H. E. WHITE.

SHEET FEEDING PROCESS FOR METAL EXPANDING MACHINES.

APPLICATION FILED SEPT. 4, 1913.

1,230,635. **Patented June 19, 1917.**

3 SHEETS—SHEET 1.

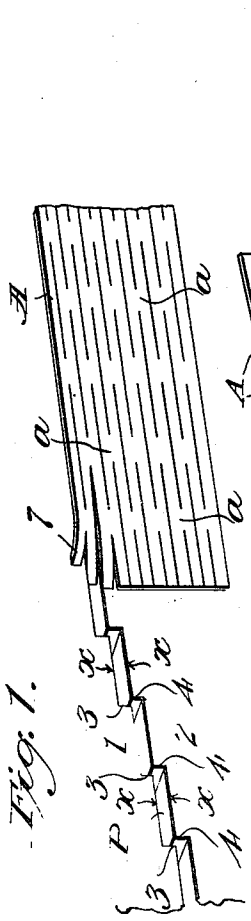


Fig. 1.

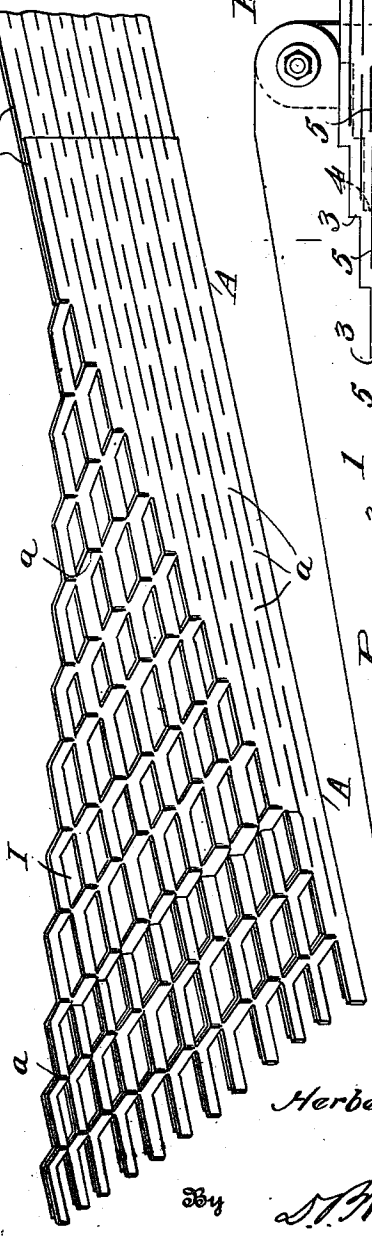


Fig. 5.

