

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

*Ex parte*  
PHILIP KNEISL, LAWRENCE A. BEHRMANN,  
and BRENDEN M. GROVE

---

Appeal 2008-3423  
Application 10/157,609  
Technology Center 3600

---

Decided: September 24, 2008

---

Before DONALD E. ADAMS, RICHARD M. LEBOVITZ, and  
FRANCISCO C. PRATS, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1, 3-15, 18, 19, 38-51, and 82-88. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

### STATEMENT OF THE CASE

The claims are directed to shaped charges. Shaped charges are explosives used to perforate well casing walls (Spec. ¶¶ 2-3). To accomplish perforation, a perforating gun is typically loaded with one or more shaped charges and detonated in the direction of the wall to produce a penetrating jet (*id.* at ¶¶ 3, 17). “Conventional perforating guns produce significant debris upon detonation of the shaped charges” (*id.* at ¶ 4). “Extensive research on hollow carrier perforating guns indicates that the majority of gun debris is generated by the shaped charge cases. In fact, roughly 80% of all gun debris is attributed to the charge cases” (*id.* at ¶ 5). The Specification describes caseless shaped charges to reduce debris associated with shaped charge perforating systems (Spec. ¶¶ 21-26). The pending claims are also directed to caseless shaped charges.

Claims 1, 3-15, 18, 19, 38-51, and 82-88 are pending and stand finally rejected as follows:

- 1) Claims 40 and 43-45 under 35 U.S.C. § 102(e) as anticipated by Backofen (US 4,628,819, issued Dec. 16, 1986) (Ans. 4);
- 2) Claims 1 and 46 under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere (US 4,191,265, issued Mar. 4, 1980) and Backofen (Ans. 4);
- 3) Claims 38, 39, and 83-86 under 35 U.S.C. § 103(a) as obvious over Nice (US 5,837,925, issued Nov. 17, 1998) and Davison (US 5,859,383, issued Jan. 12, 1999) (Ans. 8);
- 4) Claims 3-5, 47-49, 87, and 88 under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere, Backofen, and Nice (Ans. 5);
- 5) Claims 6-9, 41, 42, and 50 under 35 U.S.C. § 103(a) as obvious over Backofen or Bosse-Platiere and Backofen as applied to claims 1, 40,

and 46, and further in view of Reese (US 5,656,791, issued Aug. 12, 1997) or Kapoor (US 5,939,664, issued Aug. 17, 1999) (Ans. 5-6);

6) Claims 10-13 and 51 under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere and Backofen as applied to claims 1 and 46, and further in view of Kenworthy (US 6,209,457 B1, issued Apr. 3, 2001) (Ans. 6);

7) Claims 14, 18, and 19 under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere and Backofen as applied to claim 1, and further in view of Yates (US 4,829,901, issued May 16, 1989) (Ans. 7);

8) Claim 15 under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere, Backofen, Yates as applied to claim 14, and further in view of Budinger (US 4,198,739, issued Apr. 22, 1980) (Ans. 7); and

9) Claim 82 under 35 U.S.C. § 103(a) as obvious over Nice and Davison as applied to claim 38, and further in view of Seeger (US 5,831,207, issued Nov. 3, 1998) (Ans. 9).

Claims 1, 38, 40, and 46 are representative and read as follows:

1. A perforating system, comprising:
  - a perforating gun comprising a solid loading tube; and
  - shaped charges being housed in the solid loading tube, each of the shaped charges comprising an explosive that does not rely on a shaped charge case for confinement.
  
38. A debris free perforating system, comprising:
  - a shaped charge;
  - a combustible loading tube to receive the shaped charge, the loading tube comprising a surface; and
  - an oxidizer coating closely adhering to the surface of the loading tube.
  
40. A debris free perforating system, comprising:
  - a shaped charge comprising a densified explosive that does not rely on a case for confinement.

46. A perforating system, comprising:  
a perforating gun;  
a loading tube of the perforating gun forming a cavity therein;  
a caseless shaped charge having an explosive, the explosive contacting the loading tube when the shaped charge is placed in the cavity.

#### CLAIM INTERPRETATION

There are four independent claims on appeal – claims 1, 38, 40, and 46. These claims are reproduced above. A “shaped charge”, which is at issue in this appeal, is recited in each of the claims. We begin by interpreting the meaning of “shaped charge” because before a claim is properly interpreted it cannot be compared to the prior art.

During patent examination, the words in a claim are given their broadest reasonable interpretation as they would be understood by persons of ordinary skill in the art coupled with any clarification offered by the Specification. *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). According to the Specification, shaped charges are explosives which are utilized to perforate well casings during drilling operations (Spec. ¶¶ 3-5). A typical prior art shaped charge is characterized in the Specification as having a case (10), a main body of explosive material (12), a primer used to detonate the explosive material (13), and a liner (14) (Spec. ¶¶ 15-16; Fig. 1). Figure 1, depicting a prior art shaped charge, is reproduced below:

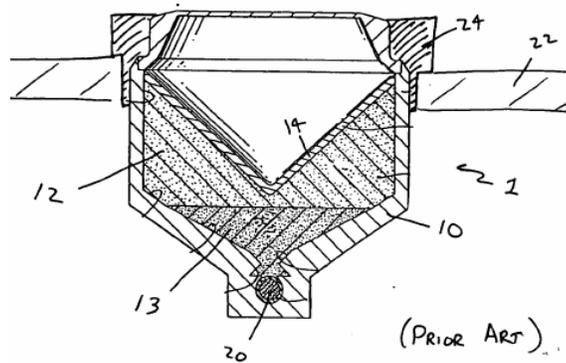


Figure 1 shows the charges' case 10, explosive material 12, primer 13, and liner 14.

