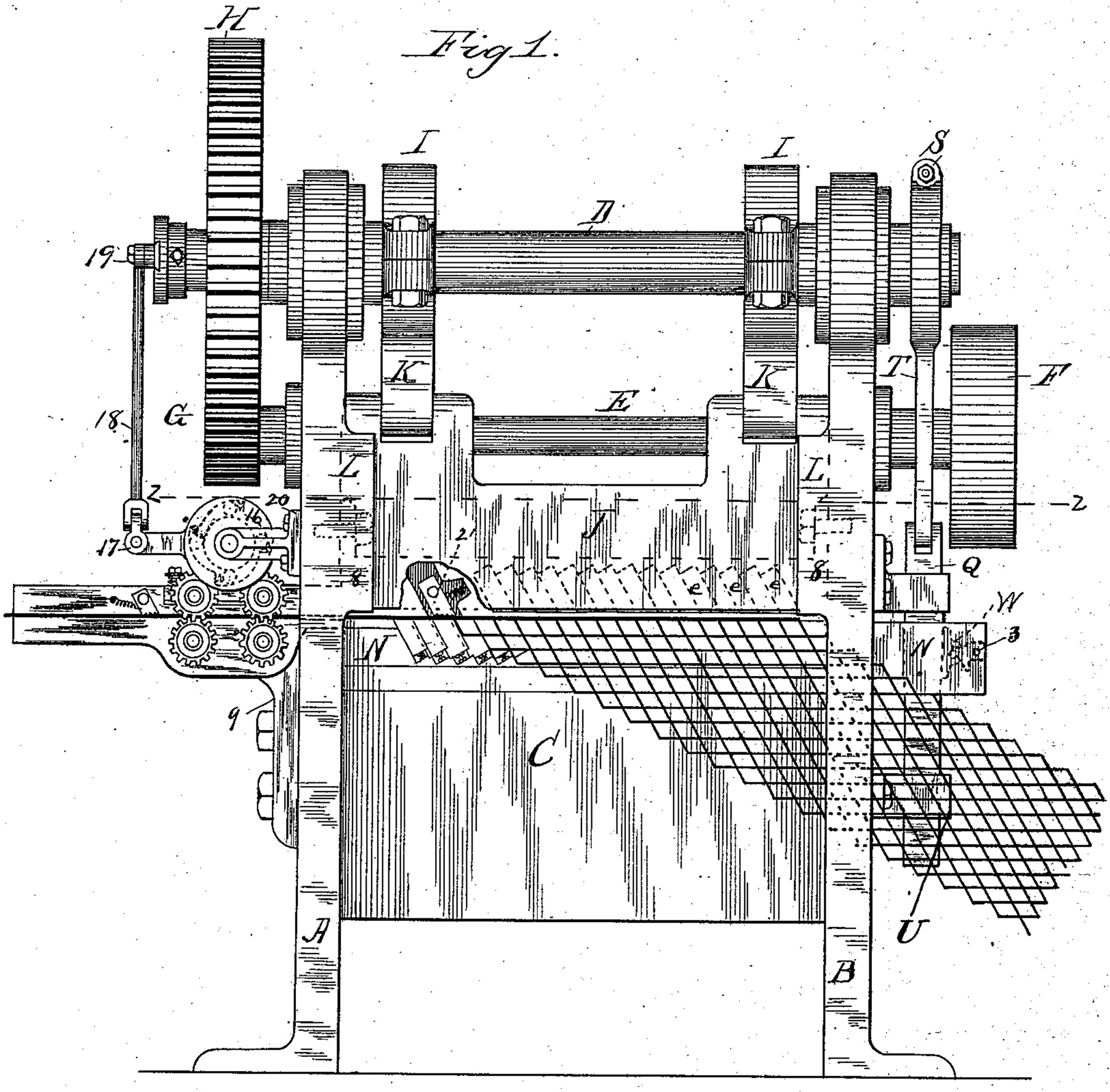
(No Model.) 4 Sheets—Sheet 1.

J. F. GOLDING & G. B. DURKEE.

MACHINE FOR SLASHING AND EXPANDING FLAT SHEET METAL TO FORM MESHES.

