H. M. BARBER.

ROTARY PUNCHING MECHANISM FOR TRAVELING WEBS.

APPLICATION FILED DEC. 12, 1914.

1,280,367.

Patented Oct. 1, 1918.

3 SHEETS—SHEET 1.

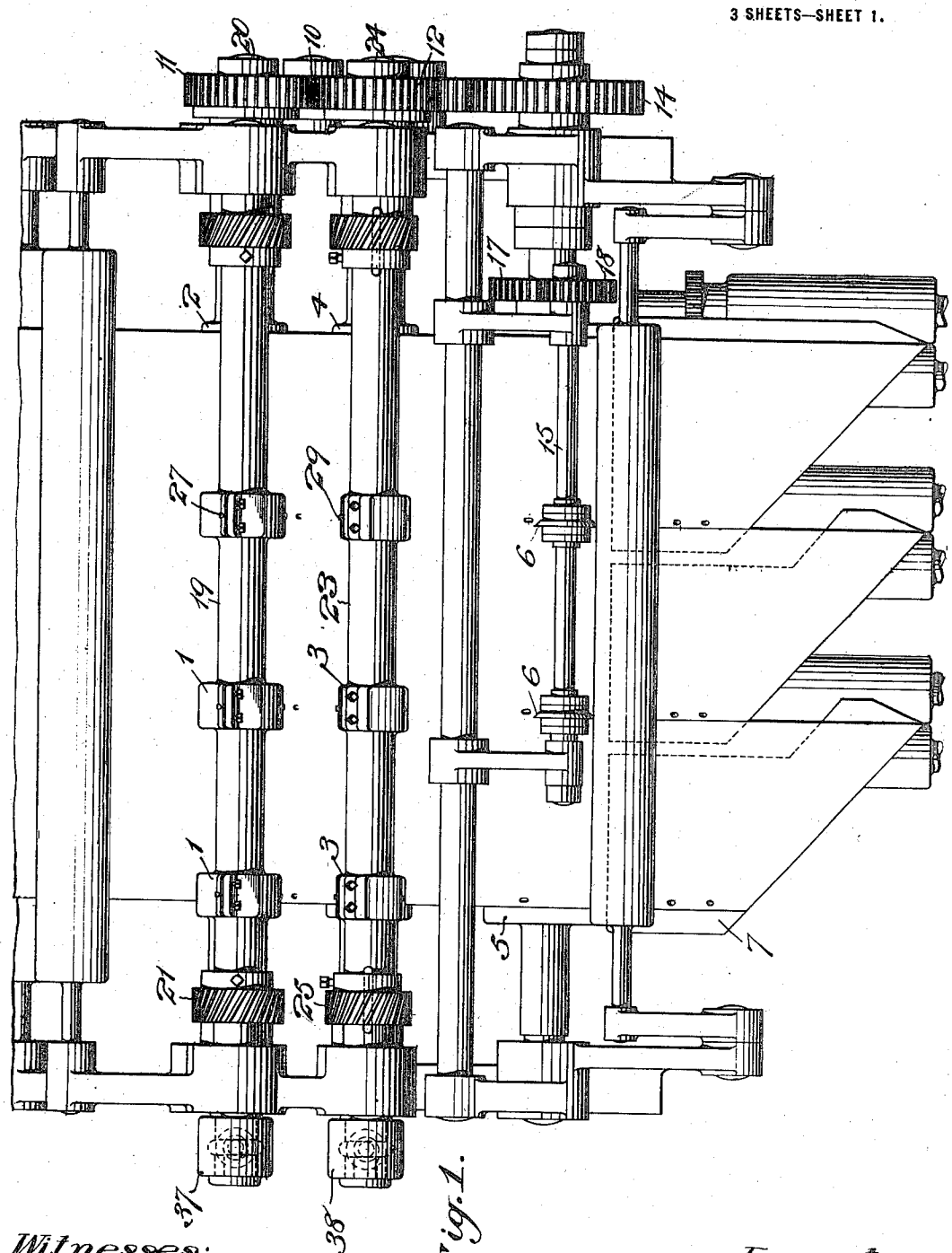



Fig. 1.

Witnesses:-
Hyperion Barry.
J. George Barry.

