper end is connected to a handle 53 pivoted on the carriage and adapted to be used by the operator to lift the plunger head out of engagement with the slots or notches in the division bar. The head of the plunger and the notches or slots of the division bar are formed with tapering sides in order to insure an accurate positioning of the carriage at all times.

The carriage is provided in addition to its supporting and driving parts with vertically extending slide ways 54 connected to the frame and bracketed thereto by brackets 56. Certain of these slides, as clearly shown in Figs. 1 and 2, are provided with an axle 57 upon which is mounted a pulley 58. This pulley is adapted to permit movement of a cable or rope 59 anchored at one end 60 to a counterweight 61 sliding or rolling on the uppermost brace supporting the slide way structure. The opposite end of the rope or cable is anchored to a torch carrier or slide 62 of general T-shape with the arms of the T extending laterally with respect to the body or slide portion of the carrier. The central portion of this T-shaped torch carrier or slide is provided with the necessary slides cooperating with slide ways 54 and also with a threaded block 64 adapted to engage the threads of a screw 66 carried by the carriage and adapted to be driven through suitable gearing by a motor M (Fig. 1). To provide for quick movement of the torch carrier, the threaded block 64 has attached thereto a handle 67 (Fig. 2), permitting disengagement of the block and screw threads, allowing rapid movement of the torch carrier independently of the motor. In this way rapid movement of the torch carrier may be obtained while utilizing a slow speed motor capable of moving the torch heads in a vertical direction at the proper cutting speed.

The ends of the torch carrier arms are provided through downwardly directed V-shaped notches 72 as clearly shown in Fig. 2, adapted to receive torch head brackets 70. Each of the torch head brackets has attached thereto a torch head T with the tip directed at the proper angle toward the billet and with its angle capable of adjustment. The torch heads are joined together by means of a right hand threaded shaft 74 operated by hand wheel 76. Operation of the hand wheel 76 will cause simultaneous approach or separation of the torch tips toward or away from the work to be cut or notched. It is to be understood, of course, that the supply of fuel and oxygen to the torches is to be controlled simultaneously and preferably by a single control, all of which is more or less conventional and not a part of the present invention.

The operation of the machine is as follows and assuming a billet or bar approaching the machine along the trackway of the supporting table structure. The billet or bar will roll along rollers 20 until it strikes stop 22 raised into position by pressure of the operator's foot on the floor track 24. Contact with the stop will definitely position the billet in the machine and the operator may then swing the index finger 30 in a counterclockwise direction until the finger or finder 32 contacts the end of the billet. As soon as the finger has contacted the end of the billet the operator notes the position of the index finger 30 and turns the division bar 34 until the face marked with the corresponding numeral is uppermost. In the case illustrated by the drawings in Fig. 1 and 2 full figure 26, the third division to engage a number one billet and number one face of the division bar is accordingly uppermost. In case a long billet was in the machine the finger and index would be in the position shown in line and dash outline in Fig. 1 and it would be known as a number eight billet which would require rotation of the division bar until number eight face was uppermost. In any case, to gauge and accurately divide the bar or billet into equal parts it is only necessary for the operator to obtain a relative reading of the bar or billet's length and turn the division rod to a corresponding reading. With the division rod turned to the proper position rotation of the hand wheel 46 will cause the carriage to be driven along the machine until plunger 51 reaches a slot 57 in the face of the division bar. As soon as the plunger 51 reaches the plunger is depressed under the action of the spring and the carriage is locked in place. The motor M is now started and the torches moved upwardly across the sides of the billet cutting a notch of any desired depth therein. As soon as the desired distance is cut the hand wheel 46 is turned and the plunger is raised to allow the torches to move away from the billet. The hand wheels 46 and 76 are operable simultaneously and the hand wheels 46 and 76 may be operated independently.

The hand wheels 46 and 76 are operable simultaneously and the hand wheels 46 and 76 may be operated independently. In other words, it is intended that the word billet be construed as merely a bar of metal and not as a bar of metal.
of certain limited dimensions as it is defined by the steel mills.

While the invention has been described more or less in detail with specific reference to one embodiment thereof, it will be obvious to persons skilled in the art that various modifications and rearrangements of parts may be made and all such modifications and rearrangements of parts are contemplated as will fall within the scope of the appended claims defining our invention.

What is claimed is:

1. A cutting machine of the character described and including, a frame, a rotatable division bar carried by the frame, a plurality of series of equally spaced stops on said bar, said bar being rotatable to a plurality of positions each presenting a different series of equally spaced stops, a torch carrier movable along the frame, and means carried by the torch carrier and engageable with said stops to retain the carrier in the positions predetermined by the series of stops presented by the bar.

2. A cutting machine of the character described and including, a frame, a rotatable division bar carried by the frame and formed with a plurality of substantially flat longitudinally extending faces, a plurality of spaced notches formed in each face of the bar with the notches on each face spaced apart a different amount than those on the remaining faces, a torch carrier movable along the frame, and means carried by the torch carrier and engageable in said notches to retain the torch carrier in the positions predetermined by the notches on the faces of the division bar.

3. A cutting machine of the character described and including, a frame, a hexagonal division bar rotatably carried by the frame, a plurality of spaced notches formed in each side of said hexagonal bar with the spacing differing on each side frame than on the remaining sides, said bar being rotatable to present any desired side toward a torch carrier, a torch carrier movable along the frame and carrying means engageable in said notches to retain the torch carrier in the positions predetermined by the notches on the side of the division bar presented to the carrier.

4. A machine for cutting of billets into predetermined lengths comprising, a frame, a support for the billet and including a limiting stop, a gauging device carried by the frame in position to contact an end of the billet and indicate its relative length, a rotatable division bar carried by the frame and formed with a plurality of substantially flat longitudinally extending sides each bearing an identifying mark corresponding to the indications on the gauging device, an equal number of equally spaced notches formed in each face of the bar but covering different total lengths of the faces, a torch carrier movable along said frame and carrying means engageable within said notches to retain the carrier in a predetermined position, said division bar being rotatable to present a face to the torch carrier locking means which corresponds to the indication given by said gauging device and whereby said billet may be cut at equally spaced points upon operation of the torch.

5. A machine for cutting of billets into predetermined lengths comprising, a frame, a support for the billet and including a limiting stop, a gauging device carried by the frame in position to contact an end of the billet with the other end abutting said stop to indicate the relative length of the billet, an octagonal division bar rotatably carried by the frame in a position substantially parallel to the billet, each side of said division bar being formed with equally spaced notches to form a series on each side spaced differently than the series on the other sides and each side bearing an identifying mark corresponding to the indication on the gauging device, a torch carrier movable along said frame and including a vertically movable torch for cutting the billet, and locking means carried by said torch carrier to sequentially lock the same in the notches of one side of the division bar, said division bar being rotatable to present to the locking means the side bearing an identification corresponding to the indication of the gauging device and whereby said billet may be cut into equally spaced parts upon operation of the torch.

6. Apparatus for notching billets comprising a billet conveyor along which the billet is adapted to be horizontally moved in an endwise direction, a track extending lengthwise of the conveyor, a torch movable along the track, spacing means paralleling the track, means on the truck engageable and disengageable from said spacing means for sequentially holding the truck at predetermined spaced intervals along the length of the billet, notching torches, and means carried by the truck supporting said torches above and on opposite sides of the billet with provision for movement toward and from the billet in both vertical and horizontal directions.

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