No. 381,230. Patented Apr. 17, 1888.

Fig 1.



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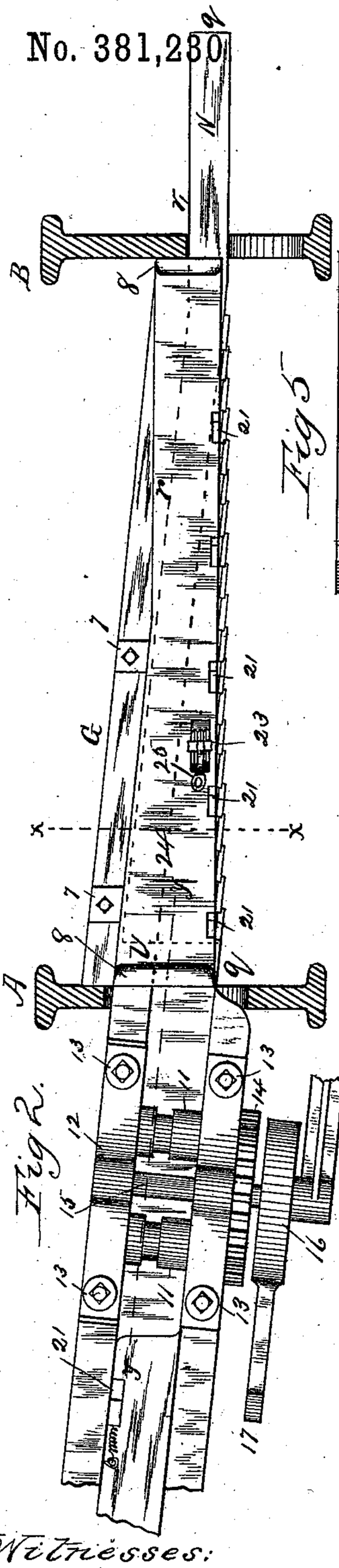