Inventor:-
Howard M. Barber
by attorneys
Brownell and

H. M. BARBER.

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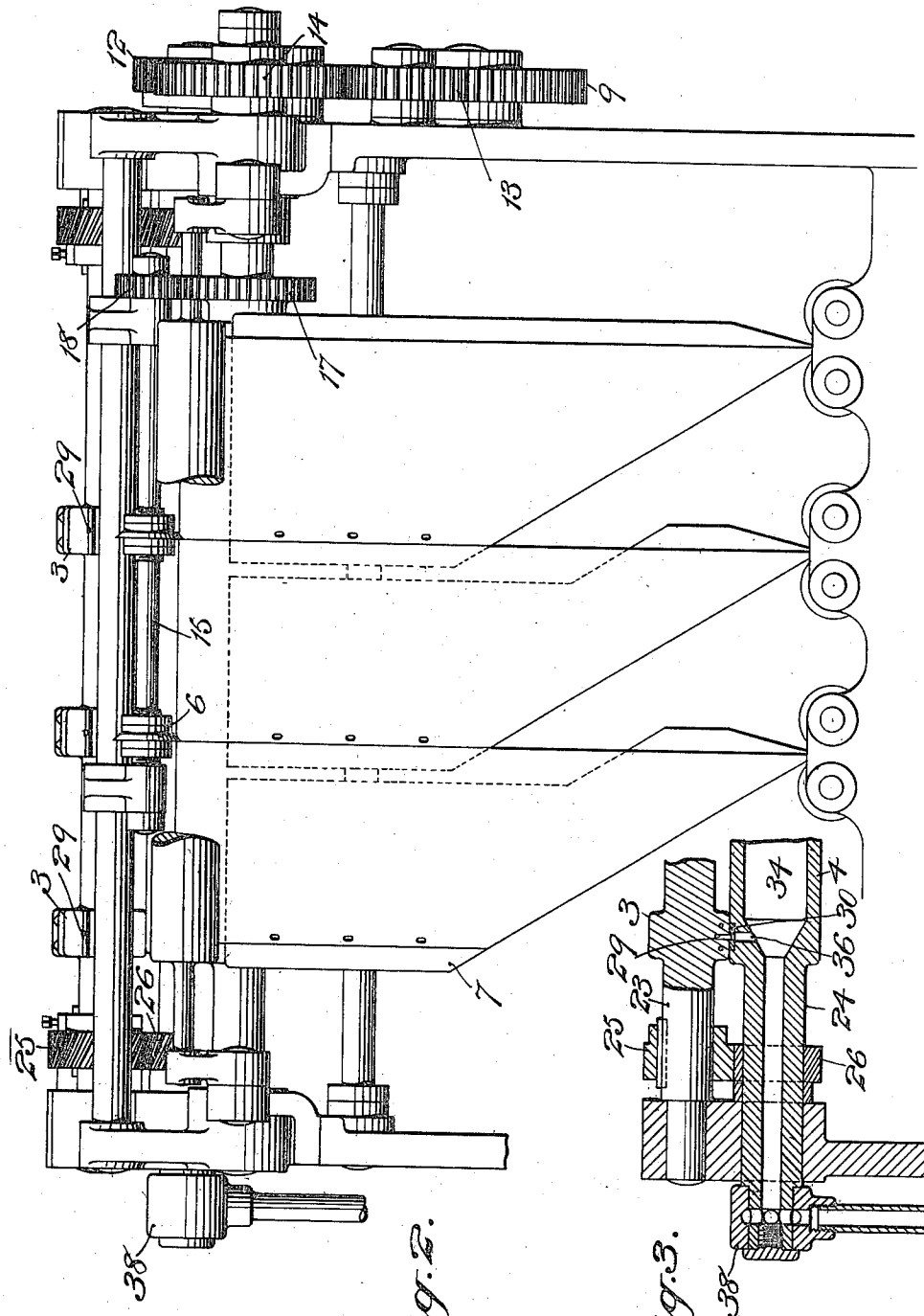



Fig. 2.




Fig. 3.