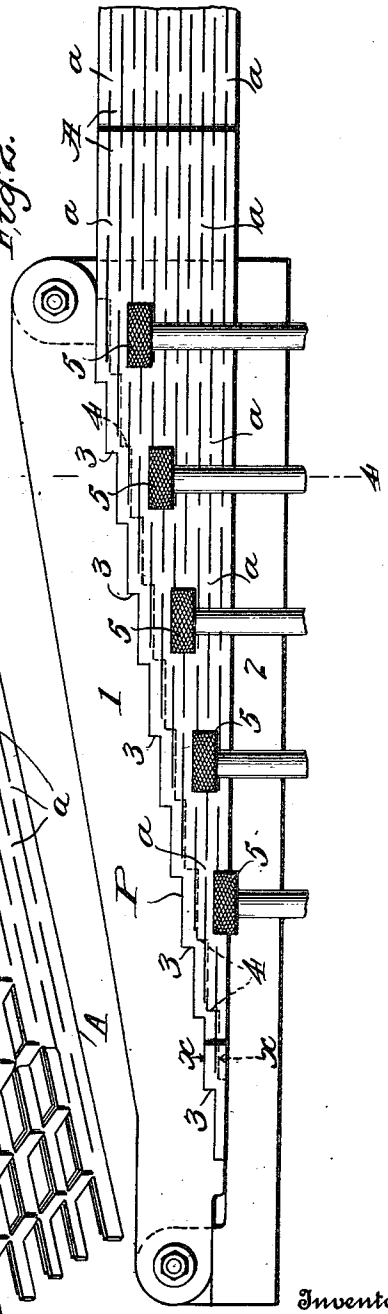


Fig. 2.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

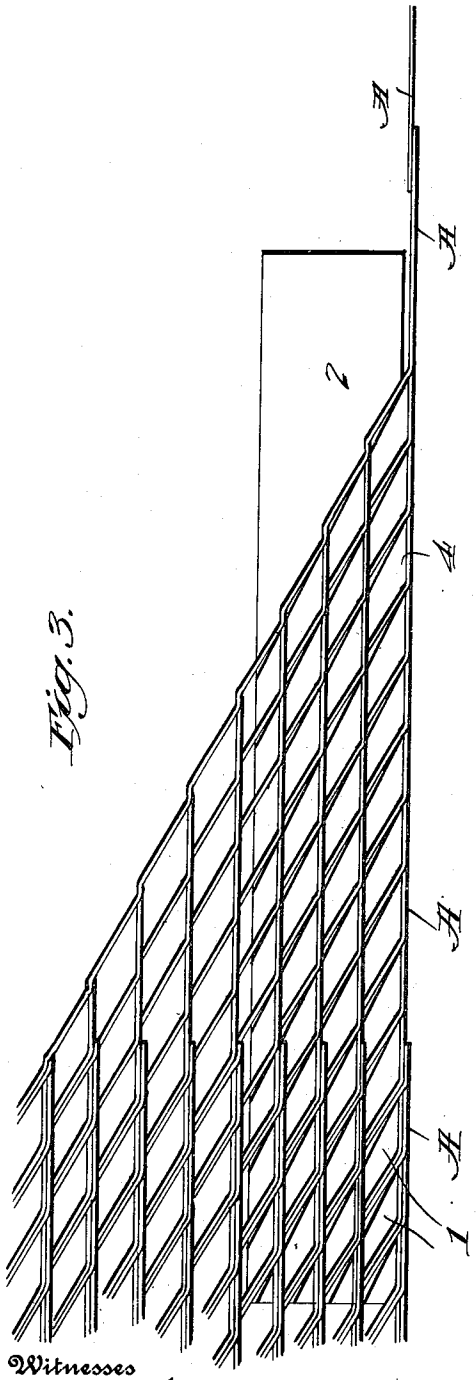
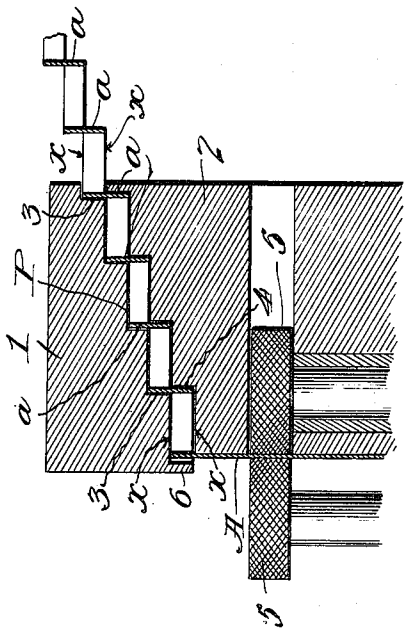


Fig. 4.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 6.