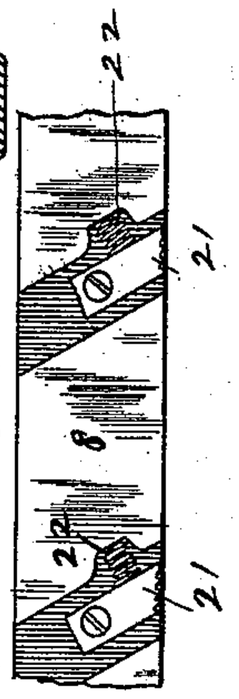

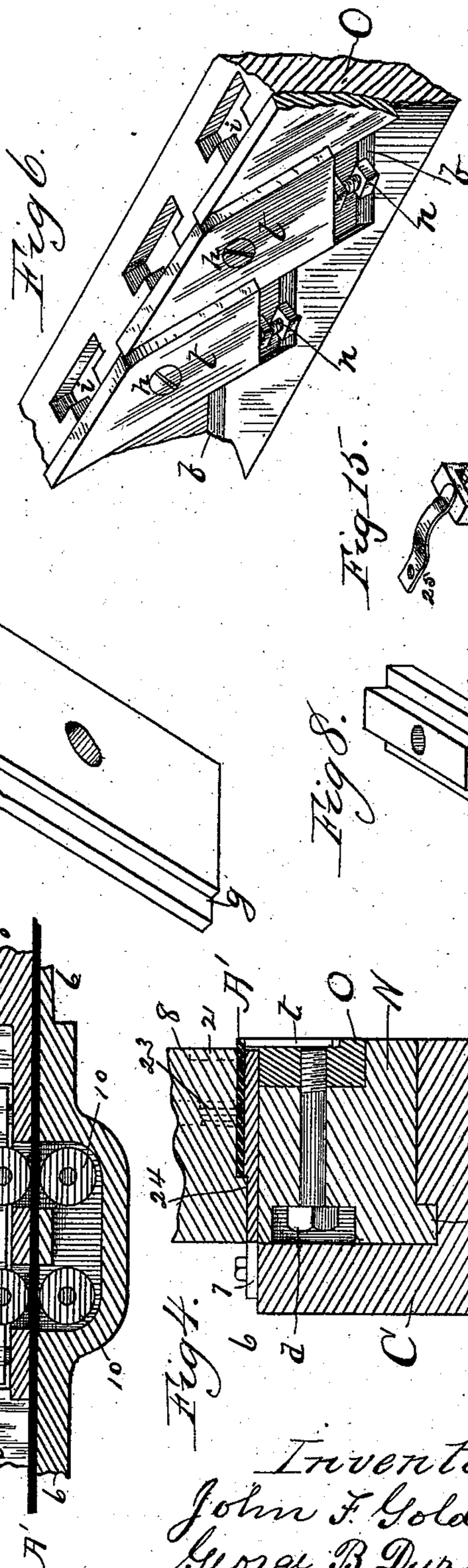

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(No Model.) 4 Sheets—Sheet 3.