Witnesses:-
Hyperion Barry.
F. George Barry

Inventor:-
Howard M. Barber
by attorneys
Pennie Davis & Ward

H. M. BARBER.

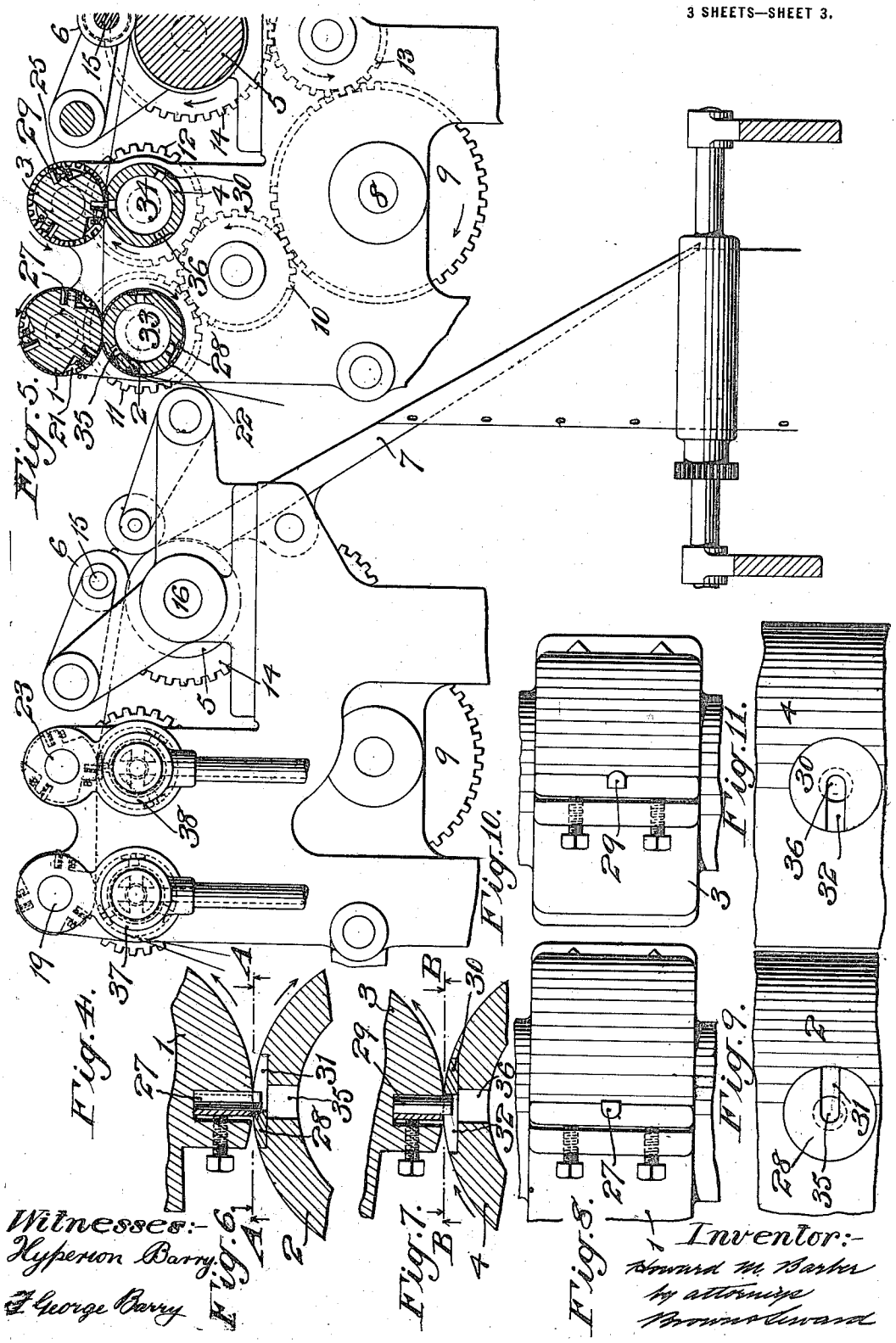
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3 SHEETS—SHEET 3.



# UNITED STATES PATENT OFFICE.

HOWARD M. BARBER, OF STONINGTON, CONNECTICUT, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

## ROTARY PUNCHING MECHANISM FOR TRAVELING WEBS.

1,280,367. Specification of Letters Patent. Patented Oct. 1, 1918.

Application filed December 12, 1914. Serial No. 876,914.

*To all whom it may concern:*

Be it known that I, HOWARD M. BARBER, a citizen of the United States, and resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Rotary Punching Mechanism for Traveling Webs, of which the following is a specification.

The object of this invention is to provide a rotary punching mechanism for cutting one or more series of holes in a traveling web, which punching mechanism will be self-freeing from the web.

