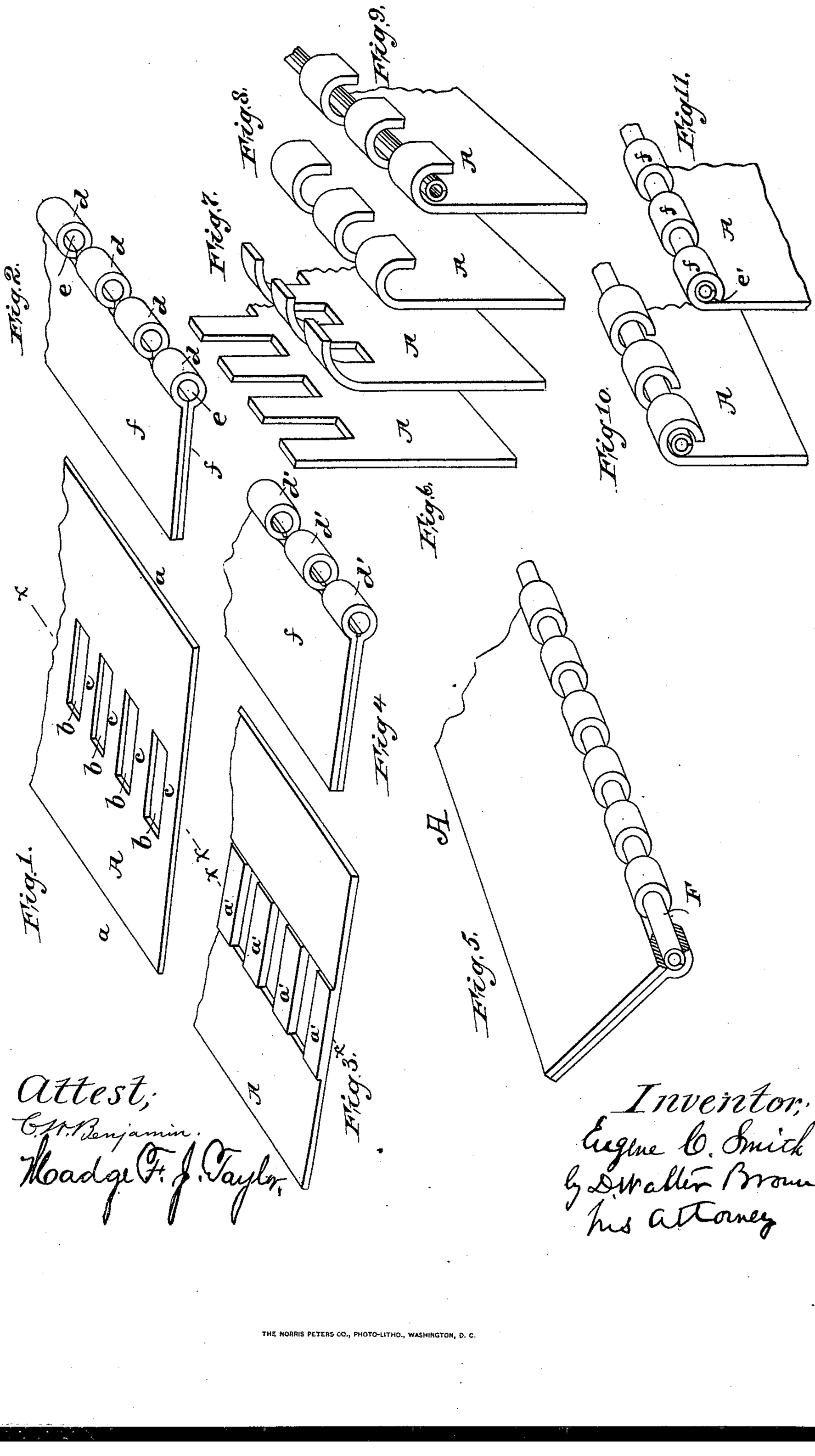
(No Model.) 3 Sheets—Sheet 1.

E. C. SMITH.

STRUCTURAL BLANK.

No. 481,207. Patented Aug. 23, 1892.



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his attorney

(No Model.) 3 Sheets—Sheet 2.