When the charge is exploded, the “liner” acts as a projectile (“jet”) that perforates the well casing (Spec. 16). The “case” is stated in the Specification to be “typically steel or similar” and to provide “substantial inertial confinement, thereby enhancing the proportion of explosive energy transferred to the” liner (14) “and hence the penetrating jet” (Spec. ¶ 17). The case also maintains the integrity and shape of the shaped charge (Spec. ¶ 24). Thus, we find that persons of ordinary skill in the art would understand a “shaped charge” to be a specific type of explosive that comprises a case, explosive material, a primer, and a liner. We interpret “shaped charge” as recited in the appealed claims to have such a meaning.

In claim 46, the shaped charge is a “caseless shaped charge.” We interpret the claimed shaped charge to have explosive, primer, and a liner, but to lack the case. In claims 1 and 40, the shaped charge “does not rely on a shaped charge case for confinement.” In this case, the shaped charge *may* have a case, but it does not rely on the case for inertial confinement and to keep its integrity and shape – the function associated with the case (Spec. ¶¶ 17, 24).

Claim 40 also states that the “shaped charge” comprises “a densified explosive.” According to the Specification: “Because . . . a typical shaped charge relies in part on its metal case to aid in perforating the well casing, it is desirable to use an explosive **12** that compensates for the elimination of the case” (Spec. ¶ 21). A “densified explosive” is described as an explosive “that possesses the beneficial confinement properties usually afforded by the case” (Spec. ¶ 22). It is “formulated to not expand as quickly, therefore increasing the duration of its primary pulse” (*id.*) “In one embodiment, the explosive **12** is densified by blending it with some inert heavy materials such as powdered metals. . . . The resulting blend provides more mass at the detonation front, which delays expansion due to the explosive cloud mass, and hence increases primary impulse detonation” (Spec. ¶ 23). Thus, we interpret “densified” to mean that the explosive has been formulated such that it provide the inertial confinement properties normally supplied by the case which is present in a typical shaped charge.

Claim 38 is directed to a debris free perforating system comprising a combustible loading tube. An oxidizer coating is “closely adhering to the surface of the loading tube.” The term “adhere” means to “stick fast or together by or as if by grasping, suction, or being glued.”<sup>1</sup> Since the oxidizer must “adhere” to the loading tube surface, we interpret this to require that the oxidizer stick to the surface of the tube; that is, the oxidizer must be in contact with the tube surface in order to “adhere” to it.

#### ANTICIPATION BY BACKOFEN

Claims 40 and 43-45 stand rejected under 35 U.S.C. §102(e) as anticipated by Backofen.

---

<sup>1</sup> *The American Heritage Dictionary* 15 (1976).

THE BACKOFEN PATENT

1. Backofen describes an explosive device to perforate walls (Backofen, at col. 2, ll. 13-15).
2. The device comprises an outer tamper mass (40') enclosing an explosive charge (12') positioned behind a projectile (14') (Backofen, at col. 4, ll. 6-14; Fig. 3).
3. The tamper mass provides inertial confinement and enables the detonation energy to be concentrated on the projectile (Backofen, at col. 3, ll. 30-35).
4. The mass includes particulate material, such as metallic particles, bound together in a self-supporting shape (Backofen, at col. 3, ll. 36-47).
5. The tamper mass replaces steel plates which are utilized in typical explosive penetrators (Backofen, at col. 3, ll. 47-50).
6. Backofen does not describe the characteristics of the explosive contained by the tamper mass.

*Analysis*

Claim 40 is directed to “a shaped charge comprising a *densified explosive* that does not rely on a case for confinement.” The Examiner contends that Backofen describes a “densified explosive [12'] . . . that does not rely on a case for confinement” (Ans. 4). As evidence, the Examiner points to Figure 3 of Backofen and states that the explosive 12’ “is densified in that it is densely packed into the desired shape of the charge” (*id.* at 11).

Anticipation requires that every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim. *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). In this case, we do not agree with the Examiner that Backofen

describes a “densified explosive” as recited in claim 40. We have interpreted “densified explosive” to mean an explosive which has been formulated such that it provides the inertial confinement normally conferred by the case (*see* “Claim interpretation” *supra*). Backofen does not describe the characteristics of the explosive contained by the tamper mass (FF6). Nor does Backofen provide any information upon which it could be reasonably presumed that the explosive has been formulated to substitute for the inertial confinement provided by the case of the shaped charge. To the contrary, Backofen expressly teaches that its tamper mass provides an inertial confinement function (FF3-5), militating against such a presumption.