My invention comprises means, such as punches and their coacting dies, arranged to act on the traveling web for first partially cutting the holes and then completing the cutting of the holes.

My invention more specifically comprises two pairs of rotary punching rolls carrying coacting punches and dies, the first pair being arranged to cut the rear portion of a hole and the second pair being arranged to complete the hole, means being provided for removing the cut-out material and any dust arising from the punching of the holes.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view in top plan of so much of a rotary web punching machine as includes my invention,

Fig. 2 is a view in front elevation of the same,

Fig. 3 is a detail longitudinal central section through one pair of coacting punching rolls,

Fig. 4 is a detail view in side elevation of the machine,

Fig. 5 is a detail longitudinal central section through the machine,

Fig. 6 is a detail cross section on an enlarged scale through the first pair of punching rolls,

Fig. 7 is a similar section through the second pair of punching rolls,

Fig. 8 is a detail view taken on the line A—A of Fig. 6 looking toward the first punch roll,

Fig. 9 is a similar view looking toward the first die roll,

Fig. 10 is a detail view taken in the plane of the line B—B of Fig. 7 looking toward the second punch roll, and

Fig. 11 is a similar view looking toward the second die roll.

The first punch roll is denoted by 1 and its co-acting die roll by 2. The second punch roll is denoted by 3 and its coacting die roll by 4. A longitudinal web slitting mechanism is shown, which comprises the slitting roll 5 and slitters 6, which, in the present instance, are arranged to slit the web, as it passes from the punching mechanism, into three narrow webs. These webs may be passed over formers 7 to any desired point.

The die rolls 2 and 4 are driven from the shaft 8 through the gears 9, 10, 11 and 12, and the slitter roll 5 is driven from the shaft 8 through the gears 9, 13, 14.

The shaft 15 of the slitters 6 is driven from the shaft 16 of the roll 5 through the gears 17, 18.

Both ends of the shaft 19 of the first punch roll 1 are driven from the shaft 20 of the first die roll 2 through the pairs of spiral gears 21, 22, and both ends of the shaft 23 of the second punch roll 3 are driven from the shaft 24 of the second die roll 4 through pairs of spiral gears 25, 26. The spiral gears 21 and 25 are adjustable along their shafts 19 and 23, respectively, to take up all lost motion between the punch and die rolls.

The circumference of the first die roll 2 is preferably made a little greater than the page length of the web so that this roll exerts a slight forward pull on the web as the web passes between the first punch and die rolls, for keeping the web up between the press and the folder.

The first punch roll 1 is provided with punches 27 and the second die roll 2 is provided with dies 28 coacting with said punches, said punches and dies being so arranged as to partially cut the holes in the traveling web at the desired points therein. In the present instance, these punches and dies are arranged to partially cut a series of holes near one edge of each of the three narrow webs into which the wide web will be cut.

The frequency of the holes will be de-

termined by the number of punches and dies arranged circumferentially.

The second punch roll 3 is provided with punches 29 and its die roll 4 with dies 30 coacting with the punches 29. These punches and dies 29, 30, are properly arranged with respect to the punches and dies 27, 28, so as to complete the cutting of the holes in the web. In the present instance, the punches and dies 27, 28, of the first punching mechanism are arranged to cut the rear portions of elongated holes and the punches and dies 29, 30, are arranged to cut the front portions of the elongated holes to complete them.

The dies 28 and 30 are set flush with the peripheries of their rolls 2 and 4, and the punches 27, 29, project beyond the peripheries of their rolls 1 and 3. This arrangement will permit the punches to enter their respective dies 28 and 30, said dies being cut away, as shown at 31 and 32, to permit the free entrance and withdrawal of the punches. The cutaway portions 31 of the dies 28 of the first die roll are arranged to the front of the dies and the cutaway portions 32 in the dies 30 of the second die roll are arranged to the rear.

The arrangement of the punches and dies on the first pair of punching rolls is such that the punches run ahead of the cutting edges of their dies after the cutting operation, the cutaway portions 31 of the dies permitting this movement. This running ahead movement of the punches is accomplished by causing the ends of the punches 27 to travel in a greater circle than the surface of the dies 28.