E. C. SMITH.

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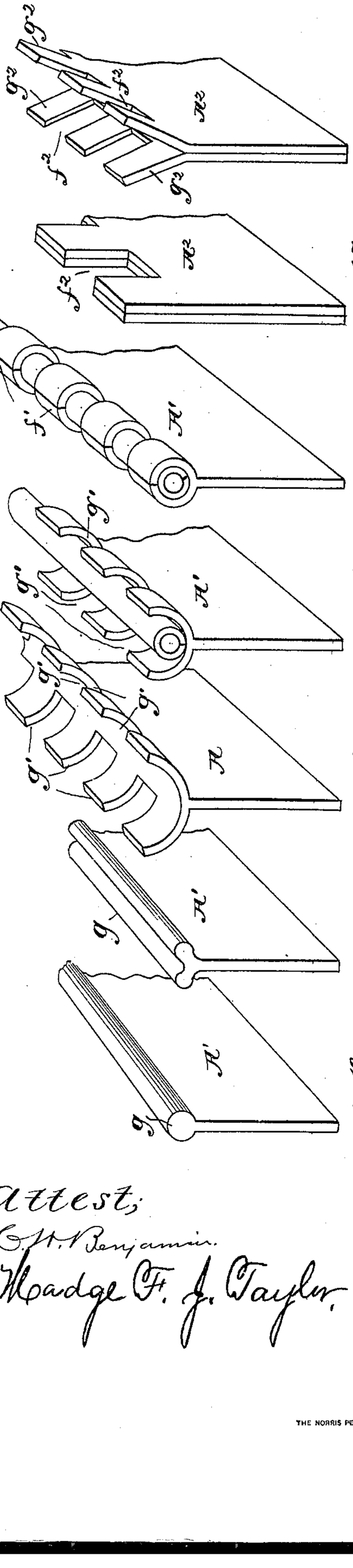

Fig. 18.

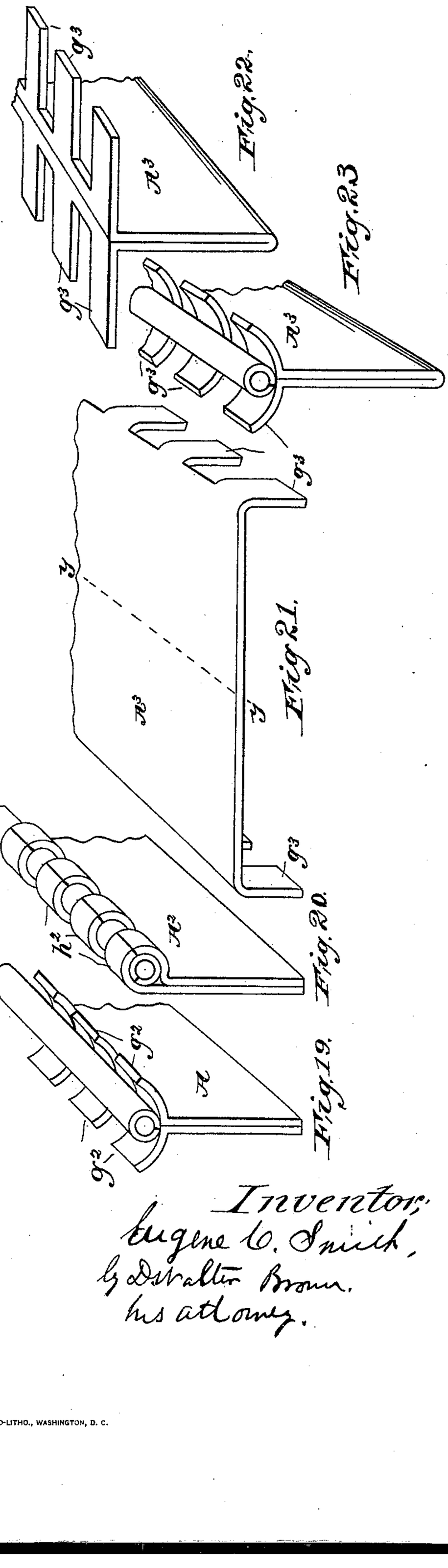

Fig. 22.

Fig. 17.

Fig. 23

Fig. 16.

Fig. 21.

Fig. 15.

Fig. 20.

Fig. 14.

Fig. 19.

Fig. 13.

Fig. 12.

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(No Model.) 3 Sheets—Sheet 3.