The Examiner’s interpretation of “densified explosive” to mean a densely packed explosive (Ans. 11) is not consistent with its meaning as explained in the Specification (*see* “Claim interpretation” *supra*). According to the Specification, a “densified explosive” is an explosive “that possesses the beneficial confinement properties usually afforded by the case” (Spec. ¶ 22). Thus, as indicated by the Specification, the claimed “densified explosive” has specific properties. There is no evidence that Backofen’s “densely packed explosive” (Ans. 11) has these properties. Accordingly, we reverse the rejection of claim 40 and dependent claims 43-45.

#### OBVIOUSNESS OVER BOSSE-PLATIERE AND BACKOFEN

Claims 1 and 46 stand rejected under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere and Backofen.

Claim 1

Findings of Fact

7. Claim 1 is directed to a “perforating system” comprising two elements: (1) a perforating gun with “solid loading tube”; and (2) “shaped charges being housed in the solid loading tube.”

8. The solid loading tube comprises more than one shaped charged, i.e., “shaped *charges* . . . housed in *the solid loading tube*.”

THE BOSSE-PLATIERE PATENT

9. Bosse-Platiere describes an oil-field perforating gun **10** comprising a tubular carrier **14** into which charge supporting modules **17-19** are inserted (Bosse-Platiere, at col. 3, 48-50 and 66-68; at col. 4, ll. 9-17; Fig. 1).

10. Each of the modules has a rigid cylindrical body **20** and a cavity **21** formed on one side of each module body for carrying a single shaped-explosive charge **22** (Bosse-Platiere, at col. 4, ll. 17-24; at col. 3, ll. 10-12; Fig. 1).

11. The shaped charge has an outer case **24**, preferably made of steel, a compacted explosive pellet **25**, and a liner **26** (Bosse-Platiere, at col. 4, ll. 32-37; Fig. 1).

12. Each module can also contain a detonating explosive **30** to detonate the explosive pellet of the shaped charge **22**, which is loaded into interconnected passages **27** and **28** and the central cavity **29** of the module (Bosse-Platiere, at col. 5, ll. 2-14).

*Analysis*

The issue in this rejection is whether Bosse-Platiere teaches more than one shaped charge in a “solid loading tube.” The Examiner finds that Bosse-Platiere comprises a loading tube 20 (a “module”), which meets the

limitations of a “solid loading tube” as recited in claim 1 (Ans. 10; FF7). The Examiner also finds that the solid loading tube contains two charges – meeting the second limitation of claim 1 that more than one shaped charge is housed in the loading tube (FF7-8). The Examiner states: “as seen in figures 1-3, the elements - at 20 [the cylindrical body of the module], contain two charges being the connecting charges - at 28,29, and the perforating charge - at 25 as seen in figures 1-3” (Ans. 10).

Appellants contend that the Examiner erred in his findings.

Appellants argue:

Referring to Fig. 1 of Bosse-Platiere and the corresponding text, the Examiner appears to be referring to shaped explosive charge 22 as being one of the shaped charges and the detonating explosive 30 as being another one of the shaped charges. As can be appreciated by one of the skill in the art, the detonating explosive 30, which is disclosed in lines 2-5 in column 5 of Bosse-Platiere, essentially serves as a detonating cord for the shaped charge 22. However, Bosse-Platiere fails to teach or suggest that the explosive 30 produces a perforating jet or some other feature that one of skill in the art would associate with a “shaped charge.”

(Reply Br. 2.)

We agree with Appellants that the Examiner erred. Bosse-Platiere clearly teaches that each of its modules only contains a single shaped charge (FF10). The shaped charge is described by Bosse-Platiere to have all its typical elements, i.e., a case **24**, an explosive **25**, and a liner **26** (FF11). In addition to the shaped charge, the module also contains a detonating explosive **30** loaded in its passages and central cavities (FF12). However, as argued by Appellants, the detonating charge is to detonate the shaped charge and has none of the other elements in a shaped charge as we have interpreted it (*see* “Claim interpretation” *supra*). Thus, the Examiner’s finding is not

correct that each module, i.e., the solid loading tube, has more than one shaped charge as in claim 1. Because the solid loading tube does not meet all the limitations recited in claim 1, and the Examiner has not explained why a solid loading tube with more than one shaped charge would have been obvious to persons of ordinary skill in the art, we are compelled to reverse the rejection of claim 1.

#### Claim 46

13. Claim 46 is directed to a “perforating system” comprising: (1) a perforating gun; (2) a loading tube; and (3) a shaped charge.

14. The shaped charge is “a caseless shaped charge having an explosive, the explosive contacting the loading tube when the shaped charge is placed in the cavity.”

#### *Analysis*

The Examiner interprets “case” as recited in the claims to be restricted to a “solid metallic cup-type casing” (Ans. 12). The Examiner finds that Backofen teaches a tamper mass, not a “case” as in claim 46 – and thus meets the limitation of “a caseless shaped charge” (Ans. 4-5). The Examiner concludes that “it would have been obvious to one of ordinary skill in the art to take the device of Bosse-Platiere and add the shaped charge not relying upon a case for confinement of Backofen et al., so as to allow for the device to be safer when detonated” (*id.* at 5).