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Fig 12.

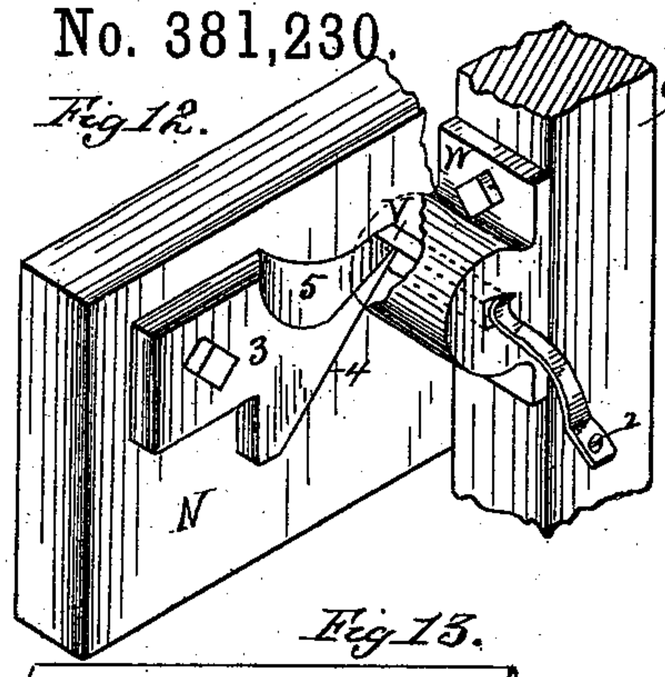


Fig 13.

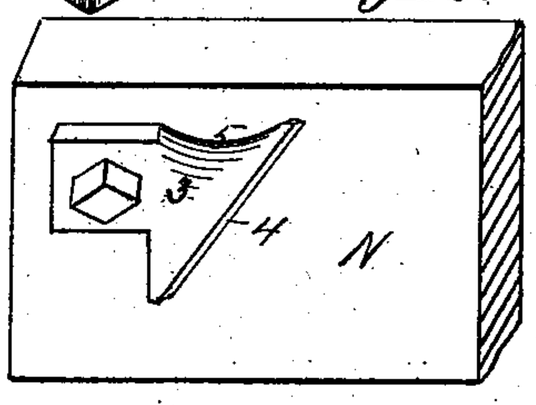
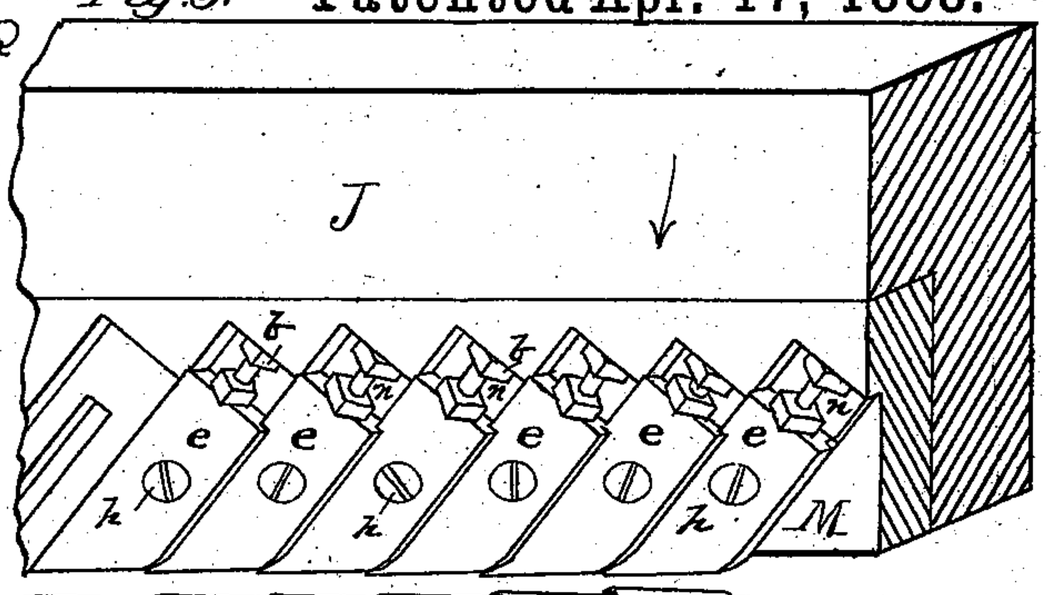


