(No Model.)

4 Sheets—Sheet 1.

G. E. NORRIS & W. E. HAGAN.

MACHINE FOR MAKING MATCHES.

No. 352,997. Patented Nov. 23, 1886.

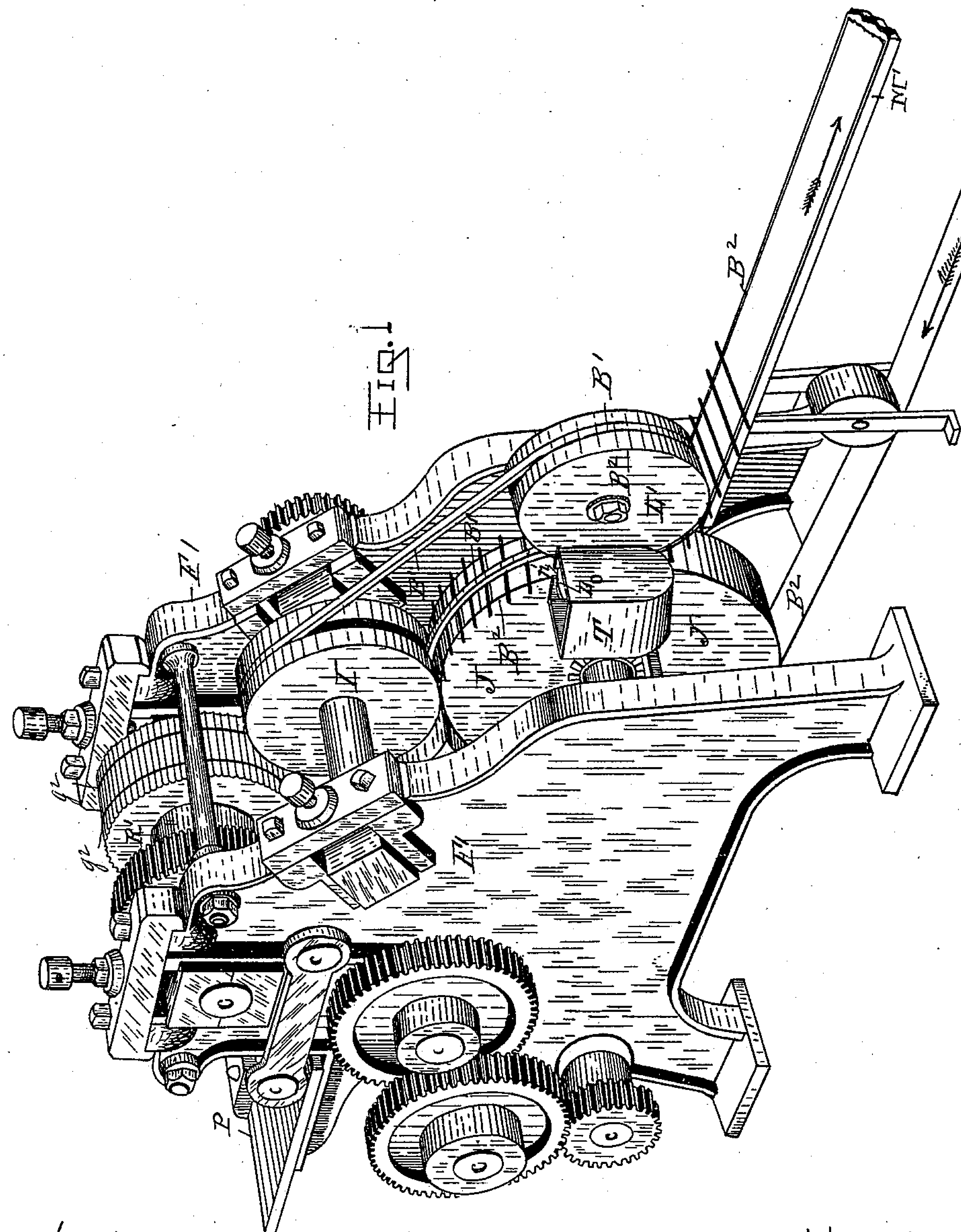

Fig. 1

WITNESSES.