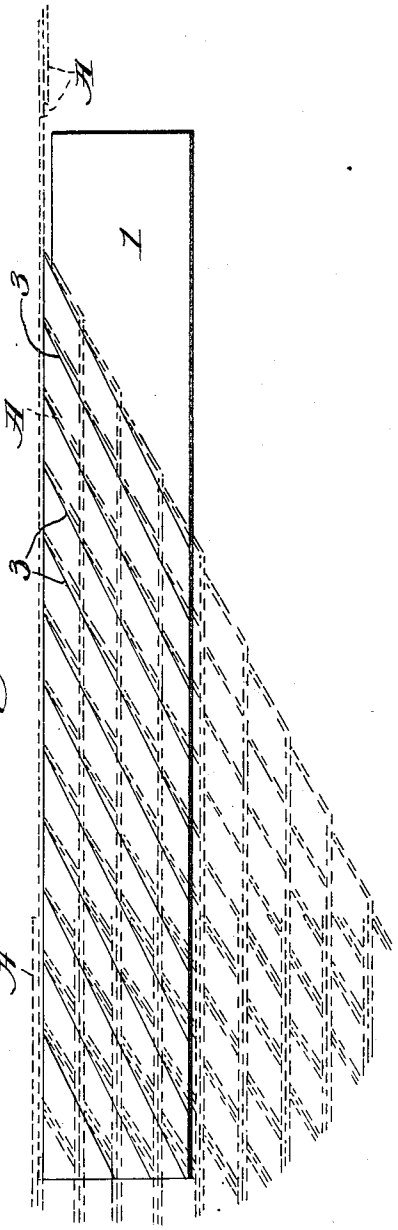


Fig. 8.

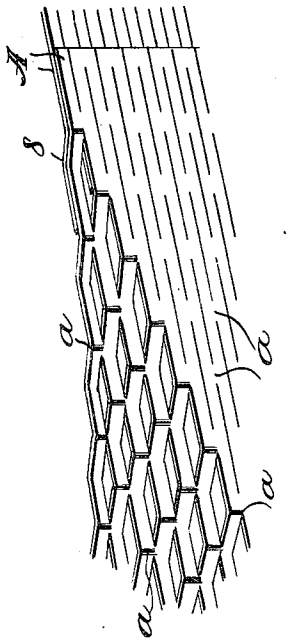
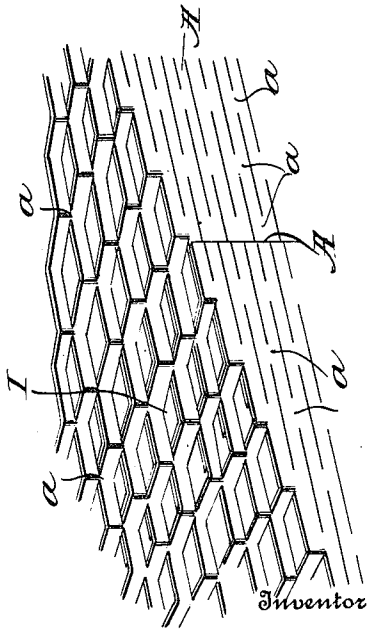


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING PROCESS FOR METAL-EXPANDING MACHINES.

1,230,635. Specification of Letters Patent. Patented June 19, 1917.

Application filed September 4, 1913. Serial No. 788,155.

To all whom it may concern:

Be it known that I, HERBERT E. WHITE, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Sheet-Feeding Processes for Metal-Expanding Machines, of which the following is a specification.

This invention relates to a novel and practical sheet-feeding process for metal expanding machines, and has for its object to provide a speedy and economical method of handling slitted metal sheets, for expanding operations, involving a substantially continuous process of feeding the sheet with a minimum handling thereof on the part of the operator, thereby permitting the manufacture of a uniform product very rapidly and on a large scale.

To this end, the invention has in view a process of sheet-feeding for metal expanding machines that entirely obviates the delay and other objections incident to the feeding, one at a time, of single slitted metal sheets to an expanding mechanism, and instead thereof provides a way whereby the sheets may be fed in a substantially continuous manner with the desirable result of the sheets themselves acting to automatically feed or enter one another into the expanding mechanism, and to discharge an expanded sheet from the latter.

In carrying out the process, any suitable instrumentalities or mechanisms may be employed which are available, or can be adapted, for the purpose, so for illustrative purposes there are only shown in the drawings, diagrammatically, such views as may be necessary for a full understanding of the novel manipulation of the slitted metal sheets to provide for a substantially continuous expanding operation within and through a stationary die-pass.

In these drawings,

Figure 1 is a detail perspective view illustrating the starting of the first slitted sheet into the pass between stationary co-acting die elements.