Fig 9.



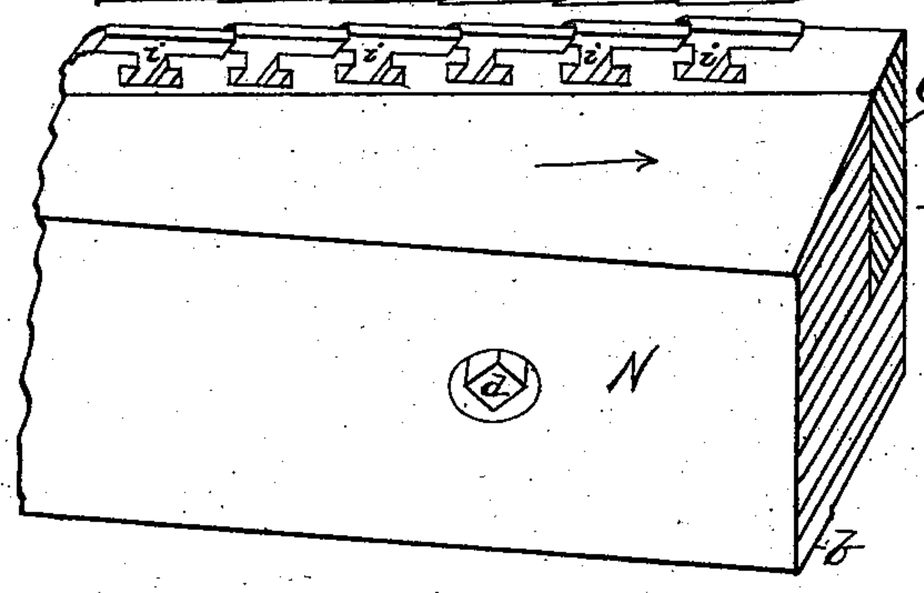
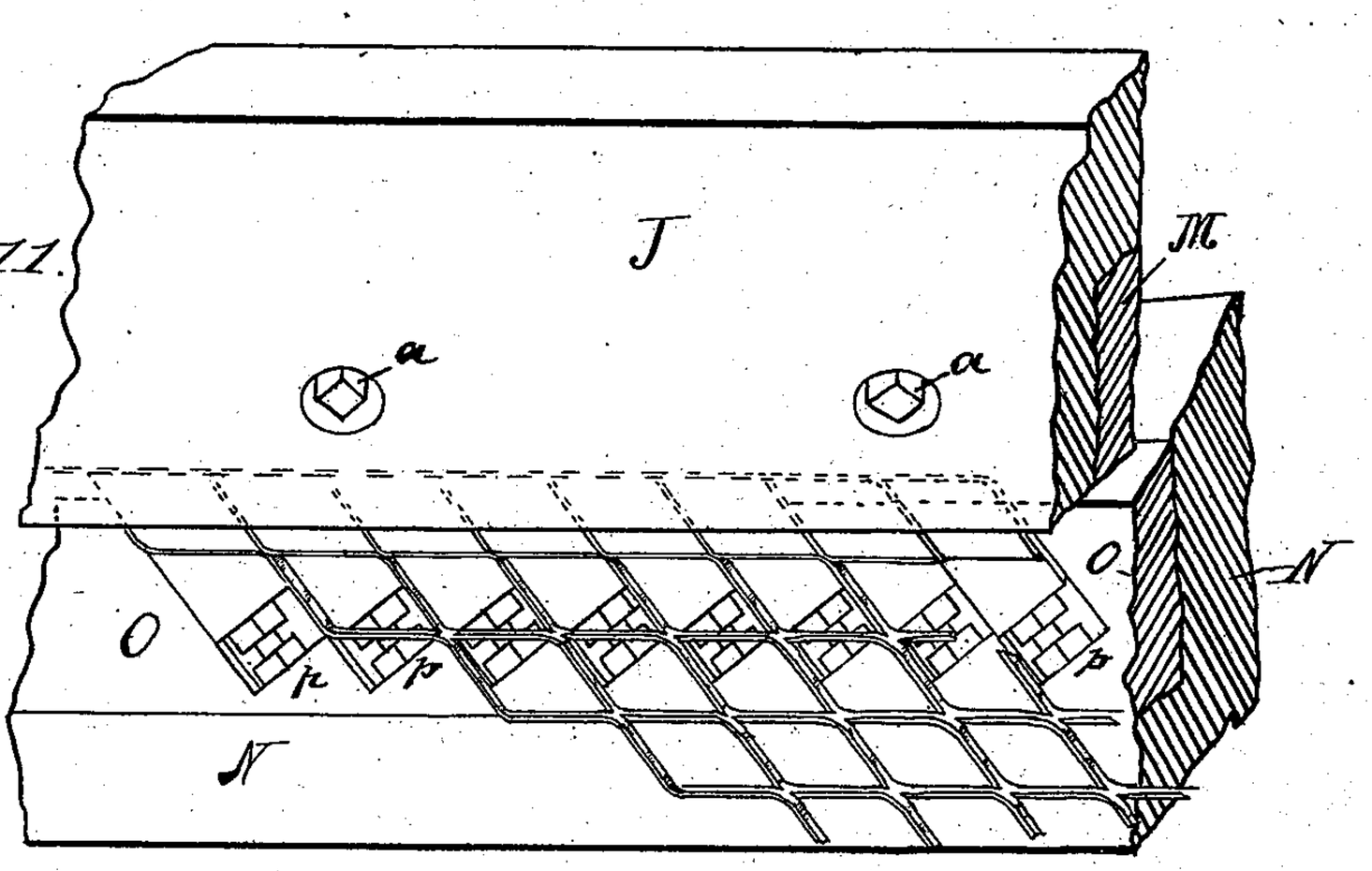


Fig 10.

Fig 11.