“During [patent] examination, the examiner bears the initial burden of establishing a *prima facie* case of obviousness.” *In re Kumar*, 418 F.3d 1361, 1366 (Fed. Cir. 2005). In setting forth a case of obviousness, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the

claimed new invention does . . . because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007).

We agree with Appellants that the Examiner has not established prima facie obviousness of claim 46. As pointed out by Appellants, both Backofen and Bosse-Platiere describe the charge explosive as encased. Bosse-Platiere describes a shaped charge in which the explosive is loaded into an outer case 24, preferably made of steel (FF11). In Backofen, the explosive is enclosed by a tamper mass which replaces the steel plates utilized in a shaped charge (FF2, 5). Based on these two prior art references, it is not apparent why a person of ordinary skill in the art would have been prompted to place a caseless charge in a loading tube where the “the explosive [is] contacting the loading tube when the shaped charge is placed in the cavity” as required by claim 46. To the contrary, both Bosse-Platiere and Backofen describe explosives with casings to provide inertial confinement to eject the liner out as a projectile to perforate walls (*see* FF1-3, 11). Since the Examiner has not explained why it would have been obvious to eliminate the casings from Backofen and Bosse-Platiere, we are compelled to reverse the rejection of claim 46.

#### OBVIOUSNESS OVER NICE AND DAVISON

Claims 38, 39, and 83-86 stand rejected under 35 U.S.C. § 103(a) as obvious over Nice and Davison.

### Findings of Fact

#### THE NICE PATENT

15. Nice describes a shaped charge retainer comprised of a combustible material which is pulverized or disintegrated upon detonation of a shaped charge (Nice, at col. 2, ll. 2-59; at col. 3, ll. 40-52).

16. The shaped charges (14) appear to have an outer case (*see* Nice, Figs. 1 and 3) as would a typical shaped charge (*see* Spec. ¶¶ 15-16).

#### THE DAVISON PATENT

17. Davison describes a shaped charge which comprises a casing (8), a reactive mass in the casing (2), a liner (6) and an electrical path to the reactive blend (Davison, at col. 4, ll. 28-33; at col. 6, ll. 55-63; *see* Fig. 1b).

18. The reactive mass is a blend of metal and an oxidizing material which is loaded into the shaped charge casing (Davison, at col. 4, ll. 34-38; at col. 5, l. 34 to col. 6, l. 40) and therefore in contact with it.

19. An electrical pulse is utilized to detonate the material in the reactive mass (Davison, at col. 4, ll. 42-44).

#### Claim 38

20. Claim 38 is directed to a “debris free perforating system comprising: (1) a shaped charge; (2) a combustible loading tube; and (3) “an oxidizer coating closely adhering to the surface of the loading tube.”

#### *Analysis*

The Examiner finds that Nice discloses a combustible loading tube, but does not disclose an oxidizer closely adhering to the tube’s surface as recited in claim 38 (Ans. 8; FF20). However, the Examiner finds that Davison discloses a shaped charge comprising an oxidizer material which,

“given the thin wall of the casing – at 30 as seen in figures 1a-1b, the oxidizer material . . . coats the casing . . . and adheres closely to the loading tube via the casing” (Ans. 11).

We agree with Appellants that the Examiner erred in finding that the oxidizer described by Davison adheres to the loading tube surface. Davison teaches a shaped charge with a case enclosing a reactive mass comprising an oxidizing material (FF17-18). We have interpreted the limitation in claim 38 that the oxidizer is “adhering” to the tube surface to mean that it sticks to or in is contact with the surface (*see* “Claim interpretation” *supra*). The oxidizing material described in Davison is in contact with the casing (FF18) – not the loading tube surface as required by claim 38. Thus, this limitation is not met by Davison as asserted by the Examiner. The Examiner does not further explain why it would have been obvious to have placed the oxidizer in Davison’s reactive mass in contact with the loading tube surface described in Nice. Consequently, we reverse the rejection of claim 38, and claims 39 and 83-86 which depend on it.

#### OBVIOUSNESS OVER BOSSE-PLATIERE, BACKOFEN, AND NICE

Claims 3-5, 47-49, 87, and 88 stand rejected under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere, Backofen, and Nice.

Claims 3-5 depend on claim 1; claims 47-49, 87, and 88 depend on claim 46. As we have reversed the rejection of claims 1 and 46, and Nice does not supplement the deficiencies in these rejections, we are also compelled to reverse the rejections of these claims as well.

**OBVIOUSNESS OVER BOSSE-PLATIERE, BACKOFEN, REESE, AND  
KAPOOR**

Claims 6-9, 41, 42, and 50 stand rejected under 35 U.S.C. § 103(a) as obvious over Backofen or Bosse-Platiere and Backofen as applied to claims 1, 40, and 46, and further in view of Reese or Kapoor.