Fig. 2 is a side elevational view illustrating a pair of stationary co-acting expanding dies such as I prefer to use, and successive overlapped slitted sheets being fed to and through the die-pass.

Fig. 3 is a top plan view of the arrangement of parts shown in Fig. 2, with the upper die member removed.

Fig. 4 is an enlarged detail cross sectional view on the line 4—4 of Fig. 2, illustrating the cross sectional characteristics of the stationary die-pass through which the slitted sheet slidably moves under the action of the feeding means therefor.

Fig. 5 is a perspective view illustrative of three overlapping slitted sheets showing all of the stages of development thereof, that is, the non-expanded slitted sheet before it enters into the die-pass and having its advancing end lapped upon the inside of the rear end of the sheet within the pass; the slitted sheet in advance thereof which is in course of its passage through the pass, and is therefore partly expanded; and, the third sheet which has reached its full development for the greater portion of its area and is interlocked at its rear end portion with the front portion of the second sheet referred to.

Fig. 6 is a bottom plan view of the upper die, illustrating by dotted lines the direction of movement of the strands against the series of inclined steps or shoulders.

Fig. 7 is a detail perspective view illustrating more plainly the nesting interlock of the opened meshes of the overlapping metal sheets.

Fig. 8 is a similar view illustrative of the manner in which the overlapping of the sheets at the starting ends of the dies causes the slitted sheet within the die to act as a feeder for entering a corner of the next following sheet into the die-pass.

Like reference characters designate corresponding parts in the several figures of the drawings.

In carrying out the present invention, the metal sheets designated by the reference letter A, are preliminarily slitted by any suitable slitting machine or apparatus which produces therein parallel lines of interrupted slits arranged alternately in adjacent rows, the alternate or staggered disposition of the slits in adjacent rows serving to provide an uncut connecting neck *a* between the mesh-forming strands in adjoining rows.

As indicated, a distinctive feature of the present invention resides in a novel process or method of sheet-feeding for metal expanding machines, in order to provide a substantially continuous process that will require a minimum handling of the sheets on

the part of the operator, and at the same time will provide for a substantially continuous sheet-feeding operation. In order to best illustrate this sheet-feeding process, I have selected for purposes of illustration a form of die-pass representing one type of expanding mechanism with which the invention may be associated. This die-pass is designated generally by the reference letter P, and constitutes the working interval or space between a pair of stationary co-acting dies 1 and 2 respectively. These co-acting dies preferably possess the structural and functional characteristics of the dies disclosed in my former Patents Nos. 895,923, dated Aug. 11, 1908, and 1,061,953, dated May 13, 1913. That is to say, the said spaced-apart dies are provided upon their opposing faces with a series of laterally and diagonally extending shoulders 3 and 4 respectively, which are adapted to be engaged by, and guide, the unslitted portions *a* of the metal sheet to one side, thereby opening the slits into meshes. While the lower die member 3 is of substantially the same structural formation as the upper die member, its function is to hold the slitted and partially expanded sheet in position for positive engagement with the shoulders or steps of the upper die member against which the material presses and bears as it slides through the pass P under the impulse of the feeding elements 5, which latter may consist of a series of feeding rolls, as diagrammatically indicated, and as fully disclosed in my former patents aforesaid.

In addition to the feature of the stationary die having a series of laterally and diagonally extending steps or shoulders 3—4, it will be observed that the pass P, between the separate die members, extends obliquely in a direction longitudinally of the dies as shown in Fig. 2 of the drawings, and obliquely in a direction transversely of the dies as shown in Fig. 4 of the drawings. This disposition of the die-pass provides for producing an expanding action that runs successively from one corner of the sheet to the diagonally opposite corner, and further, on account of the lateral obliquity of the pass P, the same has an upward trend from one side to the other as shown in Fig. 4, with the result of compelling the uncut portions *a* to bear firmly against and closely follow the shoulders of the upper die member 1.