E. C. SMITH.

STRUCTURAL BLANK.

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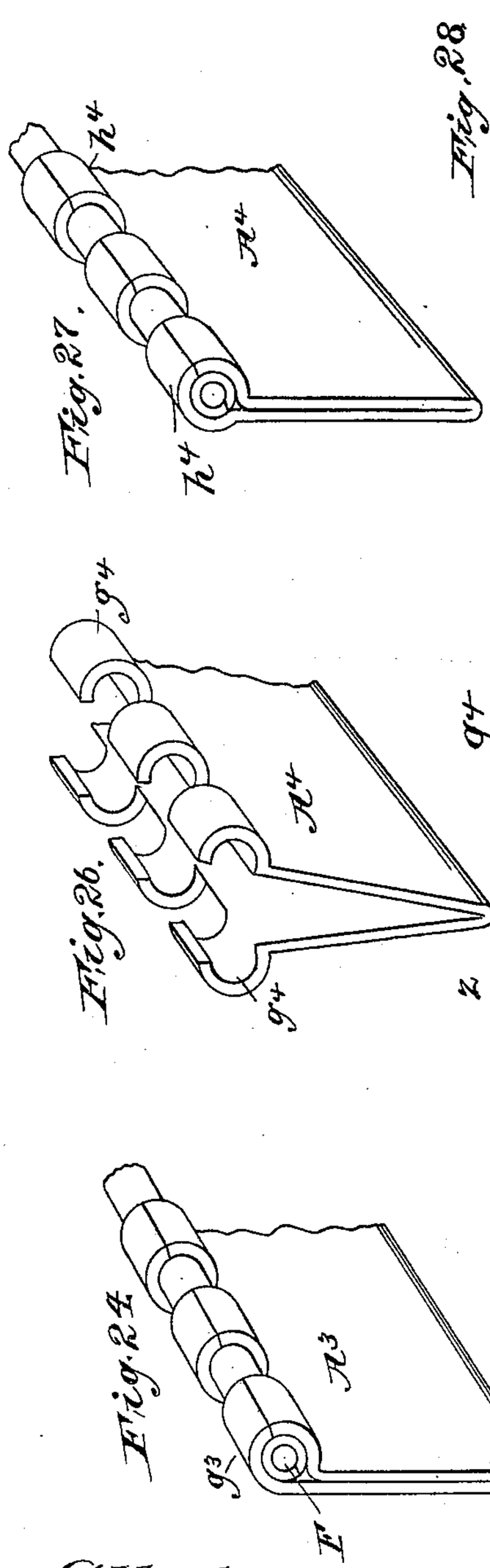

Fig. 27.

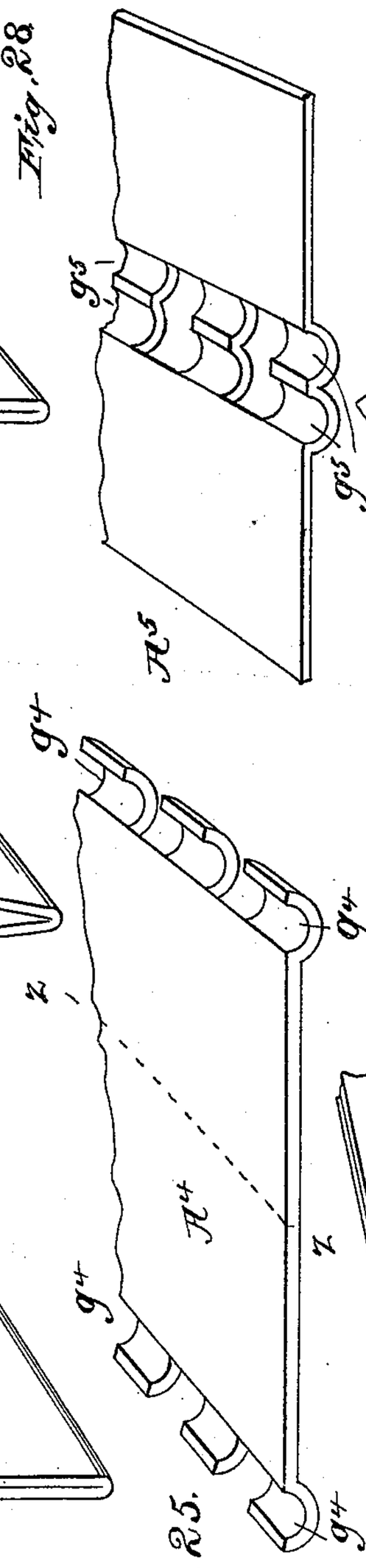

Fig. 28.