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G. E. NORRIS & W. E. HAGAN.

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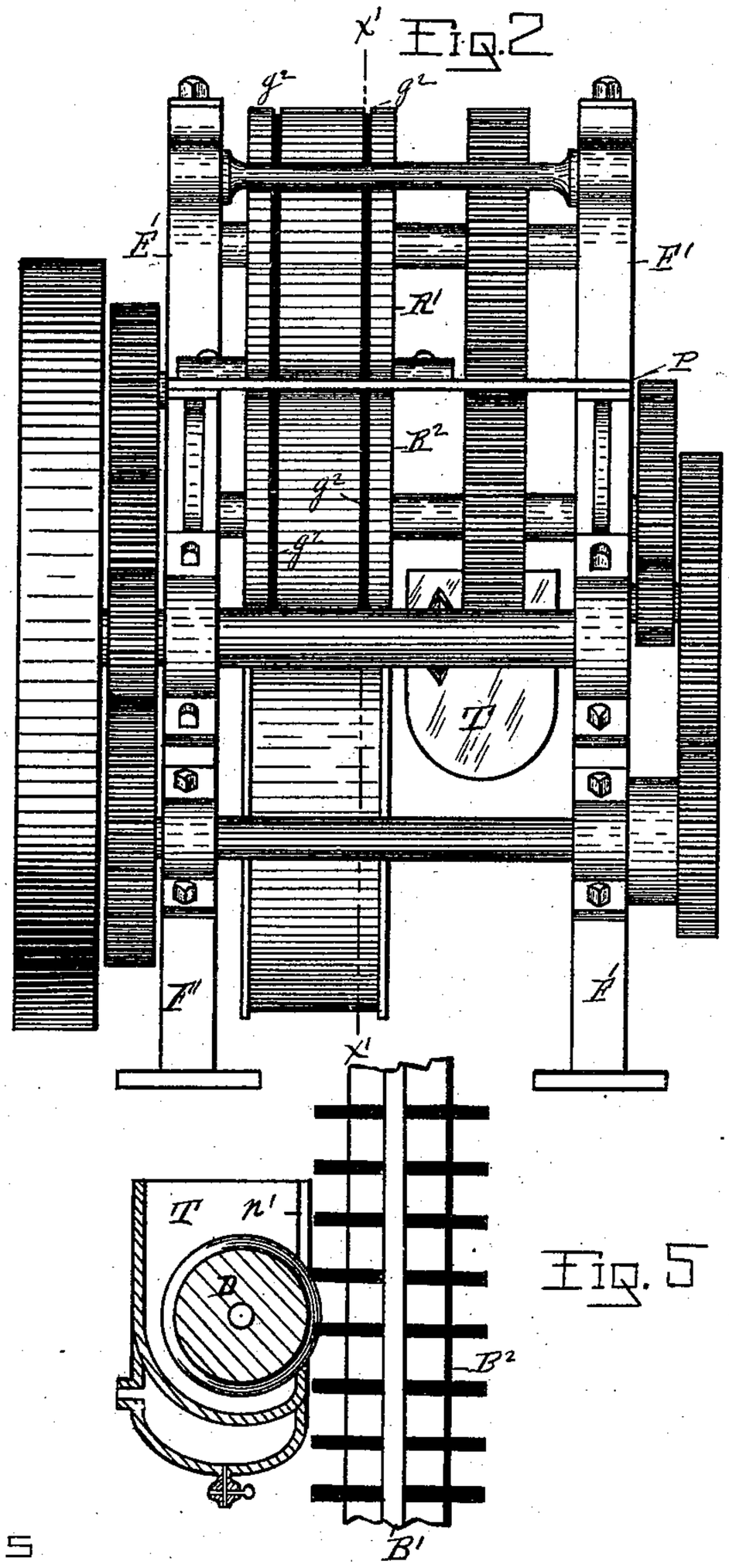