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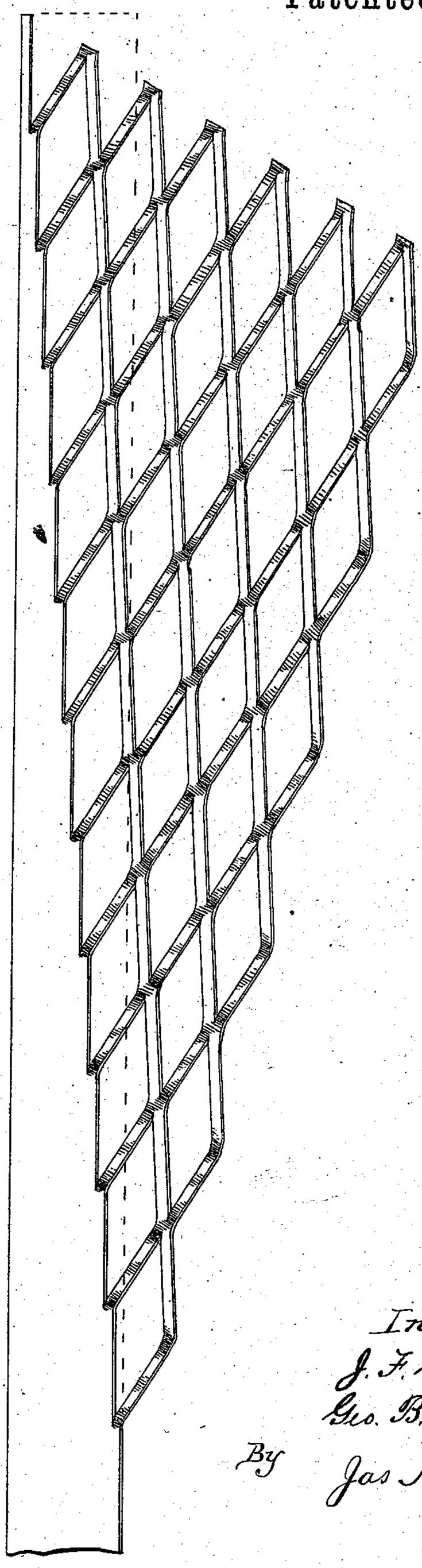

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN FRENCH GOLDING AND GEORGE B. DURKEE, OF CHICAGO, ILLINOIS, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE EXPANDED METAL COMPANY, OF MISSOURI.

MACHINE FOR SLASHING AND EXPANDING FLAT SHEET METAL TO FORM MESHES.

SPECIFICATION forming part of Letters Patent No. 381,230, dated April 17, 1888.

Application filed March 31, 1885. Serial No. 160,735. (No model.)

To all whom it may concern:

Be it known that we, JOHN FRENCH GOLDING and GEORGE B. DURKEE, both citizens of the United States, and residents of the city of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Machines for Slashing and Expanding Flat Metal to Form Meshes, of which the following is a specification.

Figure 1 is a front elevation of the machine, also showing the metal formed into meshes issuing from the machine. Fig. 2 is a plan view through line *z z* of Fig. 1. Fig. 3 is a vertical sectional view through line *y y* of Fig. 2. Fig. 4 is a vertical cross-sectional view through line *x x*, Fig. 2. Fig. 5 is a detail front elevation of bar-holding dogs. Fig. 6 is a detail perspective view of lower knife-bar, showing knives in position. Fig. 7 is a perspective of one of the knives. Fig. 8 is a perspective of nut-block. Fig. 9 is a sectional perspective view of upper vertically-traveling beam, showing knives and knife-bar in position. Fig. 10 is a sectional perspective of lower longitudinally-traveling bar, showing knife-bar and upper ends of knives attached thereto. Fig. 11 is a reverse view of Figs. 9 and 10, showing strands of expanded metal in connection therewith. Fig. 12 is a detail perspective of device for actuating lower longitudinally-traveling bar. Fig. 13 is a detail perspective of cam shown in Fig. 12. Fig. 14 shows a piece of flat metal partially cut and partially uncut and expanded in the form of meshes. Fig. 15 shows roller with threaded surface and spring to force it down.

The nature and object of this invention are to provide a machine for cutting and expanding flat metal into the form of meshes.

Similar letters and figures of reference refer to similar parts in the different figures.

A and B are the end frames of the machine, connected together by a bed-piece, C.

D is the main shaft, working in the frames A and B, provided with suitable bearings.

E is the driving-shaft, secured to frames A and B by suitable boxing, having at one end the pulley F and at the other end the spur gear-wheel G, the latter not shown in the drawings, but being located at the rear of main gear-wheel H and gearing therewith.

I I are eccentrics located on shaft D between the frames A and B.

J is the vertically-traveling cross-head, connected to eccentrics I I by links K K and traveling in guides L L on frame A B.

M is the knife-bar attached to the vertically-traveling cross-head J, and secured thereto by suitable bolts, *a a*, Fig. 11.

N is the longitudinally-traveling bar, located on bed-plate C, as shown in Figs. 4 and 10, provided with guide *b*, working in a slot in the bed-plate C.