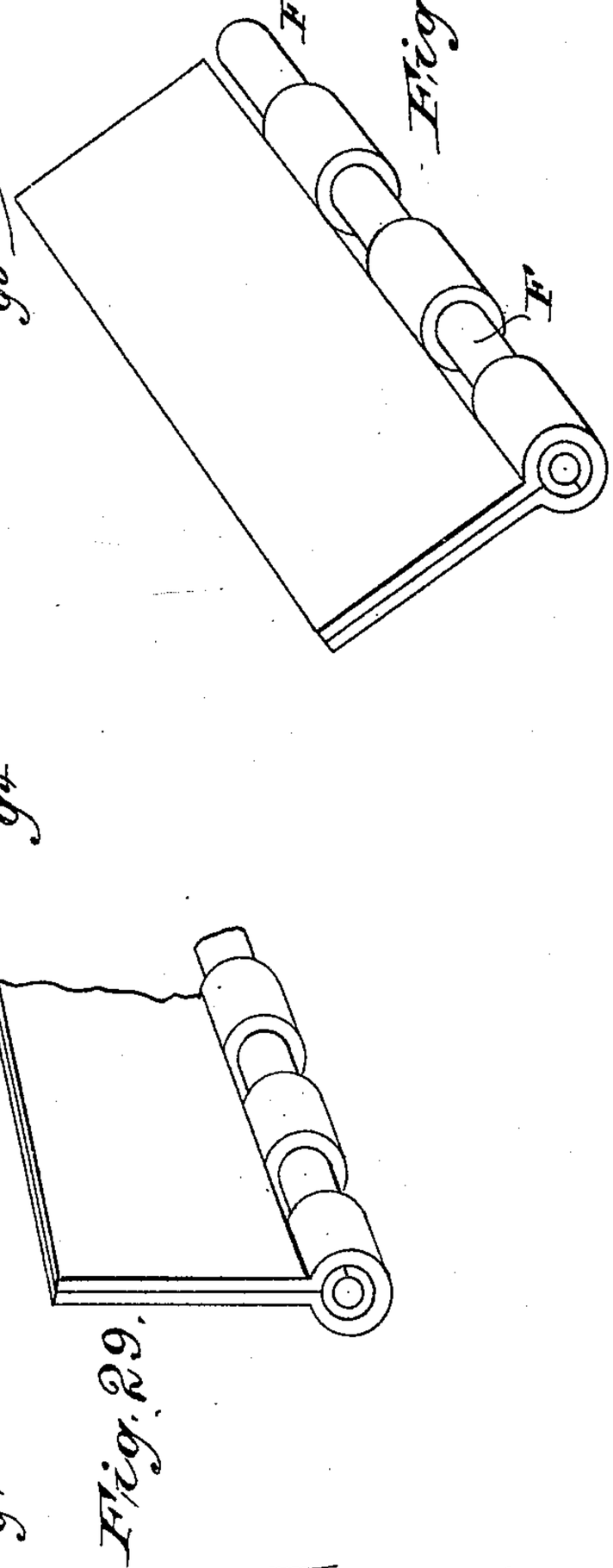

Fig. 30.

Fig. 26.

Fig. 25.

Fig. 29.

Fig. 24.

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UNITED STATES PATENT OFFICE.

EUGENE C. SMITH, OF NEW YORK, N. Y.

STRUCTURAL BLANK.

SPECIFICATION forming part of Letters Patent No. 481,207, dated August 23, 1892.

Application filed December 16, 1891. Serial No. 415,321. (No model.)

To all whom it may concern:

Be it known that I, EUGENE C. SMITH, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Structural Blanks, of which the following is a specification.

My invention pertains to improvements in structural blanks, and said blanks are particularly designed to be used for the manufacture of hinge-butts. The blanks are finished in long strips of a proper width for the hinge-butts and with knuckles properly spaced all along the length of the blanks and perforated for the pintle.