Fig. 2

Fig. 5

WITNESSES

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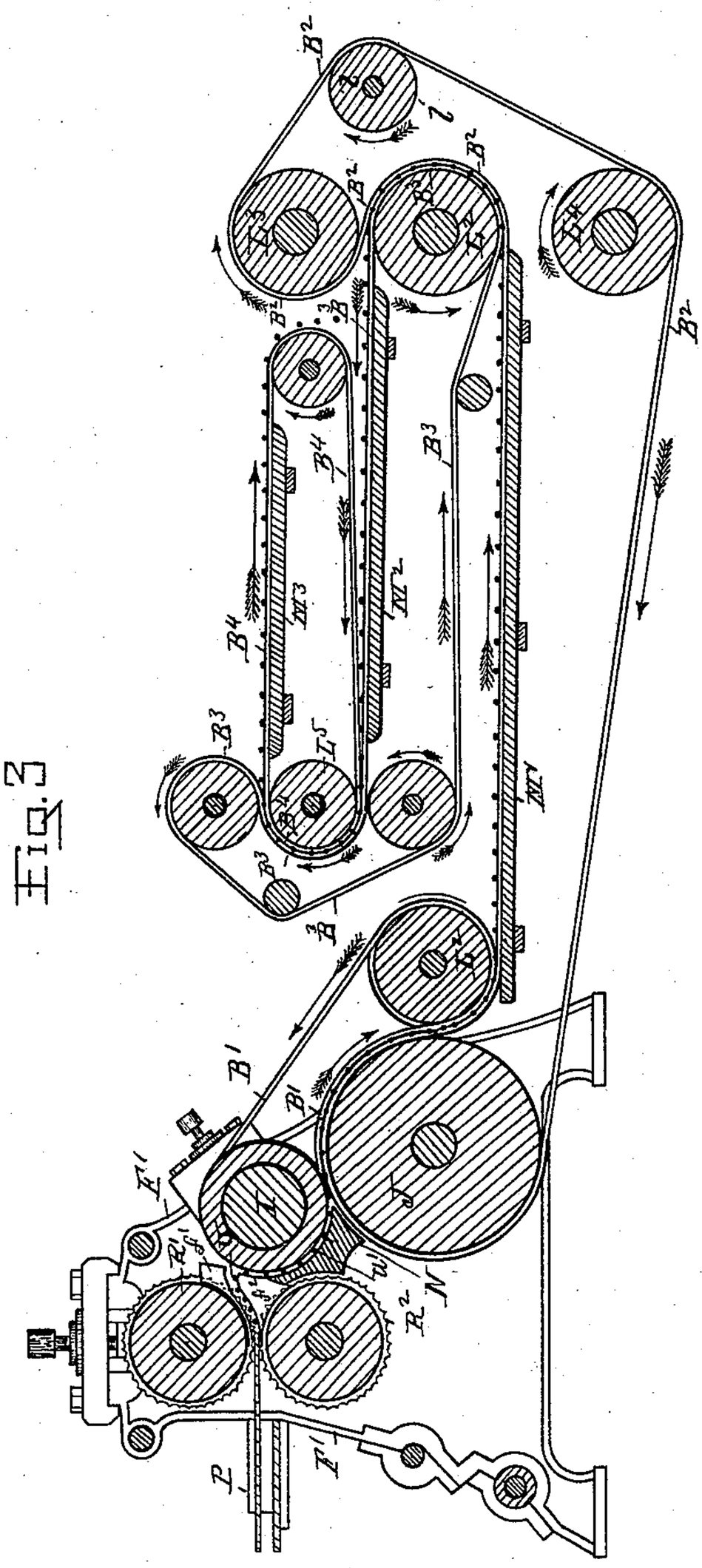

Fig. 2.

WITNESSES

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MACHINE FOR MAKING MATCHES.