O is the knife-bar attached to the longitudinally-traveling bar N, and fastened thereto by bolt *d*.

e e e are knives attached to the upper knife-bar, M, placed at an angle thereon, as shown in Fig. 9 and in dotted lines on beam J, Fig. 11. The said knives are fastened to the knife-bars M and O, Figs. 9, 10, and 6 by countersunk bolts *h*, which pass through the knife and into the nut-block P. This nut-block is in T form and fits in corresponding recesses, *i i*, in bars M and O, Figs. 6 and 10. These knives are made adjustable upward and downward by bolts and jam-nuts *n n*, located at one end, Figs. 6 and 9, and working against shoulders *b*.

The knives in both upper and lower bars are secured in the same manner by the use of nut-blocks P, which are similarly located in both bars, and also are adjustable by the bolts and jam-nuts *n n*, similarly located in the respective bars. The knives *t*, Fig. 6, on lower bar, O, also are placed at an angle with the bar to which they are attached. The knives on the upper bar are set facing the knives in the lower bar, as shown in Figs. 9, 10, and 11. In the simultaneous respective movements of the upper and lower bars the inclined surfaces of the upper knives move along parallel with the inclined surfaces of the lower knives, the faces of the knives fitting closely together. The lower longitudinally-traveling bar, N, is of a wedge form, as shown in Figs. 10 and 2. In Fig. 2 it is more clearly shown extending from

q to *q*, the dotted line *r* showing the rear beveled edge, the knives covering the front line of the bar. On the end of shaft D, Fig. 1, opposite gear-wheel H, is the eccentric S, from which extends pitman T, which actuates plunger Q, and the latter, working in box U, Fig. 1, actuates pawl V, which is located in box W and held in position by the spring 2. (See Fig. 12.)

3 is a cam located on longitudinally-traveling bar N, Figs. 1, 12, and 13, having under edge, 4, cut beveled, Figs. 12 and 13. On the upper surface of the lower longitudinally-traveling bar, N, is a stationary plate, 6, firmly fastened to lower bed-plate by projections 7 7, Figs. 2 and 4, extending through frame A and supported by brackets 9, Fig. 1.

8, Figs. 3 and 4, is a pressure-bar, located above plate 6, extending between and secured to frame A B, as is also shown by dotted lines in Fig. 1. This pressure-bar 8 extends through frame A to the front of the feeding device over plate 6. In Fig. 3 are shown the plates 6 and 8 and the feeding device attached thereto.

10 10, Fig. 3, are lower feed-rolls in cut-away part of plate 6. 11 11 are upper feed-rolls in plate 8. The surfaces of these feed-rolls are corrugated. The feed-rolls 11 11 are held in place by cap 12 and tension-springs and bolts 13 13. (Shown in Figs. 2 and 3.)

In Fig. 3 the upper rollers, 11 11, are shown annularly grooved to allow plate 8 to remain in a continuous strip, the lower rolls being similarly grooved for a like purpose. These feed-rolls are actuated by gears at one end of each, which are driven by a larger wheel, Fig. 2, on shaft 15. On this shaft is a clutch-wheel, 16, with arm 17, Figs. 1 and 2, joined to the lower end of connecting-rod 18, which is connected to crank-pin 19 on main shaft D. This crank-pin is adjustable by means of a slot and a set-screw. The end of shaft 15 works in caps 12, Figs. 2 and 3, and its projecting end is supported by bracket 20, attached to frame A.

In pressure-bar 8, Figs. 1, 2, 4, and 5, are shown dogs 21, loosely attached to said bar at their upper ends by a bolt and dropping obliquely therefrom, and on their upper sides are set springs 22, their lower beveled ends being serrated and located close to the upper knives.

23, Figs. 2 and 4, is a roller having screw-like projections, forming corresponding annular grooves on its surface, set in bar 8, and set at an angle with the rear face of the lower bar, N, and is pressed downward by spring 25, Fig. 15.

The under surface of the pressure-bar 8, Fig. 4, is partially cut away, leaving flange 24, which fits into a correspondingly cut-away part in plate 6, for the purpose of forming a guide.