Claims 6-9 depend on claim 1; claims 41 and 42 depend on claim 40; claim 50 depends on claim 46. As we have reversed the rejection of claims 1, 40, and 46, and neither Reese nor Kapoor supplement the deficiencies in these rejections, we are also compelled to reverse the rejections of these claims as well.

**OBVIOUSNESS OVER BOSSE-PLATIERE, BACKOFEN, AND  
KENWORTHY**

Claims 10-13 and 51 stand rejected under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere and Backofen as applied to claims 1 and 46, and further in view of Kenworthy.

Claims 10-13 depend on claim 1; claim 51 depends on claim 46. As we have reversed the rejection of claims 1 and 46, and Kenworthy does not supplement the deficiencies in these rejections, we are also compelled to reverse the rejections of these claims as well.

**OBVIOUSNESS OVER BOSSE-PLATIERE, BACKOFEN, AND YATES**

Claims 14, 18, and 19 stand rejected under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere and Backofen as applied to claim 1, and further in view of Yates.

Claims 14, 18, and 19 depend on claim 1. As we have reversed the rejection of claim 1, and Yates does not supplement the deficiencies in this rejection, we are also compelled to reverse the rejections of these claims as well.

**OBVIOUSNESS OVER BOSSE-PLATIERE, BACKOFEN,  
YATES, AND BUDINGER**

Claim 15 stands rejected under 35 U.S.C. § 103(a) as obvious over Bosse-Platiere, Backofen, Yates as applied to claim 14, and further in view of Budinger.

Claim 15 depends on claim 14 which depends on claim 1. As we have reversed the rejection of claim 1, and neither Yates nor Budinger supplements the deficiencies in this rejection, we are also compelled to reverse the rejection of claim 15 as well.

**OBVIOUSNESS OVER NICE, DAVISON, AND SEEGER**

Claim 82 stands rejected under 35 U.S.C. § 103(a) as obvious over Nice and Davison as applied to claim 38, and further in view of Seeger (Ans. 9).

Claim 82 depends on claim 38. As we have reversed the rejection of claim 38, and Seeger does not supplement the deficiency in this rejection, we are compelled to reverse the rejection of claim 82.

**CONCLUSION**

In summary, the rejections of claims 1, 3-15, 18, 19, 38-51, and 82-88 are reversed.

**REVERSED**

Appeal 2008-3423  
Application 10/157,609

cdc

SCHLUMBERGER RESERVOIR COMPLETIONS  
14910 AIRLINE ROAD  
ROSHARON TX 77583

<b>Notice of References Cited</b>	<b>Application/Control No.</b> 10/157,609	<b>Applicant(s)/Patent Under Reexamination</b>	
	<b>Examiner</b> David Parsley	<b>Art Unit</b> 3600	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS	DOCUMENT SOURCE **	
							APS	OTHER
<input type="checkbox"/>	A						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	B						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	C						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	D						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	E						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	F						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	G						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	H						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	I						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	J						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	K						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	L						<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	M						<input type="checkbox"/>	<input type="checkbox"/>

**FOREIGN PATENT DOCUMENTS**

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS	DOCUMENT SOURCE **	
								APS	OTHER
<input type="checkbox"/>	N							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	O							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	P							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	Q							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	R							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	S							<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	T							<input type="checkbox"/>	<input type="checkbox"/>

**NON-PATENT DOCUMENTS**

*		DOCUMENT (Including Author, Title Date, Source, and Pertinent Pages)	DOCUMENT SOURCE **	
			APS	OTHER
<input type="checkbox"/>	U	The American Heritage Dictionary of the English Language pg. 15 (1976)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	V		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	W		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	X		<input type="checkbox"/>	<input type="checkbox"/>

\*A copy of this reference is not being furnished with this Office action. (See Manual of Patent Examining Procedure, Section 707.05(a).)

\*\*APS encompasses any electronic search i.e. text, image, and Commercial Databases.

THE AMERICAN HERITAGE

# DICTIONARY

OF THE ENGLISH LANGUAGE

WILLIAM MORRIS, Editor

Published by

HOUGHTON MIFFLIN COMPANY / BOSTON  
ATLANTA / DALLAS / GENEVA, ILLINOIS / HOPEWELL, NEW JERSEY / PALO ALTO

Words that are believed to be registered trademarks have been checked with authoritative sources. No investigation has been made of common-law trademark rights in any word, because such investigation is impracticable. Words that are known to have current registrations are shown with an initial capital and are also identified as trademarks. The inclusion of any word in this Dictionary is not, however, an expression of the publishers' opinion as to whether or not it is subject to proprietary rights. Indeed, no definition in this Dictionary is to be regarded as affecting the validity of any trademark.

© 1969, 1970, 1971, 1973, 1975, 1976 by Houghton Mifflin Company  
All correspondence and inquiries should be directed to  
Dictionary Division, Houghton Mifflin Company  
One Beacon Street, Boston, Massachusetts 02107

All rights reserved under Bern and Pan-American Copyright Conventions

ISBN: 0-395-20360-0 (new college edition; thumb-indexed)  
0-395-20359-7 (new college edition; plain edges)  
0-395-24575-3 (high-school edition)

Library of Congress Catalog Card Number 76-86995

Manufactured in the United States of America

Computer-composed by Inforonics, Inc.  
in Maynard, Massachusetts

f group of islands in s in World War II.