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Fig. 6

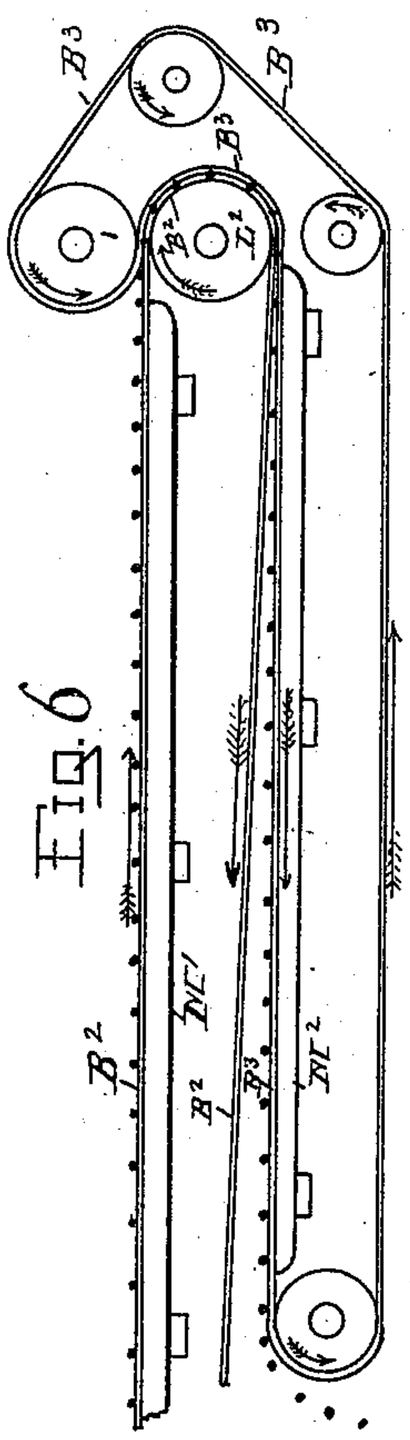
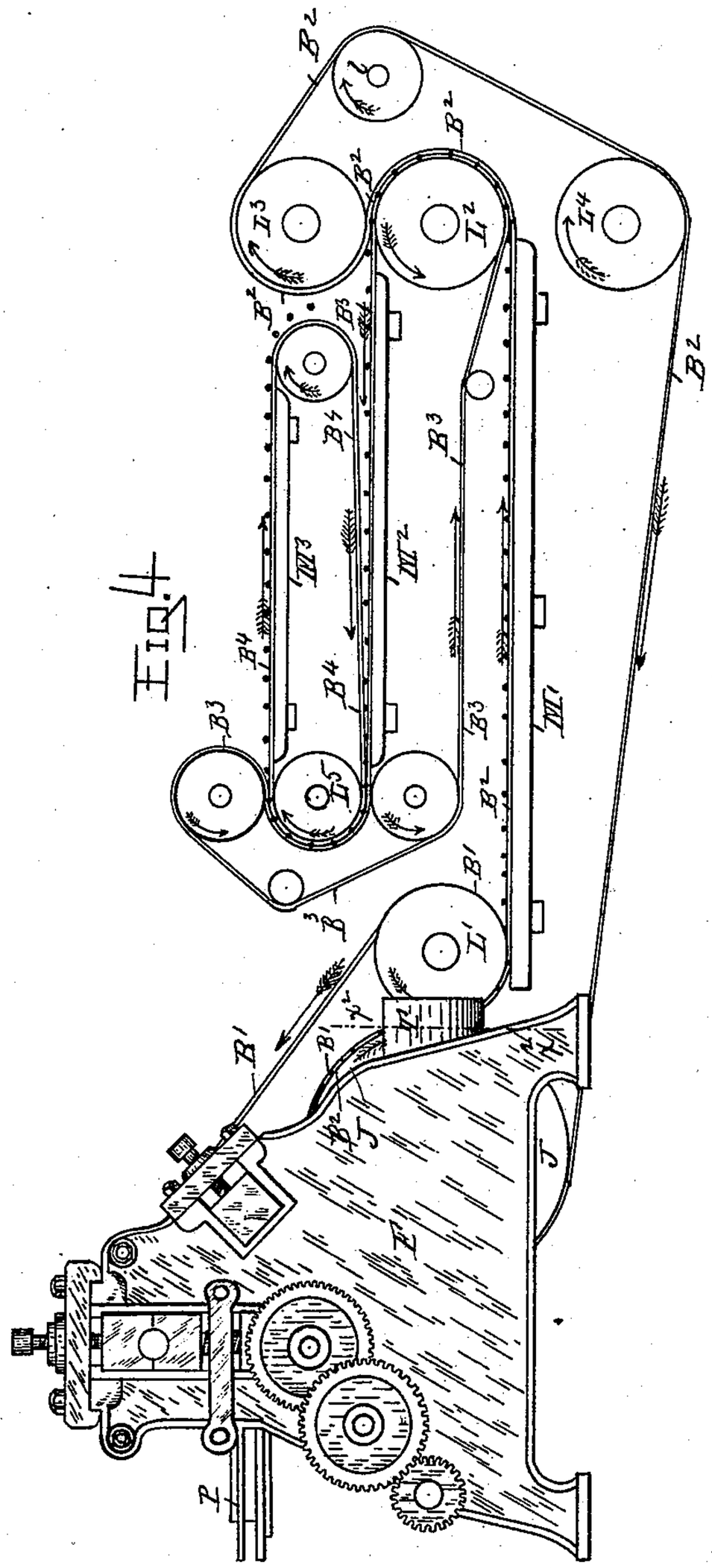