The arrangement of the punches and dies on the second pair of punching rolls is such that the punches fall back from the cutting edges of their dies after the cutting operation, the cutaway portions 32 of the dies permitting this movement. This falling back movement of the punches is accomplished by causing the ends of the punches 29 to travel in a smaller circle than the surface of the dies 30. Both sets of punches, therefore, do their work when entering the dies and run free from the cutting edges of the dies when withdrawing therefrom, thus insuring the clearing of the punches from the traveling web.

To remove the dust and cut-out material, I preferably make the die rolls 2 and 4 hollow, as shown at 33, 34, and connect these hollow portions with their respective dies through openings 35, 36. The shafts of rolls 2 and 4 are hollow and are connected to a suitable suction means, not shown, through the hollow heads 37, 38, at the ends of the shafts 20 and 24, respectively.

What I claim is:

1. Mechanism for cutting holes in traveling webs, comprising two pairs of coacting punches and dies rotating in the direction of travel of the web, the first pair being arranged to cut through the traveling web to start the holes and the second pair being arranged to cut through the traveling web to complete the holes.

2. Mechanism for cutting holes in traveling webs, comprising two pairs of rolls carrying coacting punches and dies rotating in the direction of travel of the web, the first pair being arranged to cut through the traveling web to start the holes and the second pair being arranged to cut through the traveling web to complete the holes, and suction means for removing the dust and cut-out material through one or both of the die rolls.

3. Mechanism for cutting holes in traveling webs, comprising two pairs of rotary coacting punches and dies, the first pair being arranged to cut through the traveling web to start the holes and the second pair being arranged to cut through the traveling web to complete the holes, the non-cutting side of each die being cut away to permit its punch to clear itself after the cutting operation.

4. Mechanism for cutting holes in traveling webs, comprising two pairs of rolls carrying coacting punches and dies rotating in the direction of travel of the web, the first pair being arranged to cut the rear portions of the holes and the second pair being arranged to cut the front portions of the holes to complete them.

5. Mechanism for cutting holes in traveling webs comprising two pairs of rotary coacting punches and dies, the first pair being arranged to cut the rear portions of the holes and the second pair being arranged to cut the front portions of the holes to complete them, the front non-cutting side of the first die being cut-away and the back non-cutting side of the second die being cut away to permit their respective punches to clear themselves after the cutting operation.

6. Mechanism for cutting holes in traveling webs comprising two pairs of rotary coacting punches and dies, the first pair being arranged to partially cut the holes and the second pair being arranged to complete the holes, said punches being arranged to do their work when entering the dies and to run free from the cutting edges of the dies when withdrawing therefrom.

7. Mechanism for cutting holes in traveling webs comprising two pairs of rotary coacting punches and dies, the first pair being arranged to partially cut the holes and the second pair being arranged to complete the holes, the punches of the first pair being arranged to run ahead of the cutting edges of the dies of the first pair after the cutting operation and the punches of the

second pair being arranged to fall back from the cutting edges of the dies of the second pair after the cutting operation.

8. Mechanism for cutting holes in traveling webs, comprising two pairs of rotary coacting punches and dies, the first pair being arranged to partially cut the holes and the second pair being arranged to complete the holes, the punches of the first pair being arranged to run ahead of the cutting edges of the dies of the first pair after the cutting operation and the punches of the second pair being arranged to fall back from the cutting edges of the dies of the second pair after the cutting operation, the said dies being cut away respectively to the front and rear of their cutting edges to permit the punches to run free from their cutting edges when withdrawing from the dies.

9. Mechanism for cutting holes in traveling webs, comprising two pairs of rotary coacting punches and dies, the first pair being arranged to partially cut the holes and the second pair being arranged to complete the holes, the free end of the punch of the first pair moving in a larger circle than the surface of its die and the free end of the punch of the second pair moving in a smaller circle than its die.

10. Mechanism for cutting holes in traveling webs, comprising two pairs of rotary coacting punches and dies, the first pair being arranged to partially cut the holes and the second pair being arranged to complete the holes, the free end of the punch of the first pair moving in a larger circle than the surface of its die and the free end of the punch of the second pair moving in a smaller circle than its die, the dies being cut away respectively to the front and rear of their cutting sides to permit their respective punches to clear themselves after the cutting operation.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this seventh day of December, A. D. 1914.

HOWARD M. BARBER.

Witnesses:

A. R. STILLMAN,

E. M. GRANT.