My said blanks are constructed of folded sheet metal, and essentially my invention consists in the first place in a structural blank consisting of a continuous strip of sheet metal having a series of spaced folded knuckles and an eye longitudinally through each knuckle. For economy of metal it is desirable that the leaves of the butts shall be as thin as practicable, but since the metal of which a folded butt can be constructed must be somewhat soft, and since the wear is principally at the eye of the knuckle, the metal of the knuckle should be as thick as possible or the knuckle should be reinforced in some manner; but from the manner in which the blank is formed by folding the leaves of the butts would ordinarily be thicker than the knuckles. Therefore it is the second object of my invention to strengthen the knuckles, and I do this, first, by forming a rib at that part of the flat sheet which forms the knuckle and by thinning the rest of the flat sheet, and, secondly, by inserting in the knuckle fold when the blank is being manufactured a continuous tube. These tubes can be united to the blank by fluxes, as tin, which are fused during the operations on the blank or by other means.

Referring now to the drawings which accompany the specification to aid the description, Figure 1 is a perspective view of a sheet of metal perforated preparatory to making the blank. Fig. 2 is a broken perspective view of the completed blank. Fig. 3 is a broken perspective view of a sheet with a rib for reinforcing the knuckles. Fig. 4 is a broken perspective view of the completed blank. Fig. 5 is a broken perspective view of a completed blank with reinforcing-tube. Figs. 6 to 11 illustrate a method of making the blank by folding one edge of the sheet to successively greater degrees. Figs. 12 to 16 illustrate a method of making the blank by successive swagings. Figs. 17 to 20 illustrate a method of making the blank by uniting two sheets and then opening and successively bending one edge of each sheet. Figs. 21 to 24 illustrate a method of making the blank by first forming rectangular flanges on each long edge of the sheet and then folding the sheet and forming the knuckles with said flanges. Figs. 25 to 27 illustrate a method of making the blanks by first forming semi-cylinders along each long edge of the sheet and then folding the sheet. Figs. 28 and 29 illustrate a method of making the blank by first forming two semi-cylinders along the middle line of the sheet and then folding the sheet. Fig. 30 shows the reinforcing-tube applied to a single butt.

One method of making my structural blank is shown in Figs. 1 and 2. A is a long flat strip of sheet metal with parallel edges *a a*. Along its middle line *x x* said sheet A is perforated with a series of equally-spaced rectangular openings *b b*, by which there is produced a series of ribs *c c* between said openings, suitable to form the knuckles of hinge-butts. Now the strip A having been thus perforated, said strip is folded on the said middle line *x x*, and by appropriate means, known to metal-workers and not claimed here, knuckles *d d*, Fig. 2, are formed during the operation of folding, each knuckle having an eye *e*. The leaves of the fold *f f* are secured together by brazing, riveting, or any other similar means. Thus there is produced a structural blank, as seen in Fig. 2, with a series of knuckles all along one edge. For hinge-butts the said knuckles *d d* project more to one side than to the other of the blank, so that when a hinge is formed with two butts it can shut closely.

Figs. 3 and 4 illustrate a method of reinforcing the knuckles. A longitudinal rib *a'* is formed on one side of the strip A and the parts of the strip to either side of the said rib *a'* are beveled, as seen, to reduce their thick-

ness. The strip A will also be perforated, as before. Then it is folded on the middle line x x, as before, but so that the rib a' will be on the inside of the knuckles d' d', which are formed by the folding, as hereinbefore described. Thus the rib a' reinforces the knuckles against wear. Of course the leaves of the fold will be united by brazing, by rivets, &c., as before.

Fig. 5 illustrates another method of reinforcing the knuckles—viz., by a continuous tube. The strip A is prepared in the same manner as described in connection with Fig. 1; but when the said strip is folded the knuckles are formed around a long tube F. The inner surface of the strip A and the outer surface of the tube F having been tinned, heat applied during the operations on the blank melts the tin and forms a flux, which firmly unites the tube to the knuckles. When a hinge is to be made, the tube is cut out between the knuckles of the butts. Evidently such a tube F can be employed in connection with the structural blank described in my application for patent, Serial No. 404,610, filed September 3, 1891.