Fig. 4



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE E. NORRIS AND WILLIAM E. HAGAN, OF TROY, NEW YORK, ASSIGNORS TO THE CITIZENS MATCH COMPANY, OF SAME PLACE.

MACHINE FOR MAKING MATCHES.

SPECIFICATION forming part of Letters Patent No. 352,997, dated November 23, 1886.

Application filed March 11, 1886. Serial No. 194,793. (No model.)

To all whom it may concern:

Be it known that we, GEORGE E. NORRIS and WILLIAM E. HAGAN, both of the city of Troy, county of Rensselaer, State of New York, have jointly invented new and useful Improvements in Match-Making Machines, of which the following is a specification.

Our invention relates to match-making machinery, and more particularly to certain improvements in appliances for manipulating the splints during the process of dipping and drying them, our invention being shown as applied to the mechanism for which Letters Patent were granted us July 7, 1885, and as shown in an application for Letters Patent made and filed by us in the Patent Office December 28, 1885, and known as Serial No. 186,856.

Accompanying this specification, to form a part of it, there are four plates of drawings containing six figures illustrating our invention, with the same designation of parts by letter-reference used in all of them. Of these illustrations, Figure 1 is a perspective of a machine for making and dipping match-splints, with its delivery end and one side turned toward the sight, and with our improvement shown as applied thereto, the splint-carrying belt by which the matches are carried off to a series of drying-belts being shown as broken off. Fig. 2 is a rear end elevation of the mechanism shown at Fig. 1. Fig. 3 is a longitudinal vertical section through the mechanism taken on the line x' x' of Fig. 2, with the addition of the drying-belt tables and belts. Fig. 4 is a side elevation of the combined mechanism. Fig. 5 is a section taken on the line x^2 x^2 of Fig. 4, through the dipping-tank and dipping-wheel, with the belts which carry the splints through the dipping process shown in an exaggerated proportion as to size; and Fig. 6 shows a modification of the belt carrying apparatus.

The several parts of the mechanism thus illustrated are designated by letter-reference, and the function of the parts is described as follows:

The letters R′ and R² designate the splint-producing rollers, which are made with cutting and pressing grooves arranged in their circumferential faces parallel to their axes. These cutting and pressing rollers are arranged to run with the same speed, one above the other, by means of connected gears.

The letter P indicates a feed-platform, along over which the veneer of wood to be pressed and cut into splints is fed to the rollers.

The letters g^2 designate ring-form grooves that are made in the face of the cutting and pressing rollers circumferentially to their axes.

The letters f' and f^2 designate fingers adapted to enter said ring-form grooves to strip the splints from off the rollers.

The letter U indicates a guide-passage formed between the said fingers for the passage of the splints as they are forced along by the expelling capacity of the rollers.

The letter N indicates a guideway arranged at the delivery end of the guide-passage U, and this guide-passage is made with a concave surface, u'.

The letter I indicates a roller, preferably made of rubber, that is arranged to be rotated within said concave u' at a sufficient distance therefrom to permit the passage over its surface of the splints, and the endless belt B′ running on said roller I thereat, and at its frontward and downward stretch on the pulley L².

The letter J indicates a pulley having its bearings in the machine-frame F′, and B² an endless belt adapted to run thereon, and also on the pulley L′, and at its frontward stretch, after leaving said pulley L′, to run on a transfer-pulley, L², and on return-pulleys L³ *l* L⁴ to the pulley J in return.

The letter T indicates the dipping-tank, made with a side slot, n', and D designates a dipping-wheel adapted to be rotated within said tank, and with its perimeter projected through the side slot.

The splints are produced by the rollers R′ and R². They are stripped from the latter by fingers, and as moved by the expelling force of the rollers are directed into and through the passage U, and are then carried down over the face of the concave u' by the action of the roller I and the belt B′, running thereon, until they are brought between said belts B′ and B² upon the pulley J, the belt B′ being uppermost. While the splints are thus held between the two belts B′ and B², and while pass-

ing down from the pulley J to the pulley L′, the projecting ends of the splints come in contact with the dipping-wheel D, where extending through the slot *n′* of the tank T, which tips their adjacent ends with ignition composition.

The means for producing and dipping the splints thus described form no part of the invention herein claimed, and these features are illustrated to show the connection our invention makes with them in application.

In our application for Letters Patent filed December 28, 1885, Serial No. 186,856, the splints are shown and described as caught between two belts, by one of the latter running on a roller that turns within a concave to move the splints along therein, so as to transfer them onto the other belt running on a pulley, over which pulley both belts passed, one above the other, with the splints carried down by said belts as thus held past the dipping-wheel, to be tipped with ignition composition, and from thence to run alternatingly over and under on a series of pulleys to return-pulleys, where the said belts separated to release the splints held between them.

Our improvement upon the means shown in our former application differs from the latter in the fact that we use belts of different lengths, the shorter one of which runs on a roller that turns in a concave to move along the splints, and thence down onto a pulley on which the longer belt runs, the short belt placing the splints on the longer belt, and between it and the short belt, with the splints thus held by both of the belts carried down to be operated upon by the dipping mechanism, as in our older application; but with the two belts arranged to pass under a pulley immediately after leaving, and below the dipping-tank, wherefrom the short belt, being uppermost, makes its return stretch, while the long belt, with the splints resting on its upper surface, makes a progressive stretch horizontally to a transfer-pulley and return-pulleys, the splints by the transfer-pulley being put upon the upper surface of another belt of a series on which the splints are moved to dry them.