[Late Latin, from arth.]

gentior of mankind, man nature: the old

neoclassic style of Robert and James

1 architect and fur-30-1794).

ant, the puttyroot [ie human bodies.]

ne believed to be cc. —adj. 1. Firm

antique. —See Syn-

na(u)nt, diamond, atin adamās (stem

il, steel, diamond, tame, break down

ly. 1. Made of or ss or luster of a

Adam. —n. 1. A A nudist.

-1818. American

-1886. American of John Quincy

"F.P.A." 1881-thor.

l. American his- Adams.

President of the

sixth President of

470 feet high, in 2. A mountain

New Hampshire. New Hampshire

ryngeal cartilage [Translation of

slow crystalline 1 air as a poison

chemist.] t (see). [From enesis 3:7.]

center in south- n, 232,000.

tr. To adjust to come adapted.

fit, from aptus.

ting or of being ill'i-ty, a-dapt'

1 (a-dāp'shən), or process of

nges so as to uation. 3. An ch a species or

to its environ- an to repeated

l or group in dings. —ad'

1. One that ipatibility be- paratus.

or having a tive system." ness n.

unspecialized by different

vironments, the Hebrew cadian ad/d- be dark.]

(see). [He-

r unite so as te (a column or write fur-

t. Used with rmal. 1. To n't add up.

nake sense. die English o + dere, to —add'e-ble,

kick/l lid, ship, dish/

add. 1. addendum. 2. addition; additional. 3. address.

Ad-dams (ād'əmz), Charles Samuel. Born 1912. American cartoonist of the macabre.

Ad-dams (ād'əmz), Jane. 1860-1935. American social worker.

ad-dax (ād'āks') n. An antelope, *Adax nasomaculatus*, of northern Africa having long, spirally twisted horns. [Latin *addāx*, of African origin.]

ad-dend (ād'ēnd', ə-dēnd') n. Any of a set of numbers to be added. [Shortened from ADDENDUM.]

ad-dend-dum (ə-dēn'dəm) n., pl. -da (-dā). *Abbr.* add. Something added or to be added; especially, a supplement to a book. [Latin, neuter of *addendus*, gerundive of *addere*, to ADD.]

ad-dēr (ād'ār) n. 1. Any of various venomous Old World snakes of the family Viperidae, especially the common viper, *Vipera berus*, of Eurasia. 2. Any of several nonvenomous snakes popularly believed to be harmful, such as the hognose snake, or puff adder, of North America. [Middle English *adder*, from an *adder*, mistaken from a *nadder*, Old English *nædre*, snake. See *nētr* in Appendix\*.]

ad-dēr's-mouth (ād'ārz-mouth') n. Any of various orchids of the genus *Malaxis*, having clusters of small, usually greenish flowers. [From the resemblance of the flowers to the opened mouths of snakes.]

ad-dēr's-tongue (ād'ārz-tūng') n. 1. Any of several ferns of the genus *Ophioglossum*; especially, *O. vulgatum*, of the Northern Hemisphere, having a single sterile, leaflike frond, and a spore-bearing stalk. 2. Any of various plants of the genus *Erythronium*, such as the dogtooth violet (see). [From the spike sticking out from the base of the frond of the fern, suggesting a snake's tongue.]

ad-dict (ə-dikt') tr.v. -dicted, -dicting, -dicts. To devote or give (oneself) habitually or compulsively. Used with *to*. See Usage note below. —n. (ād'ikt). One who is addicted, especially to narcotics. [Latin *addictus*, "given over," one awarded to another as a slave, past participle of *addicere*, to award to: *ad-*, to + *dicere*, to say, pronounce, adjudge (see *deik-* in Appendix\*.)]

—ad-dic'tion n. —ad-dic'tive adj. & n.

**Usage:** The past participle *addicted* is regularly followed by *to* plus noun (including the verbal noun ending in -ing, or gerund): *addicted to alcohol*; *addicted to lying*. It is not followed by the infinitive (not *addicted to lie*).

Ad-di-s Ab-a-ba (ād'īs āb'ā-bā). The capital and largest city of Ethiopia, in the center of the country at an altitude of 8,000 feet. Population, 644,000.

Ad-di-son (ād'ā-sən), Joseph. 1672-1719. English essayist and poet.