In Fig. 30 I show a continuous tube applied to a single hinge-butt after the butt is made. In this case a tube F, tinned on the outside, is passed through the knuckles of the butt. Then the butt is heated to melt the tin and the knuckles are compressed tightly on the tube. The tin forms a flux which will unite the tube firmly to the butt. When the butt is to be used for a hinge, the tube will be cut out between the knuckles. Figs. 6 to 29 show various methods of producing the blanks of these.

Figs. 6 to 11 show how the blanks may be made by bending by successive stages and to continually-greater degrees one edge of the perforated sheet-metal strip A till finally the knuckles f f are formed, as in Fig. 11. The said knuckles f f will be united to the body of the blank at the joint e', Fig. 11, by proper fluxes. Fig. 9 shows how a reinforcing-tube can be inserted in the knuckles.

Figs. 12 to 16 show stages in producing the blanks by successive swagings. First on the strip A, not yet perforated, is formed a head g, which head g is then successively swaged open, as in Figs. 13 and 14. At the stage represented by Fig. 14 the perforations g' g' are punched along both edges of the head g. Finally the sides of the said head g are folded to form the knuckles. The joint f' will be brazed or soldered in any suitable manner. Fig. 15 shows how the reinforcing-tube may be inserted.

Figs. 17 to 20 show how the blank may be formed by first uniting two strips of sheet metal A^2 A^2, which have corresponding and registering perforations b^2 b^2, then opening the joint somewhat along one edge of the strips and first bending back the flaps g^2 g^2, and then by successive steps folding the flaps g^2 g^2 to form the knuckles h^2 h^2, Fig. 21. The joint of the knuckles when folded will be brazed or soldered in any manner.

Fig. 19 shows how the reinforcing-tube may be inserted.

Figs. 21 to 24 show how the blank may be made by first bending each long side of the perforated strip A^3 at right angles and to the same side of the strip A'. Then the strip A^3 is folded on its middle longitudinal line y y, and the leaves of the fold are brazed or otherwise united. Finally the bent edges g^3 g^3 are folded into knuckles, Fig. 24, and, as before, the joints of the knuckles are soldered or brazed. Fig. 23 shows how a reinforcing-tube may be inserted.

Figs. 25 to 27 show the perforated strip A^4 formed at the first stage with semi-cylinders g^4 g^4 along each long side. The strip A^4 is folded on the middle line z z and the leaves of the fold are brazed, as before. By this folding the two semi-cylinders g^4 g^4 become complete cylinders and form the knuckles h^4. As before, the joints of the knuckles will be soldered or brazed.

Fig. 27 shows a reinforcing-tube, which is inserted before the two leaves a^4 a^4 are quite brought together.

Figs. 28 and 29 show the perforated strip A^5, with a cylinder g^5 along each side of its middle line w w. The strip A^5 is folded on this said middle line and the lines of the fold are united, as before. A reinforcing-tube may be inserted before the folding is completed.

Evidently the method of reinforcing the knuckles by a rib a, as shown in Figs. 3 and 4, and hereinbefore described, is applicable to all the aforesaid methods of making the blanks; also it is to be understood that in all the methods of making the blanks the knuckles will be formed more to one side of the blank than to the other, as seen in Figs. 11, 16, 20, 24, and 27. Finally when a reinforcing-tube is used the seam of the tube will be turned well out of line with the seam of the knuckles, so that two joints shall not be in line. This is clearly shown in the drawings.

Now, having described my improvement, I claim as my invention—

1. A structural blank consisting of a folded sheet-metal strip having a series of knuckles along one edge of the strip and an eye in each knuckle.

2. A structural blank formed of folded sheet metal and having a series of knuckles along one edge of the strip, an eye in each knuckle, and a continuous reinforcement through all the eyes.

3. A structural blank formed of folded sheet metal and having a series of knuckles along one edge of the strip, an eye in each knuckle, and a continuous tube through said eyes.

4. A reinforcement for the knuckles of hinge-butts, consisting of a continuous tube inserted through the eyes of said knuckles.

5. The combination of a continuous-folded

sheet-metal blank having a rib with an eye in the rib and a continuous tube through said eye.

6. The combination of a continuous sheet-metal blank having a continuous rib with a continuous eye through said rib and a continuous reinforcement through said eye.

Signed at New York, in the county of New York and State of New York, this 23d day of November, A. D. 1891.

EUGENE C. SMITH.

Witnesses:

BERNARD J. ISECKE,

JOHN C. WALL.