The letter B′ designates a short belt arranged to run on the roller I, and from thence down over the pulley J, above the lower belt, B^2, also running on said pulley, the splints being transferred from the concave *u′*, whence they are delivered by the passage U, by said roller I and belt B′ on top of the long belt B^2, and between it and the former belt. From thence these belts, with the splints between them, pass down to be acted upon by the dipping-wheel, and then down under the pulley L′, with the belt B′ under the belt B^2, when passing under said pulley L′. The belt B′ then returns to the roller I, and the belt B^2, with the splints on its upper surface, makes a progressive stretch over the table M′, as shown at Figs. 3 and 4, until the belt B^2 reaches the end of its progressive stretch upon the drying-table M′, with the splints upon its upper surface, when the belt B^3 underruns the belt B^2 upon the transfer-pulley L^2, the two belts B^2 and B^3, with the splints between them, passing around the transfer-pulley L^2 to separate, with the splints deposited upon the upper surface of a return stretch of the belt B^3, while the belt B^2 passes over the pulleys L^3, *l*, and L^4 to return to the pulley J, and the belt B^3 carries the splints along over a drying-table, M^2, until it in turn is underrun by a belt, B^4, on another transfer-pulley, L^5, when the splints are transferred to the upper surface of the upper stretch of said belt B^4, running on the table M^3, with the belt B^3 returning to the transfer-pulley L^2, as before. In this way any number of belts that are necessary may be used to move the splints until they are dried, when they are delivered from the last one of the series of belts into a trough, from whence they are taken for boxing.

While we have shown the belts B^2, B^3, and B^4 arranged so that the matches are transferred from each belt to one that is above it, if desired, however, the operation may be reversed and the splints carried onto the upper stretch of each belt of the series to one of the series beneath it, as shown by the modification illustrated at Fig. 6, where what are illustrated as return-pulleys at Figs. 3 and 4 are used as transfer-pulleys in the modification. The belts that carry the splints have a width less than the length of the matches, so that the dipped ends of the latter subtend the adjacent edge of the belt.

While we prefer to use the drying-tables M′ M^2 M^3 in connection with the belts on their upper stretch, yet the matches will stay on the belts without the tables.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination of the belt B′, adapted to run on the roller I and pulley J on its progressive stretch, and on and from the bottom of the pulley L′ on its return stretch, and the belt B^2, adapted to run on the pulley J, beneath the said belt B′, with said belts adapted to intermediately receive match-splints while coming together on the pulley J, and arranged to separate at the bottom of the pulley L′, with the belt B′ returning to the roller I, and the belt B^2, with the matches deposited upon its upper surface, making a progressive stretch to a transfer and return pulley or pulleys, substantially as and for the purposes set forth.

2. The combination of the belt B′, adapted to run on the roller I and pulley J on its progressive stretch, and on and from the pulley L′ on its return stretch, and the belt B^2, adapted to run on the pulley J, beneath said belt B′, with said belts adapted to intermediately receive match-splints while coming together on the pulley J, and arranged to separate at the bottom of the pulley L′, with the belt B′ returning to the roller I, and the belt B^2, with the matches deposited upon its upper surface, making a progressive stretch to a transfer and return pulley or pulleys, and the table M′, ar-

ranged with reference to the progressive stretch of said belt B^2, substantially as and for the purposes set forth.

3. The combination, with the belt B^2, arranged to receive and convey match-splints upon its upper surface, substantially as shown and described, of the transfer-pulley L^2, and pulleys to return said belt B^2 to the pulley J, the belt B^3, adapted to underrun the belt B^2 on said transfer-pulley L^2, to receive the matches on its upper surface, and return-pulleys for said belt B^4, all arranged to operate substantially in the manner as and for the purposes set forth.

4. In a mechanism for drying matches, the combination of a series of horizontally-arranged belts, with each belt of the series excepting the last one provided with a transfer pulley or pulleys, whereon it runs connectedly with another belt of the series, and each belt having a return pulley or pulleys arranged to operate substantially as shown and described.

5. In a mechanism for drying matches, the combination of a series of horizontally-arranged belts, with each of them excepting the last one of the series provided with a transfer pulley or pulleys to transfer the matches from it to another belt of the series, and each belt of the series provided with a return pulley or pulleys, and a table upon which the upper stretch of the belts carrying the splints moves, substantially in the manner as and for the purposes set forth.

Signed at Troy, New York, this 20th day of February, 1886, in the presence of the two witnesses whose names are hereto written.

GEO. E. NORRIS.
WILLIAM E. HAGAN.

Witnesses:
CHARLES S. BRINTNALL,
J. W. GARDNER.