**Addison's disease.** A usually fatal disease caused by failure of the adrenal cortex to function and marked by a bronzelike skin pigmentation, anemia, and prostration. [Discovered by Thomas Addison (1793-1860), English physician.]

ad-di-tion (ə-dish'ən) n. *Abbr.* add. 1. The act or process of adding. 2. The result of adding; something added; an annex. 3. The process of computing with sets of numbers so as to find their sum. —See Synonyms at *appendage*. —in *addition*. Besides; also; as well as. —in *addition to*. Over and above; besides. —ad-di'tion-al adj. —ad-di'tion-al-ly adv.

ad-di-tive (ād'ā-tiv) adj. Marked, produced by, or involving addition. —n. A substance added in small amounts to something else to improve, strengthen, or otherwise alter it.

ad-dle (ād'l) v. -dled, -dling, -dles. —tr. To muddle; confuse: "My brain is a bit addled by whiskey" (O'Neill). —intr. 1. To become rotten; spoil, as an egg. 2. To become confused. —adj. 1. Mixed up; confused. Usually used in combination: *addle-brained*. 2. Spoiled; rotten. [From Middle English *adel*, rotten, putrid, Old English *adela*, filth, urine, akin to Middle Low German *adelet*.]

ad-dress (ə-dres') tr.v. -dressed, -dressing, -dresses. 1. To speak to. 2. To make a formal speech to. 3. To direct (a spoken or written message) to the attention of. Used with *to*: *address a protest to the Council*. 4. To mark with a destination: *address a letter*. 5. a. To direct (oneself) in speech to. b. To direct the efforts or attention of (oneself): *address oneself to a task*. 6. To dispatch or consign (a ship, for example) to an agent or factor. 7. To adjust and aim the club at (a golf ball) in preparing for a stroke. —n. (ə-dres'; also *ād'rēs* for senses 3, 4). 1. A formal, spoken or written communication: *polite forms of address*. 2. A formal speech. 3. *Abbr.* add. The written or printed indication on mail or other deliverable items indicating destination. 4. *Abbr.* add. The location at which a particular organization or person may be found or reached. 5. Usually plural. Courteous attentions; wooing. 6. Manner or bearing of a person, especially in conversation. 7. Skillfulness or tact in handling a situation. 8. *Abbr.* add. The act of dispatching or consigning a ship, as to an agent or factor. 9. *Computers.* A number used in information storage or retrieval that is assigned to a specific memory location. —See Synonyms at *tact*. [Middle English *addressen*, from Old French *addresser*, from Vulgar Latin *ad-drecciāre* (unattested), to straighten, direct oneself toward: *ad-*, + *directiāre*, (unattested), to straighten, from Latin *directus*, DIRECT.]

ad-dress-ee (ād'rēs-ē', ə-drēs'ē') n. One to whom something is addressed.

ad-dress-er (ə-drēs'ər) n. Also *ad-dres-sor*. A person who or a machine that addresses.

ad-duce (ə-dūs', ə-dyūs', ā-) tr.v. -duced, -ducing, -duces. To cite as an example or means of proof in an argument; bring forward for consideration. [Latin *adducere*, to bring to (someone): *ad-*, toward + *ducere*, to lead (see *deuk-* in Appendix\*.)]

—ad-duce'a-ble, ad-duc'i-ble adj.

ad-du-cent (ə-dūs'sant, ə-dyūs', ā-) adj. *Physiology.* Drawing toward or together.

ad-duct (ə-dukt', ā-) tr.v. -ducted, -ducting, -ducts. *Physiology.* To pull or draw toward the main axis. Used of muscles. [Back-formation from ADDUCTOR.] —ad-duc'tion n. —ad-duc'tive adj.

ad-duc-tor (ə-dūkt'ər, ā-) n. A muscle that adducts. [Latin *adductor*, "a bringer toward," from *adducere*, ADDUCE.]

—ade. Indicates a sweetened drink or, for example, lemonade. [French *-ade*, from Provençal, Portuguese, and Spanish *-ada* and Italian *-ata*, all from Latin *-āta*, feminine of *-ātus*, "furnished with," past participial ending of verbs in *-āre*.]

Ad-e-la (ād'ā-lā). A feminine given name. [Middle English, from Norman French and Medieval Latin *Adela*, from Old High German *adal*, nobility. See *athal-* in Appendix\*.]

Ad-e-laide' (ād'l-ād'). A feminine given name. [French, from German *Adalheid*, from Old High German *Adalheid*, nobility: *adal*, nobility (see *athal-* in Appendix\*) + *-heit*, -hood (see *skai-* in Appendix\*.)]

Ad-e-laide' (ād'l-ād'). The capital of South Australia, an industrial city in the southeast and the oldest settlement in the state. Population, 742,000.

A-dē-lie Coast (ə-dā'lē). A region of Antarctica on the coast of Wilkes Land, under French sovereignty since 1938. Also called "Adélie Land."

A-dē-lie penguin (ə-dā'lē). A common Antarctic penguin, *Pygoscelis adeliae*, of medium size, with white underparts and black back and head. It lives and breeds in large exposed rookeries.

Ad-e-line (ād'l-in'). A feminine given name. [Middle English, from Norman French *Adeline*, probably diminutive of *Adela*, ADELA.]

—adelphous. *Botany.* Indicates possession of one or more groups of stamens; for example, *diadelphous*. [New Latin *-adelphus*, "having the stamens grouped together (in a 'brotherhood')." from Greek *adelphos*, brother. See *gwelth-* in Appendix\*.]

a-demp-tion (ə-dēmp'shən) n. *Law.* The disposal by a testator of specific property bequeathed in his will so as to invalidate the bequest. [Latin *ademptio*, a taking away, from *adimere* (past participle *ademptus*), to take to (oneself), take away: *ad-*, toward + *emere*, to buy, "take" (see *em-* in Appendix\*.)]