The operation of our machine is as follows: Motion is communicated to the main driving-wheel by pulley F and through intermediate connections to eccentrics, which in turn raise and lower the cross-beam J, to which are secured the upper knives. As the upper knives descend, their inclined edges engage with the inclined edges of the lower knives, causing the lower bar, N, and its knives to travel in a longitudinal direction, as indicated by the arrows in Figs. 9 and 10. As the upper beam, J, descends in direction indicated by the arrow, the plunger Q also descends, being actuated by eccentric S. In this act of descending the pawl V passes over the sloping surface 5 of cam 3, Fig. 12, when it is returned beneath the beveled edge 4 of said cam by spring 2. In the upward movement of the plunger the pawl V moves upward in a vertical line, and by this act forces a return of bar N to its original position.

It will be observed that in its longitudinal movement the lower bar, N, moves in a direction oblique to the face to which the knives are secured, the knives in both upper and lower bars being set at an angle with the plane of these bars, and as the upper knives, having beveled or inclined edges, have to pass downward along the beveled or inclined edges of the lower knives, causing a downward shear cut, the rear plane of the lower bar is correspondingly beveled to allow the knives to travel in their individual planes.

A′, Fig. 3, is a piece of flat metal fed between the bars 6 and 8, and by means of the feed-rolls is carried over the knives of the lower bar intermittingly along the line of the guide 24, Figs. 4 and 3. Consequently it is first brought in contact with the knives at one of its corners, and that part between the knives is simultaneously cut and pressed downward by the downward movement of the upper knives, the receding action of the lower knives allowing the cut strands to be expanded downward and to contract endwise. At the next feed it is evident that the metal will encounter additional knives, and so on until it has passed to the knife farthest from the feed-rolls, when at each downward stroke the upper knives of the machine are cutting to their full capacity.

In Fig. 11 is shown the position of the strands being cut and bent downward from the plane of the metal, the length of the uncut spaces depending upon the length of the feed. The feed-rollers are actuated from a crank-pin on the main shaft D. In Fig. 1 is shown the material cut and expanded, with an uncut portion in the act of being fed into the machine. The metal passes under dogs 21 freely, and is clutched by the dogs through the action of springs 22, and is firmly held between the dogs and plate 6, allowing the longitudinally-traveling bar N to be freely moved by the cutting action of upper knives, the dogs preventing the retreat of the metal while it is being cut, which otherwise would be forced backward by the shearing cut of the upper knives. As the metal is fed into the machine, it passes under guide-wheel 23, which revolves at an angle with the direction of the travel of the metal.

The clutch which actuates the feed-rolls can

be any kind that will grasp the shaft and turn it in one direction and slip by the shaft in the other direction.

We claim—

1. In a machine for cutting and expanding flat metal into meshes, the combination of two sliding cutter-heads each provided with cutters and each set of cutters arranged in step form on its respective head, the movement of one cutter-head being longitudinal and the movement of the other being at or near a right angle thereto, the cutters of each set adapted to fit into and pass over the faces of the other set, and a suitable intermittent feeding device arranged and adapted by means of mechanism to feed metal between said cutters in line with and in the direction of the forward travel of said longitudinally-traveling head.

2. In a machine for cutting and expanding flat metal into meshes, the combination of two sliding cutter-heads each provided with cutters and each set of cutters arranged in step form on its respective head, the movement of one cutter-head being longitudinal and the movement of the other being at or near a right angle thereto, the cutters of each set adapted to fit into and pass over the faces of the other set, and a suitable fixed guide located at the rear of and parallel with the travel of said longitudinally-sliding head.

3. In a machine for cutting and expanding flat metal into meshes, the combination of two sliding cutter-heads each provided with cutters and each set of cutters arranged in step form on its respective head, the movement of one cutter-head being longitudinal and the movement of the other being at or near a right angle thereto, the cutters of each set adapted to fit into and pass over the faces of the other set, and a suitable clamping device constructed substantially as described and adapted for holding the metal and preventing its retreat while it is being cut and expanded.

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