The relation of the steps 3 and 4, in a cross-section of the die members 1 and 2, is plainly shown in Fig. 4 of the drawings. It will be observed that the upper expanding die 1 projects outwardly beyond the lower guiding die 2, as at 6, so as to successively interpose the various shoulders, formed by the inclined steps, into the path of the unslitted portion of the metal sheet as it moves through the machine. Still referring to Fig. 4 of the drawings, it may be noted that the vertical distance between what may be termed the horizontal faces *x*, *x*, of the upper and lower die members, is a little wider than the width of single uncut strands, while the vertical depth of the passage provided between directly opposing shoulders or steps 3 and 4 of the upper and lower die members, is slightly greater than the width of two strands at the connecting neck *a*. The horizontal distance between the shoulders is the same as the width or size of the meshes, but all of these several distances are subject to variation and adjustment as particularly mentioned in my former Patent No. 1,061,953.

In the illustrated embodiment of the invention, the slitted sheets are fed to the machine in a vertical plane, and in order to enter the first sheet into the starting end of the pass P, the front upper corner of the sheet is bent laterally, and opened sufficiently, as indicated at 7, to permit the operator to enter the uncut strands at this corner into the pass against the first of the shoulders or steps of the die. After thus preliminarily opening the front upper corner of the first sheet and starting it into the die-pass, the feeding means of the machine will then pick up the sheet and move it longitudinally of the die, with the result of causing the unslitted strands to successively, progressively, and slidably engage the shoulders, and to be laterally guided thereby through the die-pass. This action serves to open the slits into meshes.

As indicated, as the sheet begins to feed through the die-pass, the die elements (steps or shoulders) first operate upon one corner of the sheet and successively expand a greater number of strands until the full width of the sheet is reached. As the last portion of the sheet feeds through the machine, the number of meshes acted upon successively decreases until the diagonally opposite corner, to that starting in, is expanded in the last portion of the travel.

In order to maintain the continuity of operation in the process so that it may be carried out speedily, the overlapping relation of the ends of the separate slitted sheets is essential, in effect making a continuous sheet that is being fed to and through the die-pass. This overlapping of the sheet ends is particularly important for feeding-in purposes. Also it is important to provide for this overlap in such a manner that the following sheet, about to enter the die, has its advancing end disposed at the inside of the rear end portion of the sheet ahead which is in the machine. Accordingly, the front end of said following sheet lies between the side of the die and the sheet within the die, so that as the rear upper corner of the latter sheet moves into

the die-pass, such corner will forcibly open the top upper corner (as at 8 in Fig. 8) of the following sheet so as to automatically enter it into the receiving end of the die-pass in a manner similar to the manual starting of the first sheet.

By reason of this overlapping of successive slitted sheets to provide for automatic insertion of the same into the receiving end of the die-pass, a further practical result is effected, namely, that of causing the expanded portions of overlapped sheets, within the die, to become interlocked in nested relation, as indicated generally by the letter I in Figs. 5 and 7 of the drawings. This interlocking of the meshes where adjoining sheets overlap, serves to cause the completely expanded sheet to be fully and freely ejected from the die-pass by the sheet following.

I claim.

1. In the art of expanding slitted sheet metal, the process which consists in starting the opening of the strands in the following blank, before the blank in advance thereof has passed from the expanding mechanism, by feeding the blanks with their ends in overlapped engagement.

2. In the art of expanding slitted sheet metal, the hereindescribed process which consists in starting the opening of the strands at a corner of the blank, before the blank in advance thereof has passed from the expanding mechanism, by feeding the blanks with their ends in overlapped engagement.

3. In the art of expanding slitted sheet metal, the hereindescribed process which consists in causing a rear corner of the blank within the expanding mechanism to communicate a deflecting pressure upon an advancing corner of the following sheet to start the opening of the strands in the latter.

4. In the art of expanding slitted sheet metal, the hereindescribed process which consists in causing the sheet within the expanding mechanism to exert a deflecting pressure upon a corner portion of the following sheet to thereby initiate the opening of the strands in the latter and to cause a registering interlocking of the two sheets.

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

HERBERT E. WHITE.

Witnesses:
G. R. NAUMANN,
H. R. GLENN.