A-dēn (ād'n, ād'n). Also *Aden Colony*. 1. A former British colony, since 1968 part of the People's Democratic Republic of Yemen. 2. A port city and commercial center of the People's Democratic Republic of Yemen, in the southeastern part of the country. Population, 150,000.

**Aden, Gulf of.** The western arm of the Arabian Sea, bounded by Somalia on the south and Southern Yemen on the north.

A-dēn-au-er (ād'n-ou'ər, ād'n-), Konrad. 1876-1967. German statesman; chancellor of West Germany (1949-63).

ad-en-ec-to-my (ād'n-ēk'tō-mē) n., pl. -mies. Surgical excision of a gland. [ADEN(O)- + -ECTOMY.]

ad-e-nine (ād'n-ēn', -in) n. *Biochemistry.* A purine derivative, C<sub>5</sub>H<sub>4</sub>N<sub>6</sub>, that is a constituent of nucleic acid in the pancreas, spleen, and other organs. [ADEN(O)- + -INE.]

ad-e-ni-tis (ād'n-ī'tis) n. Inflammation of a lymph node or gland. [New Latin: ADEN(O)- + -ITIS.]

adeno-, aden-. Indicates a gland or glands; for example, *adenocarcinoma*, *adenoid*. [New Latin, from Greek *adēn*, gland. See *angw-* in Appendix\*.]

ad-e-no-car-ci-no-ma (ād'n-ō-kār'sə-nō'mā) n., pl. -mata (-mā-tə) or -mas. A malignant tumor originating in glandular tissue. —ad'e-no-car'ci-nom'a-tous (ād'n-ō-kār'sə-nōm'a-təs, -nō'mā-təs) adj.

ad-e-noid (ād'n-oid') adj. Also *ad-e-noi-dal* (ād'n-oid'l). 1. Glandlike; glandular. 2. Of or pertaining to the adenoids. —n. Usually plural. Lymphoid tissue growths in the nose above the throat that when swollen may obstruct nasal breathing, induce postnasal discharge, and make speech difficult. [Greek *adenoidēs*: ADEN(O)- + -OID.]

ad-e-noi-dal (ād'ā-noi'dəl) adj. 1. Variant of *adenoid*. 2. a. Having a nasal or constricted tone: *an adenoidal singer*. b. Mouth-breathing or gaping.

ad-e-no-ma (ād'n-ō'mā) n., pl. -mata (-mā-tə) or -mas. An epithelial tumor of glandular origin and structure that is usually benign or of low-grade malignancy. [ADEN(O)- + -OMA.] —ad'e-nom'a-tous (ād'n-ōm'a-təs) adj.

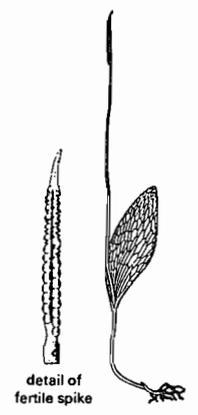
a-dēn-o-sine (ə-dēn'ə-sēn') n. An organic compound, C<sub>10</sub>H<sub>13</sub>N<sub>5</sub>O<sub>4</sub>, that is a structural component of nucleic acids. [Blend of ADENINE and RIBOSE.]

**adenosine triphosphate.** *Symbol* ATP An organic compound, C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>, that is an energy source in many metabolic reactions, especially those involving muscular activity.

a-dept (ə-dēpt') adj. Highly skilled. See Synonyms at *proficient*. —n. (ād'ēpt'). An initiate; expert. [Latin *adeptus*, "having attained (knowledge or skill)," past participle of *adipisci*, to attain: *ad-*, toward + *ipisci*, to reach for (see *ap-* in Appendix\*.)] —a-dept'ly adv. —a-dept'ness n.

ad-e-quate (ād'i-kwit) adj. 1. Able to satisfy a requirement; suitable. 2. Barely satisfactory or sufficient. —See Synonyms at *sufficient*. [Latin *adaequatus*, past participle of *adaequare*, to make equal to: *ad-*, toward + *aequare*, to make equal, from *aequus*, EQUAL.] —ad'e-qua-cy (-kwā-sē), ad'e-quate-ness n. —ad'e-quate-ly adv.

ad-her-e (ād-hir') intr.v. -hered, -hering, -heres. 1. To stick fast together by or as if by grasping, suction, or being glued. Used with *to*. 2. To be devoted as a follower or supporter. Used with *to*: "to adhere to an enemy, is to become an enemy"



adder's-tongue *Ophioglossum vulgatum*



addax



John Adams



John Quincy Adams

t tight/th thin, path/th this, bathe/ü cut/ür urge/v valve/w with/y yes/z zebra, size/zh vision/ə about, item, edible, gallop, circus/ à Fr. ami/æ Fr. feu, Ger. schön/ü Fr. tu, Ger. über/KH Ger. ich, Scot. loch/N Fr. bon. \*Follows main vocabulary. †Of